

BE WHAT YOU WANT TO BE

# SKILL-BASED GAMBLING IN

## AUSTRALIA

Central Queensland University

### **COMMISSIONED BY:**

Gambling Research Australia

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### **Executive Summary**

#### Background

Gambling Research Australia commissioned this research program to assess the implications of incorporating skill-based components into electronic gambling machines (EGMs), and how such innovations may contribute to gambling harm and the risk for developing gambling problems. The primary objective was to investigate the impacts of skill-based features in EGMs on gambling behaviour. In this report, EGMs with skill-based features are referred to as Skill-based Gambling Machines (SGMs). Skill-based gambling machines are a particular kind of electronic gaming machine that permits players to apply their skills, rather than solely relying on chance, to impact the game's result. Unlike conventional EGMs that rely on a random number generator to determine the outcome, skill-based gambling machines offer players the chance to employ their physical dexterity, strategic thinking, or knowledge to enhance their prospects of winning.

In practical terms, the research program aimed to assess how the introduction of skill and apparent skill in SGMs influences:

- 1) illusions of control, chasing losses and other cognitive processes,
- 2) the impact on the pattern of play, increases in the risk of gambling-related harm or exacerbation of problem gambling, and
- 3) the potential appeal of skill-based gambling machines to at-risk groups.

The research questions (RQs) posed by Gambling Research Australia are reproduced at the start of each data-driven study section, below, where they have been principally answered. These questions use the term "gaming" to refer to "gambling" in accordance with industry practice, but the latter term is used by the study authors throughout the report to distinguish gambling from video-gaming. This distinction is important since some survey questions in the project address internet gaming disorder separately from a gambling disorder.

#### Literature Review on Skill-based gambling machines (SGMs)

The literature review revealed that SGMs have been introduced in the US in the last decade and have been recently introduced in Australia on a trial basis. The design of SGMs incorporates aspects of skillbased play, and often mimics the operation of classic videogames. However, concerns have been expressed about the potential for SGMs to contribute to harmful engagement, as they may create false impressions of positive returns and enhance illusions of control. The "VICES" framework, which was developed for understanding the potential risk for automating traditional casino games, is relevant to SGMs. The framework was developed and detailed in the GRA-sponsored report *Innovation in Traditional Gambling Products* (Rockloff et al., 2016). The framework considers the dimensions of (V)isual and auditory features, (I)llusions of control, (C)ognitive complexity, (E)xpedited play, and (S)ocial aspects on game design. According to the reviewed literature, SGMs are expected to be popular among younger and male gamblers who have higher rates of gambling problems and tend to prefer skilled gambling products. A qualitative study found that gamblers can struggle to fully understand how these products work, leading to confusion regarding their operation and an increased risk of problematic and harmful gambling. Nevertheless, there is only limited research on the appeal of SGMs, which highlights the gap that the current research program helps to address.

#### International Environmental Scan

## What skill-based technology for gaming machines is currently available or being considered in Australia or overseas? RQ 1

The research program began with an environmental scan that documented the features of existing skillbased machines (skill-based gambling machines or SGMs), including hybrid machines incorporating skill and non-skill (reel-based) components. Presently, only a few SGMs have been approved in some jurisdictions of Australia, including the states of New South Wales, Victoria, Western Australia and Queensland. Pop Shots Witches Coven is operating in New South Wales, Victoria, and Western Australia, while Megamatch Jelly Kingdom, Megamatch Lucky Harvest, Pop Shots - Witches Coven Deluxe, and Pop Shots - Wild Mermaid Deluxe are approved for use in Queensland. All games have skillbased elements within won bonus-rounds of play but otherwise operate with spinning reels like a traditional Electronic Gaming Machine (EGM). These Hybrid Gaming Machines (HGMs) are the most popular type of skill-based game installed worldwide. In contrast, some games approved for use overseas incorporate skill-based elements throughout play. For instance, the Brookhaven Experiment, which is set within Gamblit's signature Virtual Reality Cube (VRC), offers a game more akin to a high-end arcade experience.

Thematic analysis was used to identify key themes from environmental scan data. The findings show that these games often have intense music and graphics that aim to attract a younger, non-gambling demographic. The integration of skill components and social features in these games may result in expedited play and illusions of control, which increases the risk of gambling problems and harm. The environmental scan highlights the need for further investigation to assess the risks and benefits for players to better inform regulators, legislators and the public.

#### **Expert Submissions and Interviews**

Experts were asked to submit evidence and participate in interviews to aid a current understanding of the topic, and to better inform the design of subsequent research-program components. Interviews were conducted with gambling experts from Australia and the United States (US), and written submissions were provided by stakeholders. The results showed that SGMs offer new opportunities but also come with potential new risks, such as heightened illusion of control over gambling outcomes and additional complexity affecting players' understanding of game outcomes. Moreover, the nostalgic appeal of the skill-based gambling machines (SGMs), often replicating the look and feel of classic videogames, as well as unique social aspects of play, can differentiate them from traditional EGMs. SGMs were seen by US regulators as an effort to "future-proof" the gambling industry. These findings helped aid in the design of survey questions for the subsequent internet surveys of US skill-based players (see below) that provided a better understanding what features are most appealing.

#### **Skill-based Experiment**

How accurate are gamblers in understanding the level of skill involved in skill-based gaming, and the odds of winning? RQ 3

Does skill-based gaming increase the 'illusion of control' and what is the potential impact? RQ 4

What is the potential impact on the pattern of play e.g., length and frequency of playing sessions, player loss per session, loss of control of gambling, gambling intensity and level of immersion? RQ 5

The experiment was designed to evaluate the impact of skill-based gambling games on player gamblingbehaviour, as opposed to only self-reports that can be prone to recall errors and other biases. Nevertheless, some self-report measures were also included for the analyses. This experiment involved 1,260 past-year gamblers, 46.3% female, playing an online skill-based gambling machine (SGM). An SGM was programmed to mimic the look and feel of the classic videogame, SeaWolf™, and a novel alternative we called SpaceFox. A control condition used the same graphics and sounds but presented the SpaceFox game in a more-traditional reel-based arrangement. The correlational results showed that people who already play EGMs and those with gambling problems are the people most attracted to these games. Participants had generally inaccurate assumptions about the operation of both skill-based and reelbased games, with their beliefs being significantly more inaccurate for the skill-based game. In particular, the skill-based game was found to have increased illusions of control compared to the reelbased "control" game and was also more immersive. Nevertheless, the skill-based game showed no evidence of increased betting intensity relative to the reel-based alternative. Lastly, the experiment found that people who are male, young, and who play video games are more likely to gamble more intensively on SGMs. The results suggest that SGMs provide an illusion of control that heightens a gambler's impression that they can affect game outcomes. This belief can put people at risk for greater long-term losses.

#### Interviews with Skill-Based gambling machine Gamblers in the US (Nevada and New Jersey)

What effect does skill-based technology in gaming machines have on gambling-related harm? Is interest in these games associated with problem gambling? RQ 6

### What are the options for mitigating the risks associated with skill-based gaming machine technology? RQ 9

To increase the ecological validity of the project, in-depth interviews were conducted with 20 US residents who regularly gamble on skill-based gambling machines (SGMs). The interview data revealed that the participants were attracted to the machines for their dynamic audio-visual effects, interactivity, novelty aspects, and challenge. They also reported that their motivations for playing included entertainment, nostalgia, and novelty-seeking. The study found that the participants had a poor understanding of the role of skill in determining the game outcomes. Many interviewees overestimated the impact of skill on wins and losses. The study also found that illusions of control were common among participants with a gambling problem. These SGMs may increase gambling harm by encouraging repeated play by vulnerable gamblers. The results emphasise the importance of educating gamblers on the limitations of skill in these machines and the strong role that chance still plays in determining game outcomes.

#### **Skill-based Survey**

Will skill-based gaming attract a new group of people who generally do not gamble? Which gamblers find skill-based gaming machines appealing? RQ 2

## Do different types of skill-based games have different harm implications, for example those based on skill-based features as compared with games where skill is incorporated throughout play? RQ 7

## How do responsible gambling behaviours, such as taking breaks in play, setting limits and so on differ for skill-based gaming? RQ 8

To create a better understanding of who plays skill-based gambling machines (SGMs), and their potential vulnerabilities, a survey was conducted with 1,134 people in the US states of Nevada and New Jersey. This survey allowed an understanding of the association between an interest in skill-based gambling and related outcomes of gambling-related harm and problem gambling, including among vulnerable subsets of gamblers who have exposure to these games. The study also surveyed non-gamblers to better understand the appeal of SGMs amongst people who might not otherwise use traditional EGMs. The results showed that people who play SGMs have higher rates of problem gambling compared to other bettors. Additionally, people with gambling problems showed a greater interest in playing SGMs in the future. The use of protective gambling practices was lower amongst people who played these games. Vulnerable groups, such as people of Hispanic background and those with psychological vulnerabilities, also showed a higher interest in playing SGMs, indicating a potential to worsen pre-existing inequities in society. Almost 40% of non-gamblers showed interest in playing these games, highlighting the wide appeal of SGMs outside of people already interested in traditional gambling products. The findings suggest that skill-based gambling presents some unique risks to existing players and could attract new players, particularly young males.

#### Conclusion

The research program investigated the impacts of skill-based features in EGMs on gambling behaviour. The results showed that the introduction of skill components and social features in these games can increase the risk of gambling-related problems and harm. Skill-based gambling machines (SGMs) can offer new commercial opportunities to operators in the industry, but they also come with potential new risks for consumers, such as heightened illusions of control over gambling outcomes and added complexity that obscures an understanding of the likelihood of winning. In particular, the skill-based experiment found that these games provide an illusion of control that heightens the impression that gamblers can affect game outcomes, putting people at risk of gambling problems and harm. These findings show that there is a need for strong regulation of SGMs to protect people, including both current gamblers and potential future gamblers. Traditional EGMs already account for the majority of gambling problems in Australia. Adding skill-based features to these machines will amplify the harm they cause in the Australian community. It is particularly important to safeguard vulnerable groups, such as younger and male demographics, from the risks associated with these games.

## Literature review on Skill-based Gambling Machines (SGMs)

The following three chapters—the literature review on skill-based gambling machines (SGMs), the international environmental scan, and the expert submissions and interviews—combine to respond to the following research questions:

Will skill-based gaming attract a new group of people who generally do not gamble? Which gamblers find skill-based gaming machines appealing? RQ 2

What skill-based technology for gaming machines is currently available or being considered in Australia or overseas? RQ 1

#### **Key Findings**

- The convergence of video games and gambling is evident in the trend of "gamblification", where video games include elements of gambling (e.g., loot boxes), and SGMs mimic elements of video games.
- The design features of skill-based gambling machines (SGMs), particularly their potential to create false impressions of positive returns among some gamblers, may contribute to harmful engagement, including problem gambling.
- SGMs may attract non-gamblers: SGMs with intellectual property from popular video games or those based on board games may appeal to people who do not generally gamble.
- Understanding which gamblers are interested in SGMs is an open question: It is important to determine if people with gambling problems and people experiencing gambling-related harm are especially attracted to using SGMs.

#### Introduction

New gambling products are perpetually being developed to gain an edge in the marketplace. The present research investigates a new class of electronic gambling machine (EGM) which incorporates aspects of skill-based play, defined here as skill-based electronic gambling machines (SGMs). SGMs are one of the most recent innovations in EGM design, having been, at the time of writing, licensed for use in only a few jurisdictions including a handful of US states. These states include Connecticut, New Mexico, Nevada, New Jersey, and Oklahoma (Hoskins & Hoskins, 2021; Ofgang, 2017; Pickering et al., 2020), with Nevada and New Jersey being the earliest to grant approvals in 2015 (Larche et al., 2016;

Legato, 2021). In Australia, trials and regulatory sandboxes—machines closely monitored by regulatory authorities in specific locations— are being used to monitor skill-based gambling machines. At the time of writing this report, one SGM had been approved for use in New South Wales, Victoria, and Western Australia (Pop-shots - Witches Coven), while four games had been approved for use in Queensland (Pop-shots - Witches Coven Deluxe, Pop Shots - Wild Mermaid Deluxe, Megamatch Lucky Harvest and Megamatch Jelly Kingdom) (personal communication, Australian gambling regulators).

As will be described later, this new class of machines can be very broad in scope, but one of the key mechanics is to include aspects from video games within the electronic gambling machine. Like many aspects of life, performance on a video game is something which involves an element of experience or skill. Importantly, performance on an SGM's skill-based features, whether video game-based or otherwise, are designed to in some way impact the gambling outcomes or experience produced by the machine. Any new gambling product can have differential effects based on their current involvement with gambling, and so the review will attempt to answer the following research question:

## Will skill-based gaming attract a new group of people who generally do not gamble? Which gamblers find skill-based gaming machines appealing? RQ 2

To answer these questions, literature relevant to skill-based gambling machines (SGMs) was investigated and subjected to a narrative review (Ferrari, 2015). This was done because SGMs are a relatively modern gambling product that are currently only deployed in a few jurisdictions. These facts meant that the alternative of a systematic review, based around key search terms placed into scientific databases, was unlikely to yield any direct hits beyond those already covered in a simple search. Grey literature on the topic is likely to be limited and difficult to capture. The review also more broadly covers a range of gambling literature on international developments in gambling product design, and the extent to which these innovations are relevant to gambler skill or the illusion of control when no skill element is present. A narrative review was chosen as being the most appropriate way to answer the research question since these broader issues are clearly relevant to contemporary understanding of the topic.

#### Background

The purpose of this section is to present a contextual overview for the literature review that follows, with relevant citations as necessary. The design of gambling machines evolves with technology. The first gambling machines were designed in the late 19<sup>th</sup> century and were based on three mechanical spinning reels and a single "payline", where two or more matching symbols produced a payout to the gambler

(Livingstone, 2017). These first machines were popular with gamblers and low-cost for gambling operators to maintain and operate. Nevertheless, there have always been significant incentives for developers to innovate their design to draw in new generations of gamblers. One significant shift was the move from mechanical to electronic gambling machines (EGMs) (Livingstone, 2017). EGMs allow for a faster speed of play and more immersive experience, providing a greater array of betting options and have more exciting audio-visual effects than mechanical machines did (Schüll, 2012). The introduction of EGMs facilitated the widespread introduction of multi-line betting as well as multi-way betting (e.g., ReelPower machines where players bet on columns rather than lines, and thus all lines are available for potential wins) but also the enhanced potential for "losses disguised as wins", where a small payout is less than the size of the original bet (Dixon et al., 2010).

However, SGMs are not the first ever gambling machine to introduce some skill-based aspect. The oldest type of gambling machine in the UK is known as a "fruit" machine, which the UK government would not license for use in pubs if they were based purely on chance. For this reason, fruit machines have "nudge" and "hold" buttons, which are intended to create some level of skill to sidestep this regulation (TVC Leisure, 2016). However, these features are largely symbolic, as their skilful use still does not enable any gamblers to have positive long-run chances of winning. Furthermore, they are not the only example of UK gambling machine developers finding creative responses to government regulations. For example, "fixed-odds betting terminals" are only allowed in bookmaker shops on UK high streets because the random events that determine the payoffs to gamblers occur at the bookmaker's headquarters, and not on the premises of the shop itself (Cassidy, 2020). Similarly, in Canada video lottery terminals (VLTs) mimic the operation of EGMs but each play is instead a purchase of an electronic lottery ticket from a fixed pool that is maintained off-site. However, as will be seen later in this review, SGMs can form a much more radical alteration of the typical EGMs structural characteristics than these examples from Australia, the UK and Canada.

One traditional demarcation in gambling is between *unskilled* and *skilled* gambling products. EGMs are one of the key unskilled gambling products of interest due to their international popularity (The Economist, 2017) and strong association compared to other gambling products with problem gambling (Delfabbro, King, Browne, & Dowling, 2020; Productivity Commission, 2010). EGMs are unskilled in that there is nothing that the gambler can do to affect their long-run chances of winning. The probability of each payoff happening is determined by a random draw from the EGM's paytable, which the gambler is unable to affect (Harrigan & Dixon, 2009), and which is designed so that the gambler will lose on average (Woolley, Livingstone, Harrigan, & Rintoul, 2013). This is true no matter the complexity of the EGM, with current EGMs having a number of randomly-determined features, such as bonus rounds involving free spins, which are also determined by the paytable (Rockloff, Stuart, Kim, & Hodgins, 2020). On relatively modern "multiline" EGMs gamblers can choose their number of betting "lines", but this only affects the volatility of returns and not the long-run chances of winning (Harrigan, MacLaren, Brown, Dixon, & Livingstone, 2014).

In contrast, poker and sports/horse betting are two examples of skilled gambling games where different individual bets or overall betting strategies can affect a gambler's odds of winning. This ability to affect outcomes is naturally attractive for highly skilled gamblers, a small set of whom can expect to have positive long-run chances of winning in these skilled gambling games (Kaunitz, Zhong, & Kreiner, 2017; Potter van Loon, van den Assem, & van Dolder, 2015). Skilled gambling games can be especially costly for less-skilled gamblers, by corollary, due to losses being funnelled to both skilful gamblers and to the gambling provider's charge (e.g., the casino's rake in poker, or a bookmaker's overround in sports betting); (Turner & Fritz, 2001). But skilled gambling games can still be enjoyable for people to play irrespective of skill level, as these long-run trends can take extremely long periods of play to realise returns that fall in line with skill levels (Browne, Rockloff, Blaszcynski, Allcock, & Windross, 2015). SGMs are perhaps unique in their ability to blur this demarcation between unskilled and skilled gambling products, making it difficult for gamblers to understand if their skills are leading to better returns.

One issue to touch on briefly is non-skilled hybrid electronic gambling machines where the videogame component is confined to a mini bonus-game within a purely random EGM. An example of this type of hybrid machine is "Bloomtopia" by Chill Gaming. Bloomtopia is a regular EGM with a side feature or bonus game. Along with winning points, the player can also win 'water', 'sunshine' and 'seeds' which are a resource the player can use to improve their 'garden' (a graphic of a garden to the side of the EGM reels). There is no skill element to growing the garden, and the garden side game has no impact on the outcome of the EGM or the money the player can win or cash out. There is potential that these games may hold an added attraction for certain people as there are elements that superficially resemble video or mobile phone games (such as Farmville). However, including these types of games in the current review and environmental scan on skill-based gambling games would create confusion as these types of games cannot easily be compared to games that clearly suggest the need for skill. Hence, these types of games have not been included in this review and the following chapter's environmental scan.

The ability of SGMs to blur the boundary between skilled and unskilled gambling products, and the appearance of the potential for positive long-term returns in SGMs, can be illustrated via the machine that might be the first ever SGM brought to market. In 2009 the EGM developer International Game Technology introduced an electronic gambling game called "Texas Hold'em Heads Up Poker" (International Game Technology, 2009). This was not a reel-based game (i.e., not a slot or pokie), and instead saw the gambler face off in an actual poker game against a computer opponent. This SGM relied on the fact that computers had already reached a level of skill in that poker format similar to that of the best poker professionals (Newall, 2018) with the documentation of a "perfect" computer player in that poker format announced in the journal *Science* only a few years later (Bowling, Burch, Johanson, & Tammelin, 2015). As the computer poker player in that SGM did not play perfectly, however, any imperfections in its play could hypothetically be exploited by a skilful poker professional to produce positive long-run chances of winning. However, given the high standard of computer play in that poker game, the EGM developer thought it was more likely that the SGM could instead profit from much larger potential imperfections amongst its large and diverse body of players (Christenson, 2010). Marketing material for the poker SGM explained its appeal as follows:

"This intriguing and ground-breaking game is sure to attract and entertain all types of gaming enthusiasts. . . All kinds of players will ante up for this new brand of poker game play." (International Game Technology, 2009), p.15.

#### Features of SGMs that seek to mimic video gaming

Research has demonstrated a number of ways in which gambling and the video gaming industry have increasingly converged (Kim & King, 2020; Kolandai-Matchett & Abbott, 2021). In many instances this convergence has involved video games becoming more like gambling, a trend that has been called "gamblification" (Macey & Hamari, 2022). "Loot boxes", which consist of randomised in-game items that must be purchased using real money are one example of this, and which meet several defining characteristics of gambling in that they cost money and can oftentimes produce items worth less than the purchase price (Drummond, Sauer, Hall, Zendle, & Loudon, 2020). "Social casino games" are another example and involve the playing of traditional casino games such as slot machines purely for points. These points, despite having purely symbolic value, can however also be purchased with real money (Kim, Wohl, Gupta, & Derevensky, 2017). Many SGMs, however, represent a similar trend acting in reverse. They use skill-based video game technology to effectuate gambling rather than simulating gambling games in purely digital form.

Many SGMs mimic video games for their skill-based content. Some SGMs involve first-person shooters video games like Doom or Half-Life. Other SGMs involve third-person fantasy games and role-playing games like World of Warcraft. Other SGMs involve direct replicas of retro video games, such as Pac-Man ---- games which are enduringly popular with video gamers of all ages (Pickering et al., 2020). However, as will be illustrated throughout the remainder of this review, this content varies greatly with respect to its centrality and sophistication. One SGM which has been approved for use in New South Wales, Western Australia and Queensland, "Pop Shots Witches Coven", lies at one end of this spectrum. This game is mainly a multiline slots-based game, while the bonus round determining the user's number of free spins is related to video gaming. In this bonus round, the user must pop bubbles via the machine's touchscreen interface. This videogame feature is relatively simple, and it is relatively easy to obtain the high score on it. These features mean that few gamblers are likely to find this game particularly engrossing, or to think that their ability at the game will produce positive long-run chances of winning for them at the SGM.

Other SGMs can keep this main focus on being a multiline slots-based game but have more engrossing video games for their bonus round content (Hoskins & Hoskins, 2021). One example is the retro video game of Space Invaders, which was a renowned arcade game (Pickering et al., 2020). An SGM with this bonus round might be more attractive to gamblers than the example from the previous paragraph for two reasons. First, the game involves a higher level of complexity and is harder to obtain maximum performance and a resulting high score on it. Second, the game was very popular in the past, and so many older people may wish to play it for nostalgic reasons. This simple formula of placing various games within the bonus round of a multiline slots-based game can potentially appeal to many different users, with for example a first-person shooter game being one game which might appeal to a different, and potentially younger demographic (Pickering et al., 2020). This is a topic which will be returned to later in this review. However, for now it is sufficient to state that these games, in addition to being more engaging, may also be more likely to make gamblers think that they have positive long-run chances of winning than simpler low-skilled games like Pop Shots Witches Coven.

Other SGMs can be innovative by incorporating multiplayer features. Many of the most popular video games are multiplayer, involving several players who actively compete against one another to test their relative skills. Multiplayer games can be both retro or modern, and therefore of potential appeal to diverse gamers. Importantly, the aspect of relative skill can potentially make multiplayer games of greater interest than single player games, as a game between several highly skilled players can have a

competitive appeal. Presumably, this competitive instinct also underlies the appeal of esports. One multiplayer SGM, for example, is based on the retro videogame Pac-Man and involves up to four players competing to be the last Pac-Man alive who will also win the cash prize (Pickering et al., 2020). This game is an even greater deviation from traditional EGMs, as it does not involve any traditional slots-based play. More aspects of SGM content which mimics video gaming will be discussed in later sections, in cases where they are directly relevant to the remaining topics of this review.

#### Features of SGMs that could contribute to harmful engagement

Compared to other gambling products, EGMs have a strong association with problem gambling (Delfabbro et al., 2020). Many researchers believe that this association is strengthened by numerous design features of EGMs, such as their ability to promote long gambling sessions of continuous play, and the presence of illusory payoffs such as near-misses and losses disguised as wins (Schottler Consulting, 2019). Given that these illusions are most prevalent in multiline slots-based games, it is likely that similar SGMs such as Pop Shots Witches Coven will raise similar issues. However, the unique design features of SGMs may also contribute to other aspects of harmful engagement.

An important issue for SGMs is the potential for their skill-based content to create *false* impressions of the potential for positive returns amongst some gamblers. This might especially be an issue for people with gambling problems, given the number of illusions about chance and skill in gambling present in this cohort (Raylu & Oei, 2004). One illusion that might be particularly relevant to SGMs is the "illusion of control", whereby gamblers misperceive the extent to which elements of choice, mastery, or skill will boost their chances of winning (Clark & Wohl, 2021). The illusion of control is thought to be especially relevant to skilled gambling games, given the various betting strategies that can be chosen that can have some impact on the gambler's chances of winning. However, although some gamblers can marginally improve their outcomes in skilled gambling games, most gamblers will lose money; and losing gamblers can overestimate their level of skill and ability to win in the long run. This illusion is particularly relevant in sports betting, where many gamblers think that their knowledge about the sport provides them with an opportunity to win. However, that knowledge needs to be better than the market's knowledge implied by the current betting odds, inclusive of the provider's overrounds, which is a high standard to beat. Previous studies have shown that expertise about a sport does not necessarily confer better predictive ability of eventual outcomes (Andersson, Edman, & Ekman, 2005). An illusion of control can lead to sports bettors selecting predictably bad bets. Sports bettors with higher levels of illusion of control, for instance, are more likely to customise their own complex bets on several constituent events

(Newall, Cassidy, Walasek, Ludvig, & Meyer, 2020), which are very likely to lose in the long-run due to the high bookmaker profit margin on such long-odds bets (Newall, Walasek, Vázquez Kiesel, Ludvig, & Meyer, 2020).

Given the unique potential for SGMs relative to traditional EGMs to enhance illusions of control amongst people who are already gambling at high levels, it is important to consider previous conceptual frameworks on elements of gambling product design (Armstrong, Rockloff, Greer, & Donaldson, 2017; Livingstone, Woolley, Zazryn, Bakacs, & Shami, 2008; Schüll, 2012). In particular, the "VICES" framework is instructive, as it was initially developed for automated versions of traditional casino games (Armstrong et al., 2017). The dimensions in this framework correspond to "visual and auditory features", "illusion of control", "cognitive complexity", "expedited play", and "social aspects". The relevance of these factors to SGMs, either present or potential, is discussed next.

Traditional EGMs have many audio and visual features, such as congratulatory graphics or sounds that accompany winning bets. It has been shown, for example, that changing the type of sound played to losses disguised as wins bets featuring a mixture of a gain and a larger loss can help gamblers to better understand the overall loss occurring from these bets (Dixon, Collins, Harrigan, Graydon, & Fugelsang, 2015). However, some SGMs use modern technology to create a wholly more immersive visual and audio experience. For example, the "Virtual Reality Cube" uses virtual reality technology to embed the gambler in an immersive game equal to the latest in virtual reality video game technology (Gaudiosi, 2016). The cube also has powerful subwoofer speakers underneath where the gambler stands, making this also an unusual and enhanced audio experience for a gambling game. The cube can even fill with smoke after certain in-game events. All these features are likely expensive for the EGM developer, which may be difficult for the developer to recoup based purely off the gambler's losses. Instead, this game might be developed more to create a spectacle to entice more people to the casino floor, like the spectator element in sports and esports.

Traditional EGMs arguably have less scope to leverage illusions of control in comparison to traditional skilled gambling games such as sports betting. As discussed earlier, the most unique aspect of SGMs relative to EGMs may well be their ability to create enhanced illusions of control. This can potentially be leveraged by many SGMs in different ways. For example, a multiplayer SGM called "Deal or No Deal Poker Special" has multiple choice aspects (Ruddock, 2018). First, gamblers choose a briefcase in a manner like the TV franchise Deal or No Deal that the SGM is loosely based on. This is a purely chance-based aspect of choice, but nevertheless give an illusion of a consequential choice. Subsequently,

gamblers compete with one another to "grab" playing cards to make the best five card poker hand out of the gamblers at the game. This is an aspect of play that does involve some genuine elements of decision making and coordination skill. Just like in sports betting, however, any aspect of potential genuine skill could still be overestimated by gamblers. Last, the gambler with the winning poker hand gets to either win a sure amount of money from their briefcase or open it to win a random amount (again, similar to the choice in the TV franchise). This game involves various aspects of control, some of which either do or do not influence the gambler's long-run chances of winning.

Traditional EGMs can also be relatively low on cognitive complexity, with the only real choice in multiline slot-based games being the choice of the number of betting lines and bet size (Harrigan et al., 2014). This lack of cognitive complexity may be one reason why some traditional EGM gamblers can end up losing track of time in a dissociative state (Murch & Clark, 2021). Although SGMs will undoubtably vary on this dimension, they do have potential for a higher ceiling of cognitive complexity, which is defined here as the perceived potential for making strategic choices. For example, the multiplayer Pac-Man game, and also some example SGMs given in the next subsection based on word puzzles and fairground-type games, all present the player with complex and varied tasks in comparison to traditional EGMs. However, the true level of cognitive complexity (i.e., real rather than perceived) is likely to be less than what is found in genuine skilled gambling games, such as poker and sports/horse betting (Kaunitz et al., 2017; Potter van Loon et al., 2015).

The fast and continuous speed of play is one of the main reasons why traditional EGMs are thought to have such a strong association with problem gambling (Productivity Commission, 2010) given the impulsivity commonly found amongst people with gambling problems (Browne et al., 2019; Ioannidis, Hook, Wickham, Grant, & Chamberlain, 2019). SGMs may show considerable variation on this dimension. For example, word puzzle games could present a much lower number of bets per hour than a traditional EGM, due to the extended break in play from playing the puzzle. But other SGMs could plausibly create faster speeds of play than traditional EGMs. For example, the SGM "Tempest" recreates a classic shooter video game from the Atari console (Next Gaming, n.d). In this game every shot acts as a bet, potentially allowing the gambler to place many bets in a short space of time without giving them much thought. Paradoxically, this is a gambling machine where skill can even hurt the gambler. A greater skill at the shooting aspect will increase the effective speed of play and therefore increase the gambler's theoretical losses for any given bet size. This sort of SGM might be particularly conducive to creating a dissociative state, where a gambler loses track of the amount of money bet and time spent gambling.

Traditional EGMs are also largely solitary, with perhaps the only counterexample being progressive jackpot EGMs, which can see some competition between gamblers on different machines to try and win a jackpot (Li, Rockloff, Browne, & Donaldson, 2016). On the one hand, solitary gambling can be especially risky (Bristow, Bilevicius, Stewart, Goldstein, & Keough, 2018). On the other hand, however, being in a group of gamblers can help normalise risk-taking behaviour and having friends who gamble is a risk factor for problem gambling (Browne et al., 2019). Additionally, gambling games involving several participants, such as poker, can potentially involve more breaks in play than solitary games such as traditional EGMs. Social aspects on gambling are therefore multifaceted, as are the social elements of SGMs arguably vary even within these two categories, with – for example – the single player Virtual Reality Cube being designed to create a public spectacle (Gaudiosi, 2016), whereas the Tempest SGM that is based off a retro Atari game is likely to hold interest only for the gambler engaged with it. The social aspect of SGMs may well evolve over time if one of these two main types of SGMs ends up being more popular with gamblers.

In summary, the content of SGMs is sufficiently varied to create a large potential variation in terms of how their design features may contribute to harmful engagement. However, SGMs based on multiline slots-based games that contain some additional element of immersive skill-based play may be at least as harmful as traditional EGMs, which are considered to be one of the most harmful gambling products (Schottler Consulting, 2019). It is harder to make this prediction about other SGMs with more unique content. However, there are numerous aspects of individual SGMs of this type that could be uniquely harmful in comparison to EGMs, in particular the potential for their skill-based content to enhance illusions of control. It is hard to predict what potentially countervailing effects may occur from other differences from EGMs, such as social aspects or breaks in play.

#### Will SGMs attract a new group of people who generally do not gamble?

The video games market is now larger than the film and music industries combined (BBC, 2019), meaning that the SGMs containing intellectual property from popular video games such as Doom, Pac-Man, or Space Invaders may be effective at attracting people to SGMs who do not generally gamble (Pickering et al., 2020). Yet other SGMs involve games such as word puzzles, which were first played commonly as board games such as Scrabble, but which are now also played by many gamers on mobile devices. Finally, some other SGMs may reflect more basic fairground-type games, such as where a player must shoot balls into a hoop and can win prizes for good performance (Pickering et al., 2020). SGM content as varied as these examples are why this review has highlighted how hard it will be to predict their eventual popularity, and the extent to which they may become associated with problem gambling and gambling-related harm. From this summary of previous literature, it is possible that SGM developers are going through a trial stage of developing many different types of games, with the intention to innovate on the most popular SGMs through subsequent generations of development. It certainly appears to be the case that the non-bonus slot rounds of a majority of current SGMs, or reel-based play, reflect the many years that have gone into traditional EGM development; iterating on popular themes and pay schedules.

If SGMs primarily attract non-gamblers then this appeal, at least initially, presents a lower risk of immediate harm than the other case of SGMs attracting people with gambling problems (Browne et al., 2016). However, any increase of gambling consumption can potentially lead to distal increases in harm (Grun & McKeigue, 2000; Hansen & Rossow, 2008), in particular since some gamblers can rapidly transition from low to high levels of gambling expenditure (Muggleton et al., 2021). Migrants, for example, can experience especially high rates of problem gambling after moving to countries with large commercial gambling sectors such as Australia or the UK, if moving from a country with greater restrictions on gambling (Wardle, Bramley, Norrie, & Manthorpe, 2019). SGMs could potentially be especially attractive to non-gambling groups such as these due to their unique combination of content.

#### Which current gamblers will find SGMs appealing?

While SGMs based on traditional skilled gambling games such as poker do not appear to have taken off in popularity in the way that EGM developers had hoped, the example given earlier of arguably the first SGM from 2009, "Texas Hold'em Heads Up Poker", does demonstrate the critical issue of which demographics SGMs are marketed towards (International Game Technology, 2009). Younger gamblers and male gamblers have above-average rates of gambling problems (Browne et al., 2019) and hence can be strong drivers of gambling revenue. Compared to other gamblers, younger gamblers and male gamblers are more likely to prefer skilled gambling products such as poker (Will Shead, Hodgins, & Scharf, 2008) and sports/horse betting (Andronicos et al., 2015). This can help explain the rationale for International Game Technology's poker SGM, even though that product did not appear to be ultimately successful: to attract a potentially high-spending demographic to a gambling format that they show comparatively less interest in. This may be why the game's marketing material claimed that "all kinds of players" will be interested in the game. Gambling industry reports have suggested that SGMs are popular with younger gamblers when compared to traditional EGMs (Toscano, 2018). An important open question for research is finding out which gamblers are especially interested in SGMs, beyond the intentional skew toward younger ages (Toscano, 2018). Perhaps the most important demographic to understand is whether people with gambling problems and people experiencing gambling-related harm are especially engaged in using SGMs. This is an issue that has been of recent interest to regulators in the UK around the topic of gambling advertising (House of Lords, 2020). Specifically, it is considered dangerous to allow gambling operators to use marketing approaches which induce higher levels of gambling amongst gamblers already experiencing problems. An early review of gambling advertising suggested that there was no evidence that advertising induced people with gambling problems to spend more, and that gambling advertising might only shift a gambler's consumption from one operator to another and therefore not increase the overall amount of gambling consumption, including amongst people with gambling problems (Binde, 2014). However, a later review of the literature concluded that the existing evidence, which mainly focused on gambling advertising content and gamblers' perceptions of advertising, was not strong enough to show conclusive evidence (Newall et al., 2019). Some more recent evidence using an operator dataset of gamblers' behaviour has shown that gambling marketing inducements can prompt increases in gambling expenditure, especially amongst gamblers with higher problem gambling scores (Balem et al., 2021). Evidence such as this can help support the recent greater restrictions placed around gambling marketing in countries such as Italy and Spain (Newall & Xiao, 2021).

Even if people with gambling problems do end up having a disproportionate attraction to SGMs, then it need not be the case that SGMs will necessarily drive increases in gambling-related harm. SGMs can be slower and therefore gamblers with problems may place fewer bets in each session. Additionally, if SGMs serve to mainly displace existing gambling consumption amongst people with gambling problems, and are less harmful than the other gambling products that this group are already engaging in, then SGMs may help to lower gambling-related harm amongst this group. The main way that this mechanism could hold is if SGMs turn out to be less harmful than traditional EGMs. This could occur if the bonus round content of SGMs is less harmful than the bonus rounds common on EGMs. For example, an SGM's bonus round could act as a natural "break in play" (Blaszczynski, Cowley, Anthony, & Hinsley, 2016), allowing gamblers an opportunity to reassess their gambling and potentially quit. This potential for a break-in-play could be the case, as traditional EGMs can for some gamblers lead to a dissociative state where the gambler loses a sense of time passing as they make many bets in quick succession (Murch & Clark, 2021). However, this assumes that the SGM's bonus round does act to reduce a dissociative state. Video game players can also lose track of time during long periods of play (Petry et al., 2014), meaning

that a video game-based bonus round may not necessarily create a natural break in play. Finally, it could also be that SGMs have differential effects depending on the gambler's level of engagement with both the traditional EGM content and the skill-based bonus round, being more harmful than traditional EGMs for some gamblers, but being less harmful for other gamblers.

Due to their novelty and restriction to only a few jurisdictions, there has not been much previous empirical research to answer the question of which gamblers will find SGMs most appealing. A qualitative study suggests that gamblers, at least upon first experiencing an SGM, are likely to show a fair degree of confusion and struggle to fully understand these products (Gainsbury, Philander, & Blaszczynski, 2020). While any individual's reaction to a given SGM is likely to be highly dependent on the content of the SGM, which can vary considerably, it is possible that some gamblers might be attracted to these products, and other gamblers much less so. However, this confusion around SGMs and the level of skill involved, does suggest there may be pathways for people with gambling problems to substantially overrate their chances of winning via the illusion of control (Gainsbury et al., 2020). This account is supported by the results of a self-report study using participants from US states where SGMs are currently legal (Gainsbury, Philander, & Grattan, 2020b). That study found that, in comparison to those who had only used EGMs, gamblers who had used SGMs had: higher rates of problem gambling severity, less objective knowledge of how EGMs work (according to an ad hoc but face valid set of 4 questions), and ironically higher self-reported knowledge of how EGMs work (Gainsbury et al., 2020b). These results add support to the previous sections warning around how various SGM features may interplay with biases common amongst gamblers, and particularly common amongst gamblers with problems. Some other evidence suggests that intention to gamble on SGMs is predicted by both positive attitudes toward SGMs and perceived positive social norms (Gainsbury, Philander, & Grattan, 2020a), which aligns with predictions of the Theory of Reasoned Action (Fishbein, 1980).

One remaining issue is the extent to which any potential harms arising from the unique features of SGMs could be mitigated by providing informative warning labels to gamblers. There is a large body of literature on this topic in traditional EGMs, suggesting that the provision of most information is unlikely to have much effect on gamblers' behaviour (Ginley, Whelan, Pfund, Peter, & Meyers, 2017; Harrigan, Brown, & Barton, 2017). However, it has been suggested that cost of play information can reduce gamblers' behaviour on a simulated EGM when it is appropriately "framed" (Newall, Byrne, Russell, & Rockloff, 2022). The findings of an online self-report survey indicate that participants did not exhibit a difference in positive attitudes towards SGMs or overconfidence in their knowledge about SGMs,

regardless of whether the machine was labelled as having outcomes determined by a mix of skill and chance or not (Philander & Gainsbury, 2020). This last result suggests that further work is needed to see if a more sophisticated warning label can modify relevant aspects of SGM attitudes and behaviour given the variability of designs in the current SGM market.

#### **Discussion and Conclusion**

This literature review was devised with the purpose of providing a preliminary answer, with evidence accumulated to date, to the following question posed by Gambling Research Australia:

## Will skill-based gaming attract a new group of people who generally do not gamble? Which gamblers find skill-based gaming machines appealing? RQ 2(a)

SGMs are an emerging gambling product which uniquely blurs the lines between unskilled and skilled gambling. The novelty of SGMs is one factor which makes it hard to predict their eventual association with problematic and harmful gambling. Another factor is the variability present within existing SGM designs, which may have been designed with quite different segments of consumers in mind, and possibly have differential effects across different types of gamblers. Additionally, SGMs' similarities with EGMs, which have the strongest association with problem/harmful gambling out of all established gambling products (Productivity Commission, 2010), is one reason to expect a potentially similar association with this new gambling product, which is a prediction supported by one of the only empirical studies performed on SGMs to date (Gainsbury et al., 2020b). In addition, SGMs can have a number of unique product features in comparison to traditional EGMs, as highlighted via the VICES framework (Armstrong et al., 2017), which may play on established vulnerabilities amongst people with gambling problems, especially the illusion of control (Clark & Wohl, 2021).

Finally, while SGMs are highly varied in content, and evidence on their popularity is scarce, it appears possible that at least some SGMs could help attract a new group of consumers who generally do not gamble due, for example, to their similarities with video games. Furthermore, whilst empirical evidence is still developing, and with the caveat that SGMs could have varied influences given their broad range of potential design, it appears that people with gambling problems are the group of current gamblers who are most likely to engage with SGMs (Gainsbury et al., 2020b).

## **International Environmental Scan**

### **Key Points**

- Fifty-one unique SGMs were identified and coded in the international environmental scan.
- Visual and auditory events in traditional gambling games have psychological and physiological effects on players, and SGMs often have more sophisticated and intense music and graphics.
- Music with high tempo, strong baseline and suspenseful tone is often observed in SGMs to increase physiological arousal and create time pressure that encourages rapid betting.
- SGMs have an element of skill or perceived skill linked to outcomes, and give players immediate feedback on the application of skills, thus contributing to illusions of control.
- Expedited play in SGMs refers to fast speed of play and ability to gamble large amounts in short time. Many such games have short bet-cycles but still cannot match speed of traditional EGM.
- Some SGMs expedite play by facilitating constant betting, making it difficult for players to keep track of spend increasing the risk of gambling-related harm.
- Social features common in skill-based gambling games include real-time multiplayer engagement, communication, and competition, potentially increasing player spend and the likelihood of harm.
- Skill-based gambling machines vary in their social-utility features, with some designed to attract spectators and others having limited communication options.

### Background

The number of people gambling on traditional gambling products, such as EGMs, has been falling in Australia for the past fifteen years (Browne et al., 2019; Hare, 2015; Hing et al., 2021; Rockloff et al., 2020b). Innovative gambling products have been developed to gain additional players, market share and appeal to new demographics (Armstrong et al., 2016). One such innovation is the integration of components of skill through tasks that require physical or mental dexterity into gambling products. These skill-based gambling games are being rolled out in overseas jurisdictions such as the United States (Pickering et al., 2020). However, caution is being applied in Australia, with some skill-based gambling machines currently being approved either in regulatory sandboxes, where games are closely monitored by the authorities, or as part of a formal trial (personal communication, Australian regulators). However, New South Wales and Queensland have fully approved SGMs in use. There has been minimal investigation targeted at identifying and classifying the current skill-based gambling games in the market and the various components of these games that may result in different patterns of betting. For gambling regulators to make informed decisions about the risks and benefits of approving skill-based gambling games in Australian states and territories, it is essential to establish what constitutes a skill-based gambling product, identify the attributes that make these products distinctive compared to other gambling products, and investigate the experience and concerns of gambling regulators in jurisdictions where these games have been approved. This part of the research program was specifically devised to answer research question 1 posed by Gambling Research Australia:

## What skill-based technology for gaming machines is currently available or being considered in Australia or overseas? RQ 1

#### **Methods**

The international environment scan was a systematic review of the skill-based gambling games available both in the USA and Australia. This task was accomplished in two stages to ensure data saturation. Stage 1(a) was an Australian in-venue visitation to observe and play an available skill-based gambling game approved in Australia (Pop Shots Witches Coven), and Stage 1(b) consisted of reviewing industry publications and online media to catalogue available and emerging skill-based gambling games internationally. Stage 2 consisted of semi-structured interviews with relevant and knowledgeable gambling regulators in the jurisdictions in the US where skill-based gambling games are legalised and in two Australian states where skill-based gambling games are being trialled. See the chapter, 'Expert Submissions and Interviews' for a detailed method, results, and discussion of Stage 2.

The VICES framework, developed by Rockloff et al. (2016) to categorise innovative gambling products, was used to catalogue the skill-based gambling games identified in the international environmental scan. The VICES framework was informed by literature examining the main characteristics of EGMs that influence player behaviour. These characteristics are:

- Visual and auditory enhancements
- Illusions of control
- Cognitive complexity
- Expedited play
- Social customisation

Visual and auditory enhancements refer to sophisticated sounds and graphics designed to create excitement, suspense, and the impression of frequent wins on the gaming floor (Armstrong et al., 2016). Examples of innovative visual and auditory characteristics include 3D graphics and sophisticated musical compositions (Armstrong et al., 2016). These visual and auditory features contribute to increasing gambling intensity, with studies showing that people with gambling problems prefer quality sounds, such as unpredictable modern sound effects (e.g., complex compositions, high-resolution audio) and bright colours (Rockloff et al., 2017), and that simply hearing the 'winning' sounds made by EGMs increases gambling expenditure (Rockloff & Dyer, 2007; Thorne et al., 2016). The winning sounds and accompanying graphics sometimes occur when the 'win' is less than the amount wagered. These are referred to as 'losses disguised as wins' (Dixon et al., 2010) and have come under scrutiny, both academically and legally, for increasing the likelihood of harm to people who gamble (Dixon et al., 2010; Leino et al., 2016; Parliamentary Joint Select Committee on Gambling Reform, 2011).

Illusions of control refer to game features that give players the impression that they can control the outcome. They are often used in games that are completely random and feed into common gambling superstitions or beliefs that skill has an impact on the outcome (Armstrong et al., 2020). Gamblers who possess more irrational beliefs, including in the domain of illusions of control, are more likely to have problems with gambling (Joukhador et al., 2003). Examples of game characteristics that encourage illusions of control include the provision of Communal Player Aide Data (game statistics) (Armstrong et al., 2016) and the active involvement in parts of the game (rather than passive machine-led play) (Stefan & David, 2013).

Cognitive complexity describes the amount of attention that is required of players to gamble on a particular product. EGMs are an example of a gambling product that is very low in the cognitive complexity needed for betting. The gambler does not need to attend closely to the workings of the game, to the point where regulators in most jurisdictions have mandated that players must push the button to start the game, i.e., not simply continue bet without player input (Turner et al., 2021). Other games, such as blackjack and poker, can be far more complex and include aspects of real skill. Apparent cognitive complexity, where the game seems complex to the point where strategic betting seems possible, is attractive to gamblers. However, such apparent complexity can also foster illusions of control over the game outcome if they feel that they have access to advantageous information (Goodwin et al., 2017). If there is a lot of information presented to players that is irrelevant to their bet choices, they may resort to erroneous heuristics that result in riskier gambling (Armstrong et al., 2016).

Expedited play refers to design features that allow faster playing speeds compared to traditional EGMs. Expedited play is associated with an increase in the number of games (i.e., spins or bets) played in an allotted time, which is often coupled with a subjective underestimation of the number of games played (Ladouceur & Sévigny, 2006). High-speed machines are also associated with a reduced likelihood of pausing between games to consider ceasing that gambling session (Loba et al., 2001). Digital gambling products offer ways to speed up play that are not available on the more traditional versions of these products. This is illustrated by digital bingo which allows users to attend to multiple games simultaneously, compared to traditional bingo where the user is constrained to gambling on, at most, a few games at a time (Goodwin et al., 2017). Gambling on multiple games simultaneously, at any fixed bet-size per game, is likely to lead to increased gambling losses over time.

Social customisation refers to the ability to connect with others via the gambling game. The mere presence of other people while gambling can cause people to gamble with greater persistence in the face of losses (Rockloff et al., 2012) . Further, efforts to be seen as a more skilled gambler by others can lead to greater gambling persistence, even in the face of the experimental manipulation of an indefinite losing sequence (Rockloff et al., 2011). In examining video games (often paired with traditional gambling games to create skill-based gambling products), the structural characteristic of video games most positively associated with feelings of addiction is sociability, e.g., access to leaderboards, multiplayer options (Hull et al., 2013). Conversely, gambling with the aim of socialising has been associated with the reduced likelihood of experiencing gambling problems (Rockloff et al., 2017). However, it may be that individual differences in motivations to gamble may account for this reduction in gambling risk rather than the structural features of the game or other factors (Thorne et al., 2019).

Preliminary description	<ul> <li>Product name</li> <li>Manufacturer</li> <li>Game description</li> <li>Mode</li> <li>Number of simultaneous players</li> <li>Level of skill required</li> </ul>
Visual/audio enhancements	<ul> <li>Nature of displays</li> <li>Use of animation</li> <li>Use of audio stimulus</li> </ul>
Illusion of control	<ul><li>Player feedback</li><li>Active vs. Passive Control of Mechanisms</li></ul>
Cognitive complexity	<ul> <li>Structural characteristics (options, features, functions, and information additional to basic game play)</li> <li>Task Complexity (number of choices available to players, number of decisions required)</li> </ul>
Expedited play	<ul> <li>Concurrent games at once</li> <li>Speed of typical game play</li> <li>Game refresh rate</li> <li>Game down-time</li> <li>Maximum and minimum expenditure per game</li> <li>Frequency of reinforcement</li> </ul>
Social customisation	<ul> <li>Privacy</li> <li>Facilitation of social interaction</li> <li>Spectators/audience</li> <li>Competition (shared or independent game mechanism, communal jackpots or prizes)</li> </ul>
Other information	<ul> <li>Nostalgic</li> <li>Type of skill required</li> <li>Extent to which skill determines outcome</li> </ul>

## Table 1. Environmental scan criteria to catalogue skill-based gambling game features inaccordance with the VICES framework
## Design

An international cross-sectional design was used for the international environmental scan. Included in the scan were skill-based gambling games operating in Australia, internationally, and those games that had been developed but were not yet operational in venues.

### Procedure

In Phase 1(a), a researcher visited the Ryde Eastwood Leagues Club in Sydney, New South Wales, to play the skill-based gambling game, Pop Shot Witches Coven. This game is approved in New South Wales and in Western Australia. The Sydney location was chosen due to the researcher's location. The researcher gambled on the EGM for approximately ten minutes, taking notes and pictures of the various features of the game with a mobile telephone. Directly following the venue visit, the researcher entered the data into a shared table (see Appendix A, Table 11, pg. 190) and coded the features according to the modified VICES framework (see Table 1).

In Phase 1(b) a snowballing method was used to scan internet websites from the last five years to identify and catalogue skill-based gambling games that were either currently available in any international venue or had been developed by manufacturers and were advertised for purchase. These websites included:

- gambling product manufacturer websites
- video footage from gambling conventions
- video footage from amateur gamblers
- gambling regulator websites
- industry publications
- technology news websites

Each novel game was logged into a shared table (see Appendix A, Table 11, pg. 190) and coded according to the modified VICES framework (see Table 1). As well as the VICES categories, the table was devised to gather information describing the game, the mode of play, and the number of simultaneous players. Fifty unique skill-based gambling games were identified in the environmental scan.

#### Analysis

Information gathered in Stages 1(a) and 1(b) of the environmental scan was collated and coded by feature. Three researchers participated in the coding to ensure robustness. Product features that were most consistently observed were deemed prominent characteristics and aligned well with the modified VICES framework. Prominent emergent codes that were outside of the VICES framework were added. As skill-based gambling games are new to the marketplace, data on usage was unable to be included in the analysis, hence other indicators of the intended audiences were used, such as commentary in industry publications and identification of the era in which the SGM's theme was based.

#### Results

#### Visual and auditory enhancements

The skill-based gambling game that was found in the international environmental scan to have the most sophisticated visual and auditory enhancements was The Brookhaven Experiment by Gamblit Gaming and Phosphor Games. The Brookhaven Experiment is a highly successful zombie video game that has been adapted to a skill-based gambling game and takes place in Gamblit's signature Virtual Reality Cube (VRC). The VRC is a raised transparent Perspex <sup>®</sup> room lit up with neon lighting and is designed to be placed in the centre of the casino floor. The player wears a virtual reality (VR) headset and uses roombased VR hand controls to play the game. The room can fill with fog to align with what is happening in the game environment and uses an underfloor subwoofer speaker to make the VRC vibrate when shots are fired or explosions occur. The game is projected onto screens around the VRC to encourage spectators. Not only does the player gamble on their success, but the spectators can also place bets on the outcome.

Music with a high tempo, a strong baseline, and suspenseful tone was often observed in skill-based gambling games. This type of music was presumably added to the games to increase physiological arousal and feelings of time pressure. Examples of games where this type of music as a feature are Zforce by Next Gaming, a space shooter game reminiscent of 1980s arcade games, and Cover Fire by Gamblit, a third-person shooter game. Both games contained high tempo music and in-game sound effects that contribute to the overall feel of the game. The immersive experience that the VRC described above offers with sight, sound, smell, temperature, and vibration changes that align with the game experience is likely to exaggerate these feelings of physiological arousal. These multi-sensory experiences currently have unknown influences on player engagement and betting behaviours.

In-game visual and auditory events in traditional gambling games have been demonstrated to have both psychological and physiological effects on gamblers (Anderson, G., & Brown, R. I., 1984; Rockloff, Signal and Dyer, 2007). Losses disguised as wins, accompanied by celebratory sounds, have been demonstrated to elicit both cognitive and physiological reactions from players (Dixon et al., 2015) and players identify EGMs with the sound turned on as far more enjoyable and arousing than EGMs with the sound turned off (Dixon et al., 2014). Physiological arousal is thought to play an important role in the development and longevity of gambling problems, with gamblers generally reacting more strongly to gambling-related cues than non-gamblers (Baudinet & Blaszczynski, 2013; Lole et al., 2020). SGMs identified in the environmental scan often had music and graphics that were more sophisticated and intense than traditional gambling products. Speculatively, this may contribute to an increased risk of gambling harm.

In an industry publication, Gamblit Gaming's Chief Marketing Officer commented that people aged between 21 and 48 years were the most common demographic to visit casinos but that they frequently do not gamble (Carbotte, 2016). Presumably, this demographic visits casinos for the other entertainment on offer, such as dining, bars, night clubs and shows, but are not attracted to the gambling games currently available. The gambling environment in the USA, where Gamblit is based, is very different from the gambling environment in Australia. Casinos in Australia are few, with each state only having one or two, except for Queensland which has four casinos that are, nevertheless, geographically dispersed. In comparison, there are 466 casinos in Nevada, USA, a state with 3.1 million people (US Census Bureau, 2020). These casinos are often frequent destinations for non-gamblers. The hope that conspicuous sights and sounds of innovative SGMs will attract this non-gambling demographic is likely grounded in the unique context of Nevada casinos that attract considerable traffic from people with less interest in gambling.

#### Illusions of control

The purpose of SGMs is for the game to have an element of skill or perceived skill that is linked to the outcome. However, for SGMs to be adopted by the gambling industry, they must have a house edge that ensures profitability. This means that despite the skill element, SGMs are programmed to deliver a mandated return-to-player percentage (please refer to the next chapter, Expert Submissions and Interviews, for more detail). Hence, every game catalogued in the environmental scan offered some illusion of control. The mechanisms through which the illusions of control are fostered are the active control given over to the player during the skill-based portions of the game and the immediate feedback

from the game, allowing the player to adapt their behaviour. An example of a SGM that has a small skillbased element is Jelly Kingdom by Wymac Gaming Solutions. Jelly Kingdom is a traditional EGM with a bonus feature allowing the player to choose a chance- or skill-based bonus game. The chance game is a lucky wheel spin and the skill game is a 'pick three' game similar to the Candy Crush mobile phone game. In this skill-based bonus game, each time the player lines up three or more matching icons, they score points which can result in bonus credits, free EGM games (spins) and prize multipliers. As with other hybrid SGMs, the skill-based element is a small part of the overall game.

However, it is well established in the literature that traditional EGMs are associated with erroneous beliefs (Delfabbro & Winefeld, 2000; Walker, 1992). In addition, people experiencing problems with gambling are more likely than people not experiencing problems with gambling to have irrational beliefs and distorted cognitions about gambling, including illusions of control (Joukhador et al., 2003; Moodie, 2007). Hence, there may be some magnification of risk by incorporating an element that claims to give the player more control into a gambling product that already fosters illusions of control. An example of a more fully integrated SGM is in Nothing But Net by Gameco. In Nothing But Net, a wager is placed at the start of the game and the player uses buttons and joystick to shoot basketballs at the hoop on the screen. Points are awarded based on the difficulty of the shot with the player winning the wager if they acquire a certain number of points. This is reminiscent of classic video games wherein immediate feedback is given for each move on the game controller, with control being perceived as high. Another skill-based gambling game which exemplifies a high control SGM is Deal or No Deal Poker Special, a multiplayer game by Gamblit. Deal or No Deal Poker Special requires a combination of both physical and mental dexterity. Players compete against each other to grab each card that appears on the table to build the best poker hand. An additional feature of this game that gives the player an illusion of control is the ability of the player to choose a 'deal' or 'no deal' with each winning poker hand. At the beginning of the game, after players have chosen their buy-in amount, each player chooses from a selection of closed prize briefcases presented on the screen; presumably choosing the briefcase that they think contains the largest prize. The winner of the poker hand is then offered a choice: to accept a prize offer from the house ('deal') or to open the briefcase that they selected containing a mystery cash amount ('no deal'). These fully integrated SGMs may increase a player's likelihood to believe that they can control the game or that, with practice, i.e., more gambling, they will be able to gain the edge over the house. This is likely to be harmful, with more time spent gambling shown to indicate an increased likelihood of experiencing problems with- and harm from gambling (Dowling et al., 2021; Rockloff, 2012) One caveat for SGMs that is openly at odds with the claim of SGMs rewarding skill is that executing the required skills well, whether requiring either mental or physical dexterity and consequently being more 'successful' at the game, does not necessarily translate to the individual winning more money – or even having a probabilistic likelihood of winning more. In some games, succeeding at a skill portion results only in the placing of a bet. Hence, despite fostering an illusion of control, this control is redundant. For example, Mystery of the Secret Temple by GameCo requires players to match three gemstones to trigger a bet with a random outcome. The same is true of Pac-Man Cash Chase by Gamblit. The player aims to avoid the ghost characters while eating as many pellets as possible. Following a certain number of pellets being eaten (approximately six seconds of play), a bet is triggered on a slot in the bottom corner of the screen. The skill element in these games is therefore superficial, as it is the randomised bet that determines the monetary outcome. In fact, the more skilful the player is at this game, the more bets that are placed and, consequently, the more money that is spent within any fixed period of gameplay.

#### Cognitive complexity

The SGMs that have been developed so far vary in their cognitive complexity. The most simple and common games are those that are added to the bonus rounds of traditional EGMs. For example, one SGM which is approved in Australia, Pop Shots Witches Coven, has a bonus round that consists of the player popping bubbles on the EGM touchscreen. The player must pop as many bubbles as they can in the allotted time, while avoiding bubbles containing a chicken icon, with the aim of accumulating points to win free regular games (i.e., free spins) and multipliers in these games. This task is extremely cognitively simple, relying instead on the skill of dexterity. Other types of games that are simple include those referred to as 'pick three' games. These games are similar to the highly successful social media game, Candy Crush, where a player matches symbols to win or trigger gambles. One example of this type of game is Pop Fish by Gameco, where players tap and match three or more bubbles to win. One added layer of complexity in this game is that wins may include loot boxes which players can gamble on to double their winnings.

In contrast, standalone SGMs that are based more on a video game format are more cognitively complex. For example, Lucked and Loaded by Synergy Blue is a first-person shooter set in a classic gun arcade. Each hit of a particular target triggers a gamble on the slot reel at the bottom of the screen. A 'bonus bounty' is also displayed at the bottom of the screen, and this potential bonus increases every time a gamble is made, irrespective of the gamble outcome. Armour and health bars are also displayed

on the screen, which the player needs to keep note of, as hitting certain characters detract from one's health and hitting other items give armour. There is also a timer bar at the bottom of the screen. Hence, there is a lot of information to which the player must attend. Lucked and Loaded is also a relatively long game in comparison to other SGMs, being five to six minutes long, adding to the mental load.

In general, cognitive complexity involves strategic choices within a game rather than only dexterity. Some games involve both motor performance and strategic choice, but the complexity always implies strategic decisions can be made. Thus, complexity does not refer to complex graphics or story telling within a game, but rather the implication that strategic choices within a game have consequential outcomes that can improve (or decrease) betting performance. In some cases, this complexity is only apparent, since the strategic choices do not meaningfully alter player outcomes. Nevertheless, a complex game necessarily has the possibility of changing player behaviour by virtue of implied strategic play. Complex games can potentially encourage larger bets to take advantage of perceived skill. Moreover, complex games may encourage people to take greater risks, including chasing losses, due to the perception of strategic advantage.

#### Expedited play

Expedited play refers to the speed of play and the related ability to gamble large amounts of money in a short amount of time. SGMs vary widely in their programmatic speed or play, or the ability for players to expedite play. Many games, such as Riches of the Golden Dragon by Gameco, can be over in less than one minute. Riches of the Golden Dragon is a 'pick three' game where players simply have to pick (guess) which is the dragon card out of three cards presented on the screen. Picking a dragon card wins the bet or unlocks other mini games. However, despite these short games, these types of SGMs generally cannot rival the speed of a traditional EGM where a bet can be made every few seconds.

To speed up play and player spend, SGMs such as Missile Control by Next Gaming enable gambles to be made constantly throughout the game, speeding up the rate of theoretical loss. Missile Control, based on the classic Atari game, Missile *Command*, requires the player to defend their city by shooting down enemy missiles. Each time the player shoots a bet is placed, magnifying the speed of play, and subsequently, the amount lost over a set period of time. The expedited play also makes it difficult for the player to keep track of their spend. The player can move on to higher levels which may also encourage prolonged gambling, potentially leading to increased gambling harm (Rockloff, 2012; Dowling et al., 2021). Lucked and Loaded (detailed earlier in the environmental scan) is one of the longer skill-based gambling games, lasting five to six minutes if the player makes it through the entire level without 'dying.' However, this game also places a bet every time the player hits a target, ensuring that gambling speed is high. The main issue that emerged when examining expedited play in SGMs is that keeping track of one's expenditure appears to be complicated by the qualities of many of these games. This is likely to be exacerbated when different characteristics are combined, such as expedited play and increased cognitive complexity. Limit setting and keeping track of how much money one spends on gambling are common ways for people to keep their gambling under control (Currie et al., 2020), so obscuring the ability for people to do this with-in game may increase the risk of gambling harm.

#### Social customisation

Social features are common in many SGMs that were catalogued in the international environmental scan. A common social feature was social utility: aspects of the game that allow players to engage, in real-time, with other players. This mostly took the form of multiplayer live games on the casino floor, where players were in direct competition with each other. For example, a game by Gamblit called Cannonbeard's Treasure is a combination of the popular television game of chance, Deal or No Deal, and blackjack. Up to four players sit at a multiplayer table that has a video screen tabletop. The game buy-in is set by the venue, e.g., \$2 per game. A wheel appears in the centre of the table and randomly selects the amount of money that people are playing for, but still based on the buy-in amount, i.e., most winning amounts are relative to the total buy-in with some being less and some being more; while still in line with the return-to-player (RTP) lifetime regulations. Cards from the deck start to appear on the screen in fast succession and the first player to press their 'grab' button gets that card. If the card is not selected within 1.5 seconds, it disappears. The winner is decided according to the same rules as traditional blackjack. In this game, players communicate with each other, but also compete, and can play in already formed social groups or with strangers.

Pac-Man Battle Casino, a licensed game based on the Pac-Man arcade game, is played on a big screen designed to draw a crowd of spectators. Up to four players can play simultaneously, with players choosing a buy-in amount, like in traditional poker. The pot that the players compete for is not the total of these buy-ins, minus the casino rake, but a random prize pot that is determined by a subsequent wheelspin. The last Pac-Man standing wins the prize pot. This game differs from Canonbeard's Treasure, as it is designed to attract spectators, giving it an additional social feature. Players and the crowd can communicate with each other and create more of an atmosphere or 'hype' around the game. Beat Square by Konami Gaming (described as 'whack-a-mole to music') is another multiplayer social game that accommodates up to 8 players at one time. In this game, players stand in front of their own terminal and hit squares on the screen as they light up. Players must hit the squares in time with the music and each hit receives a score (miss, late, perfect). The player with the most points at the end of the game (approximately 45 seconds) is the winner. This game is also projected above each personal terminal to encourage spectators. Beat Square can also be played as a single player game on its own terminal. This game does not have as many social utility features as other SGMs mentioned above. For instance, players cannot easily communicate with each other due to the loud dance music in the game and the spacing between the terminals when in multiplayer mode (lined up horizontally). However, they are in direct competition with the other players, as in the previous games.

Gambling as a solitary pursuit rather than a social activity, has been associated with an increased likelihood of experiencing problems with gambling (Hing & Russell, 2020; McBride & Derevensky, 2009). However, the opposite has also been found to be true under some circumstances, with social influences increasing gambling intensity (Rockloff et al., 2012). A 2004 study demonstrated that a preference for track betting was one of the strongest predictors of experiencing gambling problems amongst race bettors seven years later (Abbott et al., 2004). This is likely attributable to the social pull of the track, with classic qualitative research finding that track betters talked about the feeling of entering the track grounds as "coming home," and the sense of brotherhood at the off-track betting shops (Custer & Milt, 1985). If certain SGMs are designed as a social activity, encouraging competition and camaraderie, there may be a risk in players increasing their gambling on these types of machines to a point where they experience harm. However, it is important to understand that individuals have different motivations for gambling, and these motivations may feed into whether they choose to gamble alone or with others. It may not necessarily be the gambling product's innate social or non-social design that determines whether one will experience a higher risk of problems. Quinlan et al. (2014) found that those people motivated to gamble to cope with negative emotions were more likely to gamble alone whereas those motivated to gamble by the social aspect are more likely to gamble with others, showing that the motivation to play may be more significant than whether it is social.

#### Nostalgia

A feeling of nostalgia was a theme found in some skill-based gambling games that were either licensed versions of classic arcade games or games created to closely resemble these types of games. Feelings of nostalgia are perceived positively and cast the mind back to enjoyment of the past and, hence, these

games are likely targeted at older Millennials (currently aged up to 38 years) or younger Gen X-ers who grew up playing these arcade games (Delfabbro et al., 2020). Literature from video game research also indicates that nostalgia forms an attraction to certain games (Perreault et al., 2021). An example of one of the nostalgic games identified in the environmental scan is Pac-Man Cash Chase, a licensed skill-based gambling game that has the same characters and mechanics as the original Pac-Man arcade game released in 1980. The betting element consists of the game running an EGM-type gamble in the bottom corner of the screen every time your character accumulates enough points ('eats enough pellets'; a task that takes approximately six seconds). The character also accumulates keys and once a certain number has been accumulated, a jackpot round is unlocked. Another nostalgic game is Arkanoid by Next Gaming, a licensed game that was released as an arcade game in 1986. Arkanoid is a block breaker game where the player moves a paddle horizontally across the bottom of the screen to hit a ball at the rows of bricks above. Each time the player hits (breaks) a brick, a wager is placed, and points are won or lost. The game ends when the player misses the ball.

Feelings of nostalgia may also be present in games that have been adapted from social media games. Although not tapping into games from childhood, these games are familiar and may attract a nongambling demographic, much like social casino games or social EGMs that aim to attract paid players. SGMs found in the environmental scan that closely resemble or are licensed versions of successful social media games include Lucky Words and Catapult King by Gamblit. In Lucky Words, players place a bet at the beginning of each game and are presented with a collection of letters with which they must create different words. Each correct word they create earns them points. Seven-letter words unlock a 'mystery hat' bonus round. Each round takes approximately 30 seconds. In Catapult King, players launch a catapult using the touch screen and try to hit various targets. Each time the player launches the catapult, they can select their bet amount, and they receive a certain number of points for each target hit. Each catapult launch game takes approximately 15 seconds. In these simpler SGMs, there is a high frequency of losses disguised as wins.

There is growing concern about the intersection between gaming and gambling and what this may mean for young people (Derevensky et al., 2021), with gambling industry publications freely touting SGMs as a development aimed at attracting young people (e.g., Casino.org, 2016; Marx, n.d.). Research shows that people who report having ever played free-to-play (simulated) EGM apps are more likely to have gambling problems than those who have never played such apps. In addition, those who played simulated EGMs when they were children (under the age of 13) were more likely to report frequent gambling on paid EGMs when they were underage adolescents (13-18 years) (Rockloff et al., 2020a). Capitalising on existing social media games or games that were popular in previous decades may have the potential to increase the likelihood of these nostalgic gamblers experiencing harm from gambling.

### Most common skill-based gambling games

The international environmental scan catalogued 51 unique SGMs games that have been developed and presented to the marketplace (see Table 10 in Appendix A for a detailed description of each game). Each developer appeared to heavily favour a certain type of game. For example, Gamblit favours games with fully integrated skill components that mimic immersive video games; GameCo appears to specialise in games that are adapted from more basic arcade, video, and social media/mobile phone games; and Wymac Gaming Solutions favours traditional EGMs with bonus skill-based rounds based mainly on dexterity. The most common type of game found in the environmental scan was an adapted version of an existing arcade, video or social media game. However, as detailed in the methodology, a desktop scan was conducted, and results were based on products able to be found on the internet. Hence, we do not know the number of each game present in the market, i.e., there may be a high number of fully integrated skill games that have been developed but only a small number of these may be present on the gaming floor.

As previously described, present Australian regulations have restricted SGMs to EGM-style games with skill-based bonus rounds and these were able to be physically scanned by an Australian-based researcher. Future research on SGM would be prudent to include a physical environmental scan of US-based casinos to ascertain the availability of different types of SGMs, as was conducted on innovative gambling products in Australian casinos (Armstrong et al., 2016).

Table 2 below outlines some of the key observations from the environmental scan organised by VICES features for ease of reference.

VICES Features	Observations	
Visual and auditory enhancements	<ul> <li>SGMs often have more sophisticated and intense graphics and music than traditional gambling products (e.g., Virtual-reality headsets, 3D sound, fogmachine), potentially increasing the risk of gambling harm.</li> <li>Multi-sensory experiences, including 3D visuals, sound, and touch (e.g., fogmachine) have unknown effects on player engagement and betting behaviour.</li> </ul>	
Illusions of control	<ul> <li>Being successful at an SGM does not necessarily translate to winning more money due to the outsized role of chance in outcomes and the potential for playing longer rather than cashing out winnings.</li> <li>More skilful players can be more engaged with SGMs and thus spend/lose more.</li> </ul>	
Cognitive complexity	<ul> <li>In general, cognitive complexity involves strategic choices within a game rather than only dexterity.</li> <li>Complexity refers to the implication that strategic choices within a game have consequential outcomes that can improve (or decrease) betting performance.</li> <li>In some cases, "complexity" is only apparent, since the strategic choices do not meaningfully alter player outcomes.</li> </ul>	
Expedited play	<ul> <li>SGMs generally cannot rival the speed of a traditional EGM where a bet can be made every few seconds.</li> <li>Keeping track of one's expenditure is complicated by rushed gameplay, such as requiring fast reaction times for successful bets.</li> </ul>	
Social Customisation	Some games are played on a big screen designed to draw a crowd of spectators. Games can encourage competition with others.	
Nostalgia	<ul> <li>Some games are based on classic videogames to evoke a sense of nostalgia.</li> <li>Other games replicate the look-and-feel of popular social-media games.</li> <li>Use of themes from popular videogames may serve to draw-in new customers who might otherwise be non-gamblers.</li> </ul>	

## Table 2. Key observations from Environmental Scan

# **Expert Submissions and Interviews**

## **Key Points**

- Skill-based gambling games offer new opportunities and risks.
- The purpose of skill-based gambling machines is to "future-proof" the industry with younger generations interested in video games.
- Skill-based gambling machines can be complex; with strategic play in some games affecting outcomes.
- The visual appeal of SGMs is not fundamentally different from traditional EGMs but nevertheless creates a new nostalgic appeal by frequently mimicking classic video games.
- The nostalgic element of games may contribute to greater intensity when playing.
- Illusion of enhanced control over gambling outcomes is a potential risk.
- Hybrid games combine a traditional reel-based EGM with a skilled component that is usually found only in a bonus round after winning. Regulators suggested the importance of equal odds of success in both components of hybrid games (skilled and unskilled). That is, the skilled portion of play should have the same odds of success as the unskilled portion to avoid encouraging persistence in chasing a bonus round where the skill portion would become available.
- Speed of a game can affect player spending and monetisation.
- Social aspects of games can differentiate skill-based gambling machines from traditional EGMs.

## **Methods**

Please see the previous chapter for the background on this project stage.

## Recruitment

To get a clearer view of stakeholder concerns and regulator experiences relating to SGMs, interviews were conducted with gambling experts and regulators from Australia and the USA in jurisdictions where SGMs are legalised or are being trialled. Written submissions were requested from Australian stakeholders, including from regulators in jurisdictions where SGMs were not legalised. Participants for the expert interviews were recruited via personal networks, recommendations from the project funding body (Gambling Research Australia), and internet searches of Nevada and New Jersey gambling regulators. Participants for the expert submissions were recruited via personal networks and internet searches and included treatment providers, advocacy groups, industry peak bodies, regulators, and industry.

## Procedure

Potential participants were recruited via an email from the interviewer. The email contained information about the project background, aims, and an interview to participate in either a recorded online one-on-one interview or to submit an expert submission. The email also contained a participant information sheet and an informed consent preamble specific to whichever cohort to which the receiver was assigned. Experts who agreed to an interview were then liaised with to schedule a suitable time for an online interview. Experts who agreed to submit an expert submission were provided with the key questions and instructions on how to submit to the online portal. The interviews were conducted remotely from Australia via the Zoom video-conferencing platform. Participants were not provided with any honorarium payment for participating. All interviews were audio-recorded and transcribed via Zoom. Each transcript was checked for accuracy and edited by the interviewer.

#### Discussion guides

The expert interviews were semi-structured and lasted for between 30 and 45 minutes. The discussion guide was developed to align with the research question: What skill-based technology for gaming machines is currently available or being considered in Australia or overseas? (RQ 1). The following were used as guiding questions:

- 1. What types of games are available in your jurisdiction?
- 2. What are the trends in the types of skill-based gambling games that are being developed or for which approval is being sought?
- 3. What games are the most popular? Why do you think this is?
- 4. What features of skill-based games are most relevant to consider regarding player protection, product safety, and harm minimisation?

The expert submissions were guided by the following questions:

- 1. What are the features of skill-based games that most occupy attention regarding regulation?
- 2. What features of skill-based games are most relevant to consider regarding player protection and product safety?
- 3. What broad types of skill-based gaming machines are currently in use, or will soon be developed and seek approval?
- 4. What comments and/or concerns do you have about the research process? How might it be improved?

#### Participants

Four experts working in the USA participated in the interviews (labelled International Expert 1-4). Two experts were from Nevada and two were from New Jersey. All interviewees were senior regulators in their respective state governments, with all of them having over 20 years of experience in the gambling area. One expert had been a member of the state senate and all other experts were either heads of departments or held very senior positions in the regulation bureaus. In the jurisdictions of Nevada and New Jersey, skill-based gambling games are approved only in brick-and-mortar venues and not online. Additionally, only the individuals playing the game are allowed to wager on the outcome. No spectator or other third party can bet on the outcome. It is important to note that Nevada and New Jersey are likely to represent very different marketplaces than most of those in Australia. Nevada is a major gambling destination that has casinos in many of its cities, the most well-known being Las Vegas and Reno. New Jersey is also home to a major casino gambling destination, Atlantic City. It is important to keep this difference in mind when interpreting the data from the expert interviews.

Two senior gambling regulators from Australia participated in the interviews (labelled Australian Regulator 1 and 2). Australian Regulator 1 had over 25 years' experience in gambling regulation and Australian Regulator 2 had 3 years' experience in gambling regulation and a background in policy and law. Both regulators worked in jurisdictions where skill-based gambling games were available in bricks-and-mortar venues.

Four written submissions were received from stakeholders. Two submissions were from gambling regulators (labelled Australian Regulator 3 and 4), one from an industry peak body (labelled Industry Peak Body), and one from a gambling advocacy group (labelled Advocacy Group).

#### Analysis

Interview transcripts and expert submissions were uploaded into NVivo software (Version 20). Two separate analyses were conducted using the same technique, i.e., the interviews and the expert submissions were analysed separately. This division was due to the differences in the questions that were asked of each cohort and the different skill sets that each cohort possessed (the interviewees having direct experience in regulating SGMs and those invited to make submissions having indirect experience). The data was analysed qualitatively using thematic analysis (Braun & Clarke, 2006), with the data being coded according to emergent themes. The interviewer analysed the data which involved rereading the transcripts to increase familiarity with the data. Codes emerged iteratively from the data

and the most pervasive themes were identified. Findings were discussed with a second author to ensure robustness.

#### Ethics

This stage of the study was approved by the Central Queensland University Human Research Ethics Committee (approval number 23377).

## Results

#### **Expert Interviews**

#### Encouraging innovation

Across all interviewees, one of the main reasons cited for approving skill-based gambling games was to ensure the continuing success of the gambling industry. As outlined above, revenue from gambling and from the associated industries is likely to be considered of great importance by these state governments. However, this may also be said of most governments that receive tax income from gambling. The international experts outlined that the regulatory bodies had hoped that licensing skillbased gambling games would increase technological innovation in the sector, and that these developments could then be utilised by other sectors. International experts unanimously expressed that this had not been the case. There was agreement that the SGMs that had been accepted by venues were, by and large, modified EGMs instead of the more sophisticated video game-style gambling products. These modified EGMs contained a skill-based component, usually in the form of a bonus round, where the gambler completed a brief dexterity task, such as arcade-style shooting. Following this, regular EGM play resumed. More sophisticated games were said not to be common at this time in venues.

Most international experts expressed disappointment in the lack of development around SGMs. They had expected to see notable innovation in gambling products and EGM development within a couple of years of approving SGMs. However, it has been nearly six years since states approved skill-based gambling games and this technological innovation has not come to fruition. Some international experts suggested that there appears to be trepidation amongst gambling manufacturers to be innovative, as they have seen earlier SGMs fail to become popular. This was despite regulators working with industry to encourage innovation. There's been a lot of discussion. There's been some attempt at application. That some have been successful. The majority, I'm not certain if I would call it successful. You know, the industry is still trying to find, you know, what's the formula that works – International Expert 4

'Peer-to-peer' online skill-based wagering games are available in the USA, where people can play socially or play for money. When money is involved, players place a set wager, the host platform takes a percentage of this wager, and the winner of the game gets the remaining money. Interestingly, these games are available in all states but are not state regulated, aside from in Ohio. Two international expert informants expressed frustration at this loophole and indicated that their state governments may step in and require these peer-to-peer skill-based gambling games to be regulated like venue-based gambling.

#### Uptake and popularity

The international expert informants described the types of SGMs available in their jurisdictions. These included: a traditional EGM as the base game with a bonus round that requires some form of skill; Candy Crush-style 'pick three' games based on social media games; shooter/fighter/driver games; and arcade-style games. The most popular type of game, according to all the international experts, is the traditional EGM base game with an innovative bonus round. The other types of games, especially the more complex games, were reported not to have been popular, and consequently manufacturers were tending to go back to EGM-style games.

What was unique about [the more complex] games, as opposed to it being in the bonus round, it was the game itself was the skill game component of it, and I'm not certain if that has resonated with the players in the industry. Those games – and we've seen driver games as well, you know, where you drive against other players or drive against AI as the base game – and I'm not certain that those games have resonated, so what we've seen is the skill component moving back to where it is a portion of the bonus game. So that the base game is still a slot game, and then you move the skill type to the bonus round. So instead of it being the primary draw, now it's a secondary component. – International Expert 4

The international expert informants did express some surprise about the limited uptake of SGMs but did reiterate that the reason for the development of skill-based gambling games by the industry is to make money.

There were some [skill-based gambling games] that came in that we thought would be popular. The games where...there was a decent amount of dexterity and we thought, to be honest with you, that could really be the next trend as there was a lot less chance and more skill. So, when we approved the games, we really thought that was going to pave the way, but it really didn't. And I think what the industry is going to decide at the end of the day, it's a business decision. Is it really worth the cost of trying to create a skill game if it's not going to increase revenue for them in any way and so it's tough for us to comment on trends when we haven't seen any for a while. – International Expert 2

SGMs were reported by the international experts to be viewed as a risky investment by venues, whereas traditional EGMs are instead guaranteed revenue providers. For a new game to be taking up space on the gaming floor, there needs to be an assurance that this game will be able to generate at least as much revenue as an existing game that it will be replacing. One example given by an international expert informant was a modified poker game by Gamblit. In this game, up to four players sit at an electronic table with an interactive video tabletop and play a modified version of poker which includes aspects of chance, physical dexterity, and skill. The international expert informant explained that not only is the physical footprint of this game relatively large, the amount of time it takes to place a single bet is high. Therefore, the revenue per game that it would have to generate to justify this large footprint and slow rate of play would also have to be high.

To increase the earning potential of SGMs, given their low rate of play, venues can increase the cost per game. An international expert informant gave the example of a driving simulator skill-based gambling game, where a single game may take one minute to play. However, on a traditional EGM, ten games may have been played in that one minute. In this case, a traditional EGM may have a minimum bet of \$1.50 per game, so over one minute a player could spend \$15 (ten games per minute at \$1.50 per game). For the driving simulator game to have a comparable potential profit-making ability, the minimum bet needs to be \$15 per game. Even though both products are taking \$15 from the gambler in exchange for one minute of entertainment, the car simulator appears to be more expensive to the consumer. This perceived high cost of play is likely to discourage people from playing SGMs. This international expert informant described how the industry is trying to navigate this issue:

What we've seen is manufacturers trying to find that 'sweet spot' between the cost of the game and that entertainment period they're getting for that. And we've seen different vehicles try to do that, different methods, be that from just reducing the initial cost, you know, we'll drop it down to \$5 but now you don't get to [play] for 30 seconds, you only get 10 seconds. You know, try to find that balance so that you get that same [revenue] each day, to other methods of implementing it, in such that skill activities that you conduct, like let's say you're playing a shooter game. Each time you place a shot, an RNG\* event goes off that plays a little slot game. So 'pow' that's a quarter, 'pow' that's a quarter, 'pow' that's a quarter, so that you can still get that [revenue] that you need and get those games per hour or per minute to meet that floor par from the industry. – International Expert 4

\* Random number generator

Overall, enthusiasm by the gambling industry for SGMs was reported to have dampened over the past six years since the games were approved. This sentiment was echoed by an Australian regulator who talked about having seen a focus by gambling manufacturers on skill-based gambling over the last five years but that the initial enthusiasm had been dampened by poor performance in other jurisdictions (i.e., limited uptake by consumers). This poor performance had also been realised in both Australian regulators' jurisdictions where traditional EGMs with skill-based bonus feature were available.

The performance, in terms of player loss and level of turnover we've seen, has been, you know, very low in comparison to other machines in the venue...The players are certainly not gravitating towards the game. Now, whether that's [because] they don't like the visual aspect of the game, whether it's because they've engaged with the feature and don't like the concept of a skill-based feature, I'm not 100% sure. – Australian Regulator 1

The feedback that we've heard is that they aren't particularly popular, to be honest, and that the number of machines that are out there with this game has decreased overtime. And we've certainly seen, you know, 18 months ago obviously Wymac [manufacturer] was pushing a lot of these tests and trying to roll them [skill-based gambling games] out and we've certainly seen them, I would say, they haven't [been] withdrawn but they are certainly not pushing those products quite as much as they were before. – Australian Regulator 2

During the interviews, we were informed that one of the more prolific SGM manufacturers, Gamblit, had recently gone out of business due to SGMs performing far more poorly in the market than predicted. However, we have been unable to verify this information. One international expert believed that, in looking at the development of other new technology products, it is common for there to be a dip in popularity or uptake following the initial hype behind a product. Gartner Inc. coined this dip as the "trough of disillusionment" in their framework, the Gartner Hype Cycle, created to improve the analysis and predictions of the impact of new technologies (Dedehayir & Steinert, 2016). This trough that follows the initial hype of a new product is then followed by a more measured increase in growth. This international expert informant therefore expects the new technology of SGMs to follow this expected cycle of innovative technology and increase slowly in popularity over the next two to five years, despite the initial lower than expected uptake from the public.

#### Attracting younger gamblers

All the international experts consistently reported that SGMs were introduced by industry to attract younger gamblers. It must be noted that a different demographic is likely to be present in the gambling venues in these jurisdictions than which may be present in Australian gambling venues. International experts explained that both Nevada and New Jersey have an older demographic as their main casino patrons, with one international expert saying, tongue-in-cheek, that the dominant demographic was "95 and up" in age. According to a past CEO of Gamblit (a defunct SGM manufacturer), however, the most common demographic visiting casinos, although not necessarily gambling within casinos, was claimed to be persons aged 21-48 (Carbotte, 2016). However, it is important to note that the legal gambling age in the USA is 21 where in Australia it is 18 years old.

Despite the Australian demographic being slightly different from that of Nevada and New Jersey, Australian regulators did speak about EGM gambling as an activity participated in mainly by older adults. One Australian regulator commented that introducing an EGM with a skill-based bonus feature in their jurisdiction had come with challenges due to this dominant demographic.

I do think that part of the problem is probably going to be that these games are obviously a bit more targeted at a younger demographic and we know that gaming machine players skew older. I know Wymac said they had some teething issues with their first edition of [their game] because they, despite the fact that the winnings you could have in that feature were capped, the time limit wasn't. So, they talked about the fact that older people were kind of there with the screen trying to tap the screen for five, six, seven minutes and like propping the arm up because it just wouldn't end. So I get the feeling that it's probably always going to be a mix of both trying to shift a market that is used to the same games they've had forever [and it] is always going to difficult, but also the fact that these sorts of games are, you know, especially your video gamestyle skill-based games, are much more geared towards younger people and that's not predominantly who play gaming machines; especially clubs and things like that where the bulk of our machines are. – Australian Regulator 2 The interviewer asked the international experts if the industry had concerns that gamblers were 'aging out' of the market, i.e., getting to an age where they no longer had the interest or capacity to gamble. All the international expert informants had heard that concern, but it appears that, instead, as people age, they become more attracted to EGM-type products. One international expert believed that until a very technologically savvy generation who demand innovation in gambling products, i.e., the Millennial generation, come to be in this 50+ year age group, the interest in traditional EGMs will remain.

We [Gen X-ers] are more proficient on, you know, iPhones and laptops, more so than the Boomer Generation but I think it's the generation that comes up after us, or even two generations, like the Millennial generation...who were born when smartphones were really commonplace. They don't know a life without computers. They don't know, really, a life without streaming...I think we will see a skill revolution in terms of gambling games just prior to them entering their 50s, right so in the next 20 years, I think we will really see the growth and evolution in skill-based games because they're a generation that requires those products, that grew up with those products, that are not techno-phobic. – International Expert 1

In this way, SGMs were viewed as potential future-proofing the industry but were still a far way off being the main drawcard for regular gamblers.

Many SGMs are seen as close adaptations of free-to-play mobile apps or video games already available online. One international expert informant said that they had not seen much transference from free-toplay versions to SGM versions of the games and cited a lack of interest from these game-players, and the vastly decreased chances of winning on the gambling versions as potential reasons. The Australian regulators also both held similar views that the likelihood of young people transitioning from video games to SGMs was small due to the qualitative differences between playing video games at home and gambling in a venue.

There's been a lot of question marks around whether those people who have enjoyed gaming and gaming-related activities, such as, you know, PlayStation games and what-have-you, will ever look to transition to, sort of, a gaming machine in a venue. There's been a lot of discussion about, these sort of players – might be gamblers but they're not gamblers who want to leave their house and go to a gaming venue and play in these sorts of premises. It's more about that in-house, in-home experience where they're gaming and potentially gambling as a side activity. – Australian Regulator 1 With the video game-style games, again, if you want to play for free you can play at home and if you want to monetise playing video games because you're particularly good at it, you can play esports and probably earn a lot more money doing it than playing a skill-based gaming machine at your local club. – Australian Regulator 2

However, there was anecdotal evidence that one international expert informant had received from the gambling industry that the people playing the new SGMs were new players, not existing EGM gamblers. They had also received information that these players were more likely to be in their 30s rather than aged 40 and upwards. However, in terms of attracting very young gamblers, this appears not to be the case. International experts talked about the decision to approve eSports gambling in casinos as something that was much more successful than SGMs in attracting a younger gambling audience.

[Our demographic] does skew elderly. I mean, that's one of the things, that's one of the reasons we approved what they call eSports, electronic sports video games, to try to appeal to a younger demographic because our demographic is very much mature, for lack of a better word. So, frankly, [skill-based games] are not the type of games that [the] audience wants. They want to be able to press buttons, and traditional chance-based slot machines seem to be what people like here. We offer it. We look at it as it's a business opportunity for you as a casino to try and attract a younger audience, but it hasn't really taken off. – International Expert 3

#### **Player protection**

Player protection was touted by one of the international experts as being the most important aspect of gambling regulation, along with ensuring the industry declared all their revenue. However, the only harm minimisation tools discussed by international experts were general in nature. This included static signage on the casino floor for help services; ensuring patrons were not intoxicated; and explaining that casino staff may approach a person who has been gambling for a long period of time and encourage them to take a break but noting that this is not required by law. Skill-based gambling raised the usual concerns, but respondents did not have any expanded concerns due to the added skill component. It must be noted that the USA does lag Australia in implementing gambling harm minimisation measures. One of the experts described searching for any evidence for the combination of chance and skill posing a higher risk or changing player behaviour compared to traditional gambling, but that they are yet to find any.

The main focus of regulation in the USA was ensuring that the SGMs were fair and that they met their return-to-player required minimum of 75% in Nevada and 83% in New Jersey.

[We] want to make sure that the games follow the mathematical formulations in terms of payout because what we want, what the public policy is in the state...is that the games have to be fair because we want there to be confidence on the part of the patrons who come into our state to gamble – that if they play and they win, they're going to get paid. And if they're playing a game, it's going to be fair. – International Expert 1

All the international experts placed a lot of emphasis on the regulations ensuring that people who gamble understood that the game had a skill component, understood the pay tables, and consented to the legal contract between the player and the gambling product. This understanding and consent was assumed once the gambler had accepted the conditions presented on the information screen.

The prevailing perspective, from a legal perspective, is that gambling is a contract, right? So, the slot machine and the belly glass [the signage above or below the game segment of the machine] give you the terms of the contract. When the player puts the quarter, dollar, whatever it is, into the slot machine, they accept the terms of those contracts, that contract...So the presumption is then that players have full knowledge because they do have the opportunity to look at all of the rules and all of the components of that slot-based play before they ever agree to engage in the gambling activity. – International Expert 1

The international expert informants unanimously believed that the person gambling was making an informed decision about gambling on the product if they had read all the information presented to them. This is contrary to research showing that the way return-to-player percentages are typically communicated to people who gamble result in less than half of those people correctly interpreting the information (Newall et al., 2020). An Australian regulator did express concern that return-to-player concept was difficult for the general public to understand and that, along with static signage advising people that the game included a skill element, there needs to be an understanding that the skill-based element of the game does not significantly change the return-to-player percentage.

I think, clearly, the issue with a skill-based gaming machine is that concern that the player has this belief that they could significantly impact the outcome of the game. And the situation in [our jurisdiction] is that every gaming machine must return a minimum return to players which is about 85% for the general gaming machine network. So, unfortunately, when it comes to skill, there's a very small degree of skill-based games that can contribute to that RTP, just because of the complete variation in what is returned to players... So, it's important that we communicate to the player that, although you have a capacity to influence the game because there's a skill involved, your capacity to significantly influence the return from the game is very minor. – Australian Regulator 1

One expert expressed concern in receiving applications from manufacturers and casinos to use adaptive pay tables for SGMs. Adaptive pay tables differ from the standard fixed pay tables used in current licensed gambling products, such as EGMs. Fixed pay tables pay out according to the same algorithm for each gambling game (e.g., spin) or session. In this way, gambling outcomes are presumably fixed and fair for every player. However, the adaptive pay tables, which the industry expressed interest in using, changed the algorithm depending on the previous players' wins or losses. For instance, if one player does not do as well in the skill game as expected (based on the game hold percentage, i.e., profit percentage), then the next player can get a better payout to keep the return to player percentage as it should be. However, this speaks directly to lending credence to erroneous cognitions that many gamblers possess and that public health campaigns have tried to address.

Erroneous gambling cognitions include entrapment/the gambler's fallacy, of which one such belief is that if the previous gambler on a particular machine loses, then that machine is 'due' for a win. Erroneous cognitions can lead to gambling persistence in the face of losses (due to this belief that the win is coming). People with gambling problems are significantly more likely than people without problems to hold these erroneous beliefs (Joukhador et al., 2003) and in regular EGM gamblers, erroneous cognitions are predictors of high-risk gambling (Hing & Russell, 2020). Adaptive pay tables would essentially make these erroneous cognitions no longer erroneous, which may represent a significant risk in undoing previous campaigns that aimed to educate the public about how gambling products work (Queensland Government, 2020; Victorian Commission for Gambling and Liquor Regulation, 2016). It may be likely that misunderstandings by the public occur regarding which gambling products adaptive pay tables apply to, increasing the risk of harmful gambling.

One priority in crafting the regulation for SGMs outlined by two expert informants was ensuring that the return-to-player percentage for the skill-based part of the game was not substantially out of proportion with that of the chance-based part of the product. The concern here was that people would accept large losses in the traditional gambling portion of the game to reach the skill-based round and recoup those

losses. The expert also speculated an out of proportion likelihood of payout may give gamblers a sense of control over the outcome, which would likely increase the risk of problems.

Making sure that if they're going to allow for a separate payout or a separate type of return-toplayer amount on the skill-based portion, that it's not substantially, like it's not ridiculous, right? So that people don't get this false sense that they don't have to do very well on the chance part of the game because they can kill it on the skill-based game and make a lot of money, right? You want there to be some kind of proportionality between the skill-based payout and then the chance-based payout, too, so that you're not giving people who potentially have a gambling addiction a justification for just engaging in these skill-based games where they may or may not have the success they think they're going to have. – International Expert 1

Hence, the legal requirement for SGMs in this jurisdiction is that there is a fair correspondence between the skill- and chance-based parts of the game. That is, that the skill-based component does not dominate the determination of payouts.

Another concern related to uneven pay tables was that regulators did not want to incentivise people to extend their gambling sessions for longer than they would have on a traditional gambling product. There were concerns that this may occur if the payout for the first few skill-based gambling rounds was higher than for subsequent rounds, hence creating a false impression of the skill required to win on a particular machine. This kind of deceptive practice was said to often be used in enticing people to migrate from social casino games to paid casino games, in that the odds of winning were far higher when playing social games than when playing the paid games.

Like social media games, the free money games typically pay back at 130%, and then once you put your money in, they pay back at 85%. That is not something that we wanted to see translate over into the live gaming industry, precisely for that reason about patron protection. – International Expert 4

A similar concern was voiced by an Australian regulator who was concerned that adding a skill-based element may result in people 'training' to become better at the skill element by extending their gambling session for longer than they usually would, i.e., spending more money than they intended to win more money in the skill-based game.

Although SGMs are not yet approved online in Nevada and New Jersey (only in brick-and-mortar casinos), it is likely that they will be. Some experts expressed the view that online gambling may

represent a higher level of risk for these games than bricks and mortar SGMs. They explained that with online gambling being available 24/7 on one's smartphone or tablet, there is very little ability to completely disengage as there is in a venue. Online gambling providers are required in the USA to allow customers to set time and expenditure limits and to exclude themselves from all sites. However, like in Australia, the uptake of these harm minimisation tools is low, with uptake being at approximately 5%.

The concern always online is responsible gaming, more so than at the casino, believe it or not. At the casino, people get to walk away, they can leave the casino. When you're dealing with your phone, or your tablet, or whatever, we require every operator to offer all sorts of limits: a time limit, a loss limit, a spend limit, that kind of thing. Because you can get carried away and simply sit in front of your computer or your phone endlessly and not leave...It's counterintuitive because you think that being in a casino would be more of a problem for responsible gaming, but it's not. It's really the online one where people get carried away. – International Expert 3

In New Jersey, there is a requirement by statute for online gambling providers to provide a complete set of their gambling data to regulators each year. Regulators then create unique identifiers for every individual so that each person can be tracked across all gambling sites. This is possible in the USA due to gambling patrons having to provide their social security number to create a gambling account, which is a unique number related to the public pension scheme. The regulators then provide this data to researchers to allow them to investigate responsible gambling issues and make policy recommendations based on findings (see Nower et al., 2020 for latest report). As online SGMs are not yet approved, information for these online SGMs is not currently available. This lack of research was also discussed concerning in-venue SGMs, with no experts being aware of any research addressing whether a game based on skill and chance is any more or less addictive or harmful than a game based only on chance.

One Australian regulator noted that there was the potential for SGMs to minimise harm from gambling. This was noted specifically for SGMs that take the form of traditional EGMs with a skill-based bonus feature. This regulator posited that their department was curious as to whether these types of features may constitute a break in play. Breaks in play facilitated by pop-up messages displayed on the screen of EGMs have been demonstrated to have a modest effect in reducing gambling spend (Palmer du Preez et al., 2016) but this is difficult to compare to playing a related gambling game due to pop-up messages often displaying a message directed at reducing time on device. One of the areas where gambling harm can be strongest is where people get into the gambling binge and they're zoned in on the machine and just locked in and don't move from it. And so, something industry has pushed with skill-based games and, it may not necessarily be wrong, is the fact that once you get involved in that skill-based game that's almost, it's not a break in play but it certainly takes people out of that mindset of just sitting watching the spinning reels and getting into that zone. The interactive nature of it is a different mindset that can, potentially, change how people are playing. – Australian Regulator 2

#### Other concerns

One international expert went to pains to point out a key policy regulation that states that players should not be rewarded in any game for human-on-human violence and scenes depicting gore or any gruesome details. For example, shooter games where a person is depicted shooting or hurting another human are not allowed in traditional EGMs or SGMs. However, games where shooting or violence takes place are allowed if that violence is more cartoon-style or fiction-based, such as shooting aliens or targets. The reasons for this ban on human-on-human violence were not discussed but were assumed to be borne out of concern for encouraging antisocial and violent behaviour.

#### Written stakeholder submissions

Written submissions were received from four stakeholders: two gambling regulators, one industry peak body and one advocacy group. Given the mode of data collection and the lack of direct experience with SBGs, these submissions were far less rich than the expert interviews. Overall, the submissions mainly reiterated the themes from the expert interviews, emphasising the need for more research to understand whether SGMs increase the likelihood of harm to players. Concerns raised included SGMs potentially increasing illusions of control; encouraging gamblers to play for longer/spend more money in an attempt to increase skill or to attain a disproportionate reward offered in the skill-based portion; and creating a misunderstanding of how the game and return-to-player works. However, the submission from the advocacy group was novel in that it highlighted that EGMs, the vehicle for skill-based gambling features in Australia, are associated with a high degree of harm from gambling and have been shown to encourage erroneous cognitions through characteristics such as losses disguised as wins. This group was concerned that this may lead to a magnification of the harm from EGMs.

The risk of further cognitive distortions, in a setting where cognitive distortions are already encouraged and fostered, places the addition of 'skill' as a harmful element. – Advocacy Group

Conversely, one regulator stated that their jurisdiction is not considering granting licenses to any SGM that is purely skill-based, i.e., skill-based gambling games must be hybrid games where the dominant game is based on chance. They also flagged that any characteristics that are highly immersive or have the potential to be addictive would raise concerns in their approval process. This includes social features.

Inclusion of social features (e.g., competitive, cooperative or status related) common to video game play, which may motivate players to engage longer (increasing the risk of player losses) and increase gambling persistence even when play loss is experienced. – Australian Regulator

Both the advocacy group and the industry peak body submissions discussed the intended target demographic for SGMs. The advocacy group saw these games as having the potential to entice young people into gambling due to the familiarity of the game and the attraction of making money from an activity in which they already participate.

...it is clear that developers of such gaming platforms are targeting younger users, who also are a more vulnerable group to gambling harm. The impact of incorporating skills-based gaming and gaming types that are more known in young people must be considered in assessing the harm that such a form of gambling might have. In most jurisdictions legislation exists to protect users from inducements. There is the possibility that the addition of skill as an element of gambling may act as an extra inducement and create harm that needs to be considered. – Advocacy Group

The submission from the industry peak body proposed that there was an assumption that the sole purpose of SGMs was to attract a younger demographic to gambling but argued that adults aged 50+ are the 'original' video gamers. It was seen as important to consider the individual style or characteristics of the SGM in how relevant or attractive it is to particular demographics.

The industry peak body also echoed the sentiment that was attributed to industry by an Australian regulator in the in-depth interviews that skill-based features on traditional EGMs may offer a protective break in play. This industry peak body also emphasised education about SGMs for both players and venue staff as being essential for harm minimisation.

Information for players (demonstration /practice modes) and training for staff enabling them to explain how skill-based gaming machine play and outcomes may differ from more traditional, purely chance based, EGMs is likely of import in combatting some of the potential harm minimisation concerns listed. It also plays a role in enabling players to make an informed choice regarding whether to risk money on a game with a skill-based element. – Industry Peak Body

## Discussion

In this phase of the research, which includes the international environmental scan and the expert submission and interviews, we aimed to answer the following research question: What skill-based technology for gaming machines is currently available or being considered in Australia or overseas? (RQ 1). SGMs offer new opportunities to both people who gamble and gambling providers, but also entail new risks. The environmental scan and the expert interviews revealed a wide range of products on offer. Broadly, the risks associated with these new technologies were catalogued following a cognitive-behavioural approach that borrowed from the exploration previously employed with innovated gambling games (Armstrong et al., 2016). Innovated games are versions of traditional casino games that are automated with the use of EGM technology on console devices. The principal purpose of these games is to remove the croupier from the Gambling environment and use casino-space more effectively. Nevertheless, these games were described using the VICES framework based on their ability to influence consumer behaviour through introduction of digital technologies. Similarly, SGMs use digital technologies in ways that can also influence player behaviour.

The visual appeal of these newer games is not fundamentally different from existing games. Enticing animations and sound profiles are staple elements of modern EGM design. However, SGMs do appear to have more sophisticated and modern graphics and sounds which may increase attraction. Nevertheless, the addition of game mechanics allows a unique ability to capitalise on the nostalgic appeal of classic video and arcade games, a characteristic commonly found when cataloguing the SBGs available in the marketplace. People can re-experience not only the look of classic well-loved games, but also the gameplay that they enjoyed in the past. Moreover, due to the skills they had acquired in playing these classic games, players may feel they have special abilities on these games that should translate into betting success. Consequently, this nostalgic element of games may contribute to greater intensity when playing these games, particularly regarding large bet sizes and persistence while losing money.

Illusion of enhanced control over gambling outcomes is a potential added risk for people who gamble on SGMs. US regulators, for example, recognised that hybrid games where there was an EGM element, and a skill-based bonus feature should have relatively equal odds of success in both components. Otherwise, people may be tempted to suffer great losses in the hopes of later recouping them in the bonus round

through application of their skill. In short, games that suggest skill is a high component of success may motivate people to spend through increased bet sizes and persistence.

SGMs can be more or less complex in proposing that application of strategic play may confer better outcomes. Highly complex games suggest that there is something to "figure out" and that application of knowledge will result in better performance. Again, this suggestion that improving one's skills will lead to the player winning more money was seen as potentially harmful by gambling regulators. There was concern that players would attempt to 'train' their skills by gambling for longer on these SGMs and that this may be more likely on the more complex SGMs. In addition, more complex games appear to obscure the amount of money being wagered. This observation, combined with the other VICES features, such as expedited play, is likely to lead to players having difficulty tracking their spending or gambling at a lower intensity, leading to gambling-related harm.

The speed of a game can affect player spending. Our interviews with US regulators indicate that manufacturers have struggled with trying to balance the cost of the products with perceived value by players. As shown in the environmental scan, SGMs often involve slower betting due to the greater lag between the stake and the outcome Therefore, SGMs are hard to monetise without making them appear overly expensive to play due to high minimum bet-sizes. US regulators believed that the speed of play of hybrid machines—traditional EGMs with skill-based bonus features—are more attractive to gambling providers as they appear to offer more value for money to players. However, hybrid games can result, counterintuitively for the player, in a higher player spend per hour due to the speed of play. This expedited play of hybrid machines, coupled with an increased illusion of control due to the perceived skill required, indicates that hybrid machines may be more harmful than the slower paced SGMs. This is opposite to the sentiment expressed by the Australian regulators who saw hybrid machines as being less immersive and, therefore, having less potential for harm.

Social aspects of games are another aspect that can potentially differentiate SGMs from typical EGMs. In many of the games discovered in our search, social skill-based gambling machines were common. Typically, these games had players directly competing with one another. However, regulators have noted that many of these games, such as a driving simulator, were not as popular as they had once believed they might be. Instead, standalone games with spinning-reel mechanics and skill-based bonus games, so-called hybrid games, had come to dominate the successful set of SGMs. The purpose of skill-based gambling machines appears to be to "future-proof" the industry since gambling interest grows as people age. Younger generations are interested in and familiar with video games, and thus should be drawn to SGMs in the future. Although there has been some disappointment in the industry with the low marketplace acceptance of these gambling products, future innovations and the ageing of digital-native populations may yet contribute to their unrealised potential as an innovative entertainment product.

## Subsequent project phases

The analysis of the environmental scan and the expert submissions and interviews had the purpose of improving knowledge of what SGMs are available in the contemporary marketplace, as well as documenting the features of these games that might pose additional risks over traditional EGMs. The subsequent explorations of skill-based gambling machines in the following chapters, notably an experimental investigation of the features of such games, will draw from this interview and submission data, as well as the environmental scan, to better encapsulate both the visual form and the typical mechanics of such games. By drawing on this study, the potentially problematic features of the games can be explored by replicating the key features in a simulated game to see their effects on player behaviour. The present results also informed the content of questions in qualitative research involving US gamblers who have played such games recently. The interviews, submission and environmental scan thus allowed us to formulate questions with knowledge about the make-up and appeal of these games. Lastly, the current results helped us to design survey questions for a larger internet survey of US skill-based players.

# **Skill-based gambling Experiment**

## **Key findings**

- People who already play EGMs are most attracted to skill-based gambling machines (SGMs). In addition, people with gambling problems are most attracted to all features of these skill-based gambling machines.
- People were inaccurate in their assumptions about both the skill-based and reel-based game tested in our experiment. However, their erroneous beliefs were *greater* for the skill-based game; where they showed elevated belief in skill, control, and the utility of practice when evaluating the skill-based game.
- The skill-based game showed increased illusions of control by participants over the reel-based game, and behavioural indicators related to higher long-term losses.
- There was no evidence for overall greater betting intensity being behaviourally induced by skillbased gambling machines. Nevertheless, the skill-based game was rated as more immersive.
- Novel games as well as games that are easy to play (i.e., fewer missed shots) result in behaviours that increase long-term losses. People who are male, young, and who play videogames are likely to gamble more intensively on skill-based gambling machines than other gamblers.

## Background

EGMs have a wide range of attributes that can have an influence on how people interact with the machines. Some machines, within limits proscribed by regulators, may operate faster. EGMs can have 3 reels, 5 reels or more. The games can have a multitude of bet sizes available. Pay-tables and special features can vary dramatically. Often, machines are designed to attract either casual or regular gamblers. The machines designed for casual or occasional players may have more wins, including losses disguised as wins, during regular play. Conversely, games designed to appeal to regular gamblers tend to be "mean," with payouts that are less frequent but wins that are larger to compensate. Beyond these functional characteristics that determine the patterns of bets and winning amounts, EGMs have a variety of skins (i.e., themes) that determine the graphical and sound qualities of the machines.

Given the wide variety of EGMs available, it is important to use an abstract psychological framework with which to evaluate how the qualities that any given machine design is likely to affect player behaviour. The VICES framework (Armstrong et al., 2016) offers one means for analysing innovated gambling products. Innovated gambling products are machines that take traditional table games, such as roulette or craps, and automate them with the use of EGM console technologies. The acronym VICES specifies that computerised gambling games vary along psychologically important dimensions of visual and auditory enhancements, illusions of control, cognitive complexity, expedited play and social customisation. Rockloff et al. (2013) found that features that emphasise illusions of control in automated simulations of Bingo and Roulette induced people to bet faster.

Skill-based gambling is arguably a special case of innovated gambling machines products. For skill-based gambling machines (SGMs), the change (or innovation) to the game is primarily through the introduction of a skill-based element of play. Importantly, however, there is an existing ecosystem of skill-based videogames (including computer and console games) that is already optimised for player engagement, and therefore the new gambling games have often borrowed, and even copied, these games in form and function. Skill-based gambling machines can be analysed with the same VICES framework, since the literature underpinning this theoretical framework is still valid for this new set of games.

Gambling Research Australia has posed several research questions aimed at improving understand of skill-based gambling machines. Specifically, the VICES framework helps to answer RQ 5: "What is the potential impact on the pattern of play e.g., length and frequency of playing sessions, player loss per session, loss of control of gambling, gambling intensity and level of immersion?" This research was also designed to answer questions, detailed below, involving what features of these games are potentially harmful (RQ 7), who is attracted to these new games (RQ 2), how accurate people are in judging the likelihood of winning (RQ 3), and the effects of illusions of control on gameplay (RQ 4).

The present study employed an experimental paradigm, described in detail below, that sought causal evidence on how features of skill-based gambling machines may lead to different behaviours (e.g., bet size, bet speed, persistence) that are in turn related to greater potential for long-term gambling losses. In addition, skill-based gambling machines were contrasted against a similarly themed reel-based EGM-style game with the same payoff structure. This comparison allowed for an examination of both behavioural / betting differences between the two forms, but also subjective judgements about people's attraction to the respective games.

## **Methods**

### Recruitment, Inclusion and Exclusion Criteria, and the Final Sample

Details on recruitment, inclusion and exclusion criteria can be found in the appended Technical Report (see pg. 236). The final sample was 1,159 in the skill-based gambling machine (SGM) conditions, and 101 in the reel-based EGM condition. The skill-based condition required relatively more participants due to the multitude of feature combinations tested, as described in more detail below. Both versions of the game, explained below, only functioned on desktop browsers and not mobile browsers. Thus, participants were required to complete the task via a non-mobile device, such as a PC or Chromebook.

For reasons outlined in the Technical Report (see pg. 236), participants were recruited from two online recruitment sources: Qualtrics and PureProfile. The potential for differences based on these methodological constraints is discussed under the limitations section below. Based on pre-screening surveys conducted by the panel providers, participants were recruited into groups of EGM gamblers, video gamers, players of both games, and players of neither, as described in more detail below. These groupings were intended to ensure an ability to explore player reactions to SGMs based on past experiences with video games and EGMs. The final number of participants in each group from each sample is shown in Table 3 below. Soft quotas were employed to ensure approximately equal numbers of participants from groups. People's reported frequency of EGM play was defined based on use of reelbased EGMs within the last 12 months, while video games were defined based on the use of videogames at least weekly within the last 12 months. The more stringent definition for video game players, used as a quota criterion, was imposed due to the ubiquity of video games in entertainment, where many people have only casual involvement (e.g., playing a video game with their children at Christmas). To qualify for video gaming, participants were given a list of eleven video game categories (e.g., shooting games, multiplayer online battle arena, action-adventure, platformers, social games), and were required to indicate playing at-least weekly for any category, apart from social games (e.g., Word with Friends).

Group	Qualtrics (Skill-based Gambling)	PureProfile (Reel-based EGM)
EGMs in the last 12 months, but not weekly video games	337	33
At-least weekly video games, but no EGMs in the last 12 months	333	34
Both EGMs in the last 12 months and video games at least weekly	212	14
Neither EGMs in the last 12 months nor video games at least weekly	277	20
Total	1,159	101

### Table 3. Number of participants in each group from each sample

## The games

Participants took part in an online survey, hosted on the Qualtrics survey platform, that included a simulated skill-based gambling machine (SGM) or reel-based EGM. Participants were given 100 in-game credits and were told that, in addition to their usual survey compensation, they would receive compensation based on their "winnings" in the game (up to an extra \$6.50). The purpose of this was to increase the salience of the EGM experience. Immediately after the game was completed, participants were informed that they would all receive full compensation from the panel plus maximum possible winnings (an additional AU\$6.50), no matter how much they had won or lost in the game. The purpose of this immediate reveal was to minimise survey-dropout amongst those who had lost.

## Operation of the reel-based game

The *reel-based EGM* was a five-reel EGM with three visible positions for each reel (see Figure 1). An unbroken string of three or more symbols (apart from asteroids) from left to right was considered a win, i.e., any payline paid. This mimics the operation of a popular form of EGM in Australia known as Reel-

Power by Aristocrat. Participants could "bet" either 1, 2 or 5 credits per spin, and they could change the number of credits for each spin. Participants completed 30 spins, with ten of the spins being wins, and 20 being losses, randomised per participant with the constraint that the same outcome could not occur more than five times in a row. All wins paid the same amount, regardless of which symbols formed a winning payline. The reel-based EGM was based on a program previously used by members of the research team (Byrne & Russell, 2019).



Figure 1.The reel-based EGM. Note that asteroids did not count as matching symbols Operation of the skill-based gambling machine (SGM)

The SGM consisted of a game whereby participants fired a torpedo from a ship at the bottom of the screen towards ships moving left to right further up the screen. If a torpedo hit a ship, it was either destroyed the ship (a hit or win) or did not destroy the ship (a dud or loss). If the torpedo missed all ships, or hit an intervening asteroid, it was a miss and registered as "no bet". Like the reel-based EGM, participants could "bet" either 1, 2, or 5 credits per torpedo, and thus could change the amount by selecting a torpedo with associated credits. The game finished after the participant had fired 30 hits or duds, with misses not counting towards the 30 torpedoes (i.e., "misses" meant that no bet was placed, and no credits were won or lost). Like the reel-based EGM, there were 10 hits (wins) and 20 duds (losses), randomised in placement, with the added restriction that the same outcome could not occur more than five times in a row. And like the reel-based EGM, all wins paid the same amount, regardless of the type of ship hit. In short, the operation of the game, in terms of bet sizes and outcomes, was

identical to the reel-based game. Consequently, the "skill" component of the game was *apparent* skill rather than actual skill. The SGM is shown in Figure 2 below, with participants controlling the bottom ship, firing torpedoes through the mines or asteroids to hit the ships above. The SGM was custom designed for this study and was programmed by the design firm *Two Bulls*.

Figure 3 below shows the interface for a win. Like reel-based EGMs, a win was accompanied by a flourish of visuals and music, including an explosion with the number of credits won appearing in the middle of the explosion.




Figure 2. The skill-based gambling machine (SGM), in both the nostalgic (sea-themed) or novel (space-themed) versions



Figure 3. A "hit" in the skill-based gambling machine (SGM). A player has fired a one credit torpedo and won two credits

Misses are a crucial difference between reel-based machines (EGMs) and skill-based gambling machines (SGMs). There is no "miss" in a reel-based EGM; spins can only be wins or losses. This presented a potential issue in the framing of the task for participants, and how the credits operated. In the *reel-based EGM*, when a participant placed a bet, the amount they bet was deducted from their overall pot. If the spin was a loss, their credits did not change any further. If the spin was a win, their credits increased by three times the amount bet, but only after the bet outcome was known. For example, if a participant had 100 credits and bet 5 credits on a spin, when the reels started spinning, the credits would decrease to 95 (i.e., they spent 5 credits to play). When the reels stopped spinning, if they lost, their credits remained at 95. If they won, their credits increased to 110. That is, winnings were framed as triple the amount bet.

The credits worked differently for the SGM, due to the nature of misses that are unique to this skillbased gambling machine (SGM). When the participant fired a torpedo (the equivalent of starting the reels spinning on the reel-based EGM), their credits did not change. Instead, their credits only changed when the outcome of the torpedo was known, with their pot remaining the same for a miss, losing the amount bet for a dud/loss, or increasing by twice the amount bet for a hit. For example, if a participant was on 100 credits, when they fired the torpedo worth 5 credits, they would still see 100 credits in their pot until the torpedo reached its destination. If the torpedo was a miss, their credits would remain at 100. If the torpedo was a dud, it was only once the torpedo exploded that the 5 credits would be spent, compared to a reel-based EGM when the 5 credits would be spent at the start of the spin. For a hit, their credits would increase to 110, framed as double the amount bet. It is important to note that the realmoney outcome is the same for reel-based and skill-based gambling machine (SGM), that is, wins resulted in the player having 110 credits, and losses with the player having 95 credits – but the framing of the wins (triple for reel-based EGMs, double for SGMs) and the losses (credits spent before the outcome compared to credits spent after the outcome) was different across the conditions. In short, the differences were perceptual but not financial.

Both versions of the game were balanced so that if participants bet a consistent number of credits throughout, they would break even (i.e., they would end on the 100 credits that they were initially given to stake). However, even if a participant played the worst possible combination (maximum bet on losing spins/torpedoes, minimum bet on winning spins/torpedoes), they could not lose all their credits. The game was specifically designed this way because a key outcome measure was *persistence*. Persistence is often thought of as continued gameplay, however, due to time constraints and a need to minimise attrition, persistence in this experiment was captured via a final torpedo/spin, which was a double or nothing bet. Participants had the option to take all their credits, believing at this point that the more credits they had, the more compensation they would receive; or they could bet all their credits on one spin/torpedo to double their total credits or lose them all. This was programmed as a 50/50 outcome, with half of the participants who chose to double up being successful, and half losing all credits. In the skill-based condition, if the torpedo missed, as per the main game, this did not count, and they were given another torpedo to fire. Those who took this additional spin were considered to have shown higher persistence compared to those who did not, regardless of whether they won or lost. However, it is important to recognise that this was only a proxy measure for persistence since it may be based on risk-tolerance or risk-preferences as much as a desire to continue gambling.

#### VICES framework for the skill-based gambling machine (SGM)

Five variables were manipulated for the SGM, based on the VICES framework (Armstrong et al., 2016): Visual and auditory enhancements, Illusions of control, Cognitive complexity, Expedited play and Social customisation. These manipulations are described in Table 4 below.

VICES	Term used in results	Version 1	Version 2
Visual and auditory enhancements	Visual	Nostalgic (sea-themed)	Novel (space-themed)
Illusions of control	Skill-level	Skilled	Unskilled (torpedoes cannot miss)
Cognitive complexity	Complexity	Basic	Complex
Expedited play	Speed	Low speed	High speed
Social customisation	Messaging	No messaging	Messaging

 Table 4. Implementation of the VICES framework for the skill-based gambling machine (SGM)

The visual component of the game involved either playing a sea-themed version, where players fired torpedoes at ships and submarines, resembling retro games, or a novel version where the game was set in space. The differences were only visual, with the same music and sound effects being used in both conditions. There are a variety of ways in which the visual and auditory elements could have been manipulated, for instance by turning sounds "on" or "off", that could have influenced the outcomes. Nevertheless, our prior research suggested that the nostalgic element of gameplay appeared to be important to consumers and SGM manufacturers, and thus this element of the visual appeal of games was chosen as the most important factor to examine. These differences are shown in Figure 2 above.

Illusion-of-control was manipulated by players being able to miss (i.e., the torpedo hits an asteroid rather than a ship, or misses all ships completely), vs misses being far less common. This was achieved by having the last row of ships being submerged submarines (sea-themed) or cloaked spaceships (space-themed), that could appear or disappear at any time. These ships were available in all conditions, but for the unskilled condition, if a player fired a torpedo that was going to miss all other ships on the screen, a submarine or cloaked ship would appear in the last row of ships and be struck by the torpedo. This could still be a dud (loss) or hit (win). Misses were still possible, however, through torpedoes hitting asteroids.

Cognitive complexity was manipulated through messaging at the start of the game. In the complex condition, participants were specifically asked to "THINK ABOUT A STRATEGY THAT CAN HELP YOU WIN", while no such message was shown for those in the basic condition (see Figure 4). This prompt was towards the centre of the screen, and the font size changed repeatedly to capture attention. This message was designed to prompt players to consider strategy in their decision-making. The financial aspects of the game, as described above, ensured that no strategy was possible that would make winning more likely.





Figure 4. Cognitive complexity conditions in the skill-based gambling machine (SGM), showing basic (top) and complex (bottom). Note the message in the middle of the screen. This message was animated to better attract attention

Expedited play was manipulated by the game either being a slow- or fast-paced version. The enemy ships and asteroids moved 20% faster than those in the base condition, which made ships harder to hit. Since misses were recorded as "no bet" this manipulation was functionally irrelevant to the payoffs of the game. Functionally, the faster moving ships, being harder to hit, marginally slowed the rate of successful bets being made and thus lengthened the session for players.

Social customisation was simulated as through one-way messages sent to participants implying that they were in a social game. Social messaging conditions included either messaging within the game, giving the appearance that another player had just completed a task, such as achieving a high score, or no messaging. The screenshot below (see Figure 5) shows an example of this messaging in the lower left-hand corner.



Figure 5. Example of a message in the skill-based gambling machine or SGM (see lower left corner)

Importantly, these five variables could be manipulated independently of each other. For example, a player might be allocated to the nostalgic, skilled, basic, low speed and no messaging version of the game, while another might be allocated to the novel, skilled, basic, high speed, messaging version of the game. There were 32 possible combinations of these five variables (2x2x2x2x2 = 32), and participants within each of the quotas for the skill-based game were randomly allocated, via block-randomisation, to one of those 32 possible combinations using the randomiser function in the Qualtrics survey platform.

# Comparison between the reel-based EGM and the implementation of the VICES framework of the skill-based gambling machine (SGM)

Participants in the reel-based EGM condition all played in the same condition as each other; i.e., the VICES framework was not used for the reel-based EGM. However, where possible, the reel-based EGM used elements from the SGM to minimise differences across conditions. For example, the reel-based EGM used visual elements from the novel space-based game. In the reel-based game, misses are not possible, so it is not possible to compare the reel-based and skill-based game in terms of the skill-level component of the VICES framework. Participants were given similar messages at the start of the game to those in the basic cognitive complexity version of the skill-based gambling machine (SGM). Speed of the reel-based EGM was 3 seconds per spin, although delays in reaction time meant that people commonly bet every 4 seconds. The speed was not directly comparable to the SGM because players could spend time moving their ship into position before firing, and the outcome of the torpedo could take different amounts of time, depending on how far up the screen it travelled. The reel-based EGM did not feature any social messaging.

#### Measures

Measures were derived from two sources: standard survey questions before and after the game, and measures of gameplay from the game itself. These measures were the same for both the reel-based and skill-based gambling machine (SGM). The full survey is shown in the appended Technical Report (see pg. 242).

#### Participant information statement and consent

Participants were first shown a screen outlining the nature of the task, including that participation was voluntary and that they could withdraw at any time. Participants were informed that they would be playing a game and could win up to an additional \$6.50 in compensation, depending on how they went

in the game. This represented mild deception, and was approved for the study purpose, along with the rest of the study, by the CQUniversity Human Research Ethics Committee (approval number 23507). Participants were then asked to indicate that they had consented to taking part and were thanked for their time and screened out if they did not consent.

#### Screening questions and quota questions

Participants were asked their age. They were thanked for their time and screened out if they indicated they were under 18. Residence in Australia was also an inclusion criterion, but this was not determined via a question. Instead, this was determined through targeted recruitment and an IP address check, with all participants taking part from an Australian IP address.

Participants were asked how frequently they took part in each of twelve forms of gambling during the last 12 months (*not at all in the last 12 months* to *4 or more times a week*), with EGMs ("pokies") being one of the options. Participants were also asked how frequently they took part in eleven categories of video games, with the same response options. Respondents were then placed into one of the quota buckets depending on their answers (see pg. 241 of the Technical Report).

#### The game

Participants were directed to the game, which was embedded within the Qualtrics survey. They were reminded that they could win up to an additional \$6.50 in compensation, depending on their outcomes. They were instructed to use their keyboard to control the game, and were asked to turn on their volume, as the game included sounds.

At the start of the game, participants were shown an instruction screen, which outlined how the game worked, including which buttons to press. Those in the skill-based condition were also asked to hit some non-moving ships three times, to introduce them to the operation of the game (i.e., how to move the ship left and right, and how to fire torpedoes).

Participants played the game until they reached 30 spins (reel-based) or 30 hits/duds (skill-based), with misses not counting towards the total. Players were then shown their total remaining credits and informed they could take one final double or nothing spin/torpedo. If players opted for the double-or-nothing bet, they were shown one final screen. Please see Figure 6 below for the interface in the skill-based game, with a similar interface in the reel-based game.





#### Figure 6. Double or nothing question and the final mega-torpedo screen (skill-based)

When the game was completed, participants were shown their "winnings", but were told that, to be fair, all participants would receive the maximum possible compensation of an additional \$6.50 on top of their usual survey compensation, if they completed the entire survey.

#### Questions about the game

Participants were asked if they had previously played a game that was like the one game they had just played. They were then asked how important they thought their **skill level** was in determining how

many credits they were able to win (5-point Likert from not important to very important), and how much **control** they were able to exercise in winning (5-point Likert, none to a lot) (cf., Langer & Roth, 1975). They were also asked whether they thought more **practice** at the game would allow them to win more credits (no/yes), and how **immersed** or absorbed they felt in the game (5-point Likert from not at all to very much).

Participants were then asked how much each of the VICES components increased their enjoyment of the game, their desire to play longer, and how much they wanted to play again (5-point Likert, not at all to very much). Specifically, the VICES framework questions asked about the Graphics, Artwork and Sound, Use of skill, Use of strategy, Fast-paced action and Competition with others, the ability to win money, and how each of these related to enjoyment, desire to play longer and how much they wanted to play again (see pg. 247 of the Technical Report).

#### Measures scored during the game

For each spin/torpedo, the game recorded the bet size (1, 2 or 5 credits), when it was fired (number of seconds after the first spin/torpedo), and the outcome (whether it was a win, loss or miss). These data were used to derive the game-measures outlined in the next section.

In addition, the game also recorded whether the participant took the double-or-nothing option, and if they did, whether they won or lost. The game calculated the credits throughout, including the final credit total, which was shown to participants. The game was programmed to capture if participants refreshed their browser during the game. This was used to determine if any participants had attempted to restart the game, to maximise possible credits won. There was no evidence of refreshing.

#### Measure derived from the game

We determined and calculated the following measures based on the bet size, timing and outcome of each spin/torpedo.

- Number of hits/wins, which was 10 for everyone
- Number of losses/duds, which was 20 for everyone
- Number of valid fires, which was the sum of hits/wins and losses/duds, and therefore 30 for everyone
- Number of misses, which was 0 for reel-based EGM participants but potentially more for SGM participants
- Number of fires/shots, which was the total of the above three measures, and therefore 30 for reel-based EGM participants but potentially more for SGM participants

- Total time taken, which was the number of seconds between the first spin/torpedo and the last spin/valid torpedo (i.e., non-miss)
- Total valid bets, which was the sum of credits placed on valid bets (i.e., hits/wins and losses/duds, but not misses)
- Total attempted bets, which was the sum of credits placed on all bets, including misses
- Ratio of misses, which was the number of misses divided by the sum of the number of hits and misses combined. For example, if a person had 34 misses, their ratio would be 34 misses divided by (34 misses plus 10 hits) = 34/44 = .77
- Bet speed (per minute), which was the number of valid bets (hits/wins and duds/losses, but not misses) divided by the total time taken in seconds, multiplied by 60
- Fire rate (per minute), which was the number of spins/torpedoes fired (whether hits/wins, losses/duds, or misses) divided by the total time in seconds, multiplied by 60
- Average bet, which was the total expenditure on valid bets divided by the number of valid bets (i.e., 30 because it did not include misses)

#### Questions about gambling

Participants who indicated gambling on any form of gambling within the last 12 months, regardless of whether they gambled on EGMs, were asked questions about their gambling behaviour. These included typical monthly gambling spend, including online, by telephone mobile and at land-based venues across all gambling forms, whether they considered themselves to be experienced (yes, no), and which gambling forms they conducted online.

Participants who gambled on any form also completed the Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001) and the Short Gambling Harms Screen (SGHS; Browne et al., 2017). The PGSI consists of nine items, with response options "never" (0) to "almost always" (3). Scores are summed on the nine items, for a total between 0 and 27. Participants were then categorised in accordance with the original PGSI cutoffs: non-problem (PGSI = 0), low-risk (PGSI = 1 to 2), moderate-risk (PGSI = 3 to 7) and 'problem' (PGSI = 8 to 27). Cronbach's alpha for the PGSI in the current sample was .96.

The SGHS consists of ten items (Browne et al., 2018), with participants indicating which of ten potential harms they have experienced (no/yes). The number of harms reported is summed for a total between 0 and 10. Cronbach's alpha for the SGHS in this sample was .89. Helpline information was shown immediately under both the PGSI and SGHS questions.

#### Questions about gaming

Participants who took part in any category of video gaming, at any frequency, were asked questions about their gaming behaviour. This included expenditure (including cryptocurrency) on purchasing loot

boxes, betting with skins, playing social casino games or other gambling-style activities where real money cannot be won. Participants were also asked to complete the nine-item Internet Gaming Disorder scale (Petry et al., 2014). The IGD scale is scored by summing how many of the nine items are endorsed. Participants were classified as experiencing Internet Gaming Disorder if they endorse five or more items, but only if the final item ("Did you risk or lose significant relationships, or job, education or career opportunities because of gaming?") was also one of the endorsed items. Cronbach's alpha was .87.

#### Impulsivity and Sensation-Seeking

Participants completed two short measures assessing impulsivity and sensation-seeking, respectively. Impulsivity was assessed using the Brief 8-item version of the Barratt Impulsiveness Scale (BIS-Brief Steinberg et al., 2013). Four items were reverse scored, with higher scores indicating higher impulsiveness. Cronbach's alpha for the BIS-Brief was .79.

Sensation-seeking was assessed by the Brief Sensation Seeking Scale (BSSS Hoyle et al., 2002). The BSSS includes eight questions, such as "I would like to explore strange places", with response options from *strongly disagree* to *strongly agree*. Items were summed for a total score from 8 to 40, with higher scores indicating higher sensation-seeking. Cronbach's alpha for the BSSS in the current sample was .86.

#### Demographics

In addition to age, captured as a screening question, participants were asked their gender (male, female, other), their state or territory of residence, the main language that they speak at home, their Aboriginal or Torres Strait Islander status (Aboriginal, Torres Strait Islander, both, neither), their marital status, their highest level of education, their current work status, and their personal pre-tax income.

### Analysis

The survey was forced response and therefore any missing data was intentional. For example, participants who did not gamble at all were not asked any questions about gambling. An alpha of .05 was used throughout. Game data were checked for outliers, with no substantial outliers found. The outcome of ratio-of-misses had a high negative skew, and therefore was transformed with an exponential function to make it more amenable to analysis using General Linear Models (GLMs).

#### **Results**

The results are organised around the research questions posed by Gambling Research Australia that are addressed by this chapter (specifically, RQs 2, 3, 4, 5 and 7).

#### Demographics

Demographic variables for both the skill-based and reel-based conditions are shown in Table 29 and Table 30, respectively, of the Technical Report (see pg. 236). Both the Qualtrics and PureProfile samples were generally similar to each other in terms of demographics. Mean ages were 51.5 (SD = 16.7, Qualtrics) and 46.7 (SD = 15.6, PureProfile), with slightly more than half being male, and most respondents coming from the most populous states: New South Wales, Victoria, and Queensland. Both samples included people who spoke a main language other than English at home (5 – 9%) and people who identified as Aboriginal or Torres Strait Islander or both (1 – 2.6%). Around two-thirds were married or living with a partner/de facto, and a quarter were single/never married. Both samples also included a broad range of education and work status.

# Will skill-based gaming attract a new group of people who generally do not gamble? Which gamblers find skill-based gaming machines appealing? RQ 2(b)

Table 12 in the Appendix B (pg. 200) shows multivariate test for the association between demographics and valuing the features of a game, including graphics, art and sound, use of skill, use of strategy, fastpaced action, competition with others, and the ability to win money. These were not factors manipulated in the experiment but instead are correlates that could potentially explain why SGMs appeal to different people. To protect against the inflation of type I error rates with many comparisons, only results that proved significant in the multivariate effects were interpreted in the between-subjects test of significance that examined the outcome variables separately. PGSI status, Work status and Group 4 (i.e., past 12-month playing: EGMs, Video games, Both or None) were all related to these outcomes. The construction of the Group 4 variable deviated from the traditional experimental approach, as it relied on pre-existing groups instead of crossed factors. The detailed between-subjects effects are shown in Table 13 in Appendix B (see pg. 200).

Detailing these results, Figure 7 shows the association between PG-status (MR/PG vs. Other) and valuing skill-based game features. People with more gambling problems placed a significantly higher value on all measured features, except for strategy.



Panel A: Marginal Means of Graphics, Artwork and Sound, Skill-based Only

> Panel B: Marginal Means of Use of Skill, Skill-based Only





Panel D: Marginal Means of Competition with Others, Skill-based Only





### Panel E: Marginal Means of The Ability to Win Money, Skill-based Only

#### Figure 7. Effects of PG-status on Valuing Game Features

Note: SE bars shown, marginal means from self-report Likert scale 1-5 (see pg. 247 of the Technical Report).

Figure 8 shows the association between Work status and the valuing of game features. People with work responsibilities placed a greater value on competition.



Marginal Means of Competition with Others, Skill-based Only

#### Figure 8. Effects of work status on Valuing Game Features

Note: SE bars shown, marginal means from self-report Likert scale 1-5 (see pg. 247 of the Technical Report).

Figure 9 shows the association of Group 4 (i.e., what games were played in the last 12 months: EGM only, video games only, both or neither) with valuing <u>all</u> features of gameplay, showing that people who already play EGMs valued the game-features the most.



Panel A: Marginal Means of

Group 4. Hayea in the last 12 months:





Panel D: Marginal Means of Fast-paced Action, Skill-based Only





Panel E: Marginal Means of Competition with Others Skill-based Only

Panel F: Marginal Means of The Ability to Win Money, Skill-based Only



Group 4: Played in the last 12 months?

#### Figure 9. Effects of Group 4 (past games played) on Valuing Game Features

Note: SE bars shown, marginal means from self-report Likert scale 1-5 (see pg. 247 of the Technical Report).

Participants gave ratings for the features of the games; including graphics, art and sound, use of skill, use of strategy, fast-paced action, competition with others, and the ability to win money; on their enjoyment, desire to play longer and desire to play the game again. These mean outcomes are illustrated in Figure 10 below. Note that these results are associations since the manipulated factors are analysed later.



Panel B: Play Longer





Note: SE bars shown, marginal means from self-report Likert scale 1-5 (see pg. 247 of the Technical Report).

#### Figure 10. Enjoyment, desire to play longer and desire to play again by features

Given the similarity of rates of enjoyment, desire to play longer, and desire to play again, as shown by similar mean ratings in Panels A, B and C in Figure 10, these outcomes were averaged for each participant to form one variable on the desirability of each feature (i.e., averaged across Graphics, Art, Sound, use of skill, etc.). Table 14 in Appendix B (pg. 205) shows what demographic factors were related to the averaged ratings of Enjoyment, Desire to Play Longer, and Desire to Play Again. Table 15 in Appendix B (pg. 205) shows the detailed between-subjects effects for these outcomes.

To illustrate these results, Figure 11 shows that younger participants, aged 18-49, had greater rated Enjoyment, Desire to Play Longer and Desire to Play Again.



# Panel A: Estimated Marginal Means of







#### Figure 11. Age and Enjoyment, Play Longer, Play Again

Note: SE bars shown, marginal means from self-report Likert scale 1-5 (see pg. 247 of the Technical Report).

Figure 12 shows that people with more gambling problems (MR and PG) had greater rated Enjoyment, Desire to Play Longer, and Desire to Play Again.



### Panel A: Estimated Marginal Means of Game Enjoyment







### Panel C: Estimated Marginal Means of Want to Play Again

#### Figure 12. PG-Status and Enjoyment, Play Longer, Play Again

Note: SE bars shown, marginal means from self-report Likert scale 1-5 (see pg. 247 of the Technical Report).

Figure 13 shows that people who played EGMs in the past 12 months gave higher ratings of Enjoyment, Desire to Play Longer and Desire to Play Again.





## Panel B: Estimated Marginal Means of

Group 4: Played in the last 12 months?

Panel C: Estimated Marginal Means of Want to Play Again



Group 4: Played in the last 12 months?

#### Figure 13. Group 4 and Enjoyment, Play Longer, Play Again

Note: SE bars shown, marginal means from self-report Likert scale 1-5 (see pg. 247 of the Technical Report).

Figure 14 shows that people who had played the skill-based game, specifically, gave higher ratings of Enjoyment, Desire to Play Longer and Desire to Play Again.









### Figure 14. Skill vs Reel-based and Enjoyment, Play Longer, Play Again

Note: SE bars shown, marginal means from self-report Likert scale 1-5 (see pg. 247 of the Technical Report).

Figure 15 shows that people with low impulsivity showed greater Enjoyment and Desire to Play Again.





### Panel B: Estimated Marginal Means of

#### Figure 15. Impulsivity and Enjoyment, Play Again

Note: SE bars shown, marginal means from self-report Likert scale 1-5 (see pg. 247 of the Technical Report).

### How accurate are gamblers in understanding the level of skill involved in skill-based gaming, and the odds of winning? RQ 3

Table 16 in Appendix B (pg. 206) shows the multivariate effect on people's ratings of the importance of skill, control and practice in effecting their outcomes (good or bad), as well as their immersion in the game, based on whether they had played the reel-based game or the skill-based game. The detailed tests of between-subjects effects are shown in Figure 16 of Appendix B (see pg. 208).

To illustrate the findings, Figure 16 shows that the skill-based game was rated higher on all measured outcomes, including how skill affected the results of the game, how much control could be exercised over the game (to win), how much practice would help in winning, and whether people were immersed in the game. It is important to note that skill played no part in either game, so positive ratings on skill, control and practice indicate a level of misunderstand of the mechanics of the games.

Panel A: Estimated Marginal Means of How important was your skill level, good or bad, in determining the points you were able to score in Sea/Spacefox/Pokie?



Panel B: Estimated Marginal Means of How much control were you able to exercise in winning at Sea/Spacefox/Pokie?





#### Figure 16. Perceptions of Skill, Control, Practice, Immersion by Skill vs Reel

Note: SE bars shown, marginal means from self-report Likert scale 1-5 (see pg. 247 of the Technical Report).

# Does skill-based gaming increase the 'illusion of control' and what is the potential impact? RQ

To analyse the experiment further, the behavioural outcome measures examined were: Ratio of Misses, Bet Speed, Fire Rate, Average Bet Size and Double-or-Nothing Attempt. Each of these traces of behaviour are related to long term losses under the assumption that the return-to-player is less than 1, which is necessarily true when the gambling-operator maintains a house edge to pay for operations and a profit margin. A lower ratio of misses, in our game, equates to more bets made in any given period with all other factors being equal. Bet speed, which is functionally related but not the same measure, is the number of bets made each minute (on average), and higher speeds will equate to greater long-term losses. Larger bet sizes will also lead to greater losses over time. Lastly, the double-or-nothing bet is a proxy for persistence while gambling, since this is one more bet that not all participants will make (although all are given the opportunity to opt for this bet).

Table 18 in Appendix B (pg. 208) shows the multivariate test predicting participant's perception of their use of skill, ability to control outcomes, utility of practice and level of immersion in the skill-based gambling machines on the behavioural outcomes of the ratio of misses, bet speed, rate of fire, average bet size and the double-or-nothing attempt. Only the perception of the ability to control outcomes was related to their prior behaviours. The between-subjects effects are detailed in Table 19 in Appendix B (pg. 214).

Figure 17 shows that people who believed that they had control over their wins in the game had a lower ratio of misses and higher average bet sizes. Bet speeds tended to be moderately high for people who thought they had either a lot or no control over outcomes, as opposed to a moderate amount of control. It is important to note again, however, that the games afforded the player objectively little control over outcomes – besides choosing bet size – since players could not control the outcome of a bet in our games.



Panel B: Bet Speed Skill-based Only





#### Figure 17. Feelings of Control related to Misses, Bet Speed and Avg Bet

Note: SE bars shown, marginal means from self-report Likert scale 1-5 (see pg. 247 of the Technical Report).

Table 20 in Appendix B (pg. 214) shows the univariate model predicting how much control participants perceived over their outcomes on the game (wins and losses) based on their Indigenous status, Marital status, Education level, Work status, Gender, and Income level. Only work-status and gender were associated with these perceptions.

Figure 18 shows that people working full-time perceived the greatest amount of control over their outcomes (winning and losing) in the game. In addition, males were more likely to see that they had a greater perception of control over their outcomes relative to female participants.







#### Figure 18. How much control exercised in winning?

Note: SE bars shown, marginal means from self-report Likert scale 1-5 (see pg. 247 of the Technical Report).

# What is the potential impact on the pattern of play e.g., length and frequency of playing sessions, player loss per session, loss of control of gambling, gambling intensity and level of immersion? RQ 5

Table 21 in Appendix B (pg. 214) illustrates the multivariate tests on the behavioural outcomes of bet speed, fire rate, average bet size and double-or-nothing attempt in consideration of whether people played the reel-based EGM or the skill-based game (SGM). The Group 4 (i.e., EGM, Videogames, Neither, Both), PGSI status and Gender were included in the model for the purpose of equalising any minor differences between the two groups that could impact on these outcomes. Table 17 in Appendix B (pg. 208) shows that behavioural outcomes were significantly influenced by whether people played the reel-based game vs. the skill-based game, providing confidence in interpreting between-subjects effects. The between-subjects effects are shown in Table 22 located in Appendix B (pg. 219).

Figure 19 shows the behavioural effects of being assigned to either a reel-based or skill-based game. The reel-based game had a greater bet speed, whereas the rate of fire was greater for the skill-based game. Since it is impossible to "miss" on a reel-based EGM (all bet attempts are successful), the reel-based rate-of-fire is equal to the reel-based speed of betting.


#### Panel A: Estimated Marginal Means of Bet Speed (per minute)





#### Figure 19. Mean Differences by Skill vs Reel-based games

Note: SE bars shown

### Do different types of skill-based games have different harm implications, for example those based on skill-based features as compared with games where skill is incorporated throughout play? RQ 7

Table 23 in Appendix B (pg. 223) shows the results of a multivariate model predicting all these outcomes from the characteristics of the skill-based game that they played. This analysis omits the EGM reel-based condition since that condition did not vary in VICES features. Group 4 included the natural divisions between subjects who 1) only play EGMs, 2) only played video games, 3) played both, or 4) played

neither within the last 12 months. Table 29 in Appendix B (pg. 236) provides these detailed betweensubjects tests-of-significance for reference, although the significant results are detailed below in Figures 20-27.

Figure 20 illustrates that the Visual condition, which incorporated the visual "look" of the two version of the game, SeaFox vs. SpaceFox, produced differences in behaviour despite the two games being functionally identical. Participants had fewer misses, a lower bet speed, and a lower rate of fire on the nostalgic game (SeaFox) compared to the more novel game (SpaceFox).



Panel A: Estimated Marginal Means of Ratio of Misses







#### Panel C: Estimated Marginal Means of Fire Rate (per minute)

#### Figure 20. Mean Differences for Visual Conditions

Note: SE bars shown.

Figure 21 showed behavioural differences for the skill condition that was intended to manipulated illusion of control by making hitting the target relatively easy or hard. In the low-skill condition, all torpedoes hit a target (automatically), although some "misses" were still possible if people hit a blocking asteroid. The high-skill condition had a greater potential for misses, where the torpedoes that missed all targets pass off the top of the screen. Unsurprisingly, the Skill condition showed the behavioural outcome of a greater proportion of missed shots in the skill condition. The skill condition also produced a lower bet speed, presumably as players tried to time their shots to avoid misses. Similarly, the rate of fire, which includes hits and misses, was lower in the skill condition.









#### Panel C: Estimated Marginal Means of Fire Rate (per minute)

#### Figure 21. Mean Differences for Skill Condition

Note: SE bars shown.

Figure 22 showed behavioural differences that resulted from varying the speed of the game, which was instituted by making the target ships travel faster (or slower) on the screen. Unsurprisingly, there were fewer misses when the speed of the enemy ships was relatively slow. Bet speed was higher in the low-speed condition, presumably as people had a lower challenge in timing their shots with low-speed enemies.





#### Figure 22. Mean Differences for Speed Condition

Note: SE bars shown.

Figure 23 shows how behaviour differed based on the past-12-month games experience of the participants. The gaming-only participants had the fewest misses, whereas the people who only played EGMs had the greatest number of misses. The bet speeds of people who had played videogames within the last 12 months were higher than people who had not. Lastly, people who had played both EGMs and video games within the last year had the greatest rates of fire, inclusive of hits and misses.



#### Panel A: Estimated Marginal Means of Ratio of Misses



Panel B Estimated Marginal Means of Bet Speed (per minute)







Figure 23. Mean Differences for Past Games Played (Group\_4)

Figure 24 shows the differences in behavioural outcomes according to PGSI status, grouped into no-risk and low-risk vs. moderate risk and problem gambling. People with a greater number of gambling problems had more misses, other factors being equal, and fired more often (inclusive of both hits and misses).







#### Figure 24. Mean Differences for PGSI groupings

Note: SE bars shown.

Figure 25 shows the behavioural differences by age. The median age of respondents was 52, and therefore a split was made between people who were 50 or over versus those who were younger to aid in interpretation. This split appeared appropriate by looking at a plot of the raw data with respect to behavioural outcomes. Older participants missed more shots, bet slower, and bet with lower average bet sizes. All these outcomes indicated that younger people were behaviourally predisposed to greater losses on the game (assuming, again, a return-to-player less than 1).







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Figure 25. Mean differences by Age (50+ or younger)

Figure 26 shows behavioural differences by gender. Males had fewer missed shots, bet faster and had higher average bet sizes, showing a tendency for accumulating greater losses.











Figure 27 shows the interaction between the Visual condition and Gender on behavioural outcomes. Males showed fewer misses in the nostalgic games than females, although this advantage did not extend to the novel game. Males had a slightly greater rate of fire in the novel game compared to females in that game, whereas females had a slightly greater rate of fire in the nostalgic game compared to males playing that game.





Figure 27. Interaction between Visual Condition and Gender

#### Discussion

The experiment provides answers to research questions 2, 3, 4, 5 and 7 posed by Gambling Research Australia. These answers, and their potential implications are discussed below.

*"Will skill-based gaming attract a new group of people who generally do not gamble? Which gamblers find skill-based gaming machines appealing?" RQ 2.* 

Figure 9 shows that people who play EGMs tended to value all skill-based game features more highly than other participants. Skill-based gambling machines (SGMs) may appeal most to people who play both EGMs and videogames, followed closely by those who have played only EGMs in the last 12 months. The games had lower appeal to people who had only played videogames in the last 12 months, and people who used neither EGMs nor videogames.

As shown in Figure 7, people with pre-existing gambling problems (PG and MR) rated <u>all</u> features of the skill-based gambling machines more highly than those with lessor or no problems. Figure 8 showed that people working full or part-time rated competition as an attractive feature above others with less work.

People who were younger, who had gambling problems, and who already played EGMs rated their enjoyment, desire to play longer and desire to play again higher than others, as shown in Figure 11, Figure 12, and Figure 13. People who played the skill-based gambling machines, as opposed to the reelbased game, also rated these aspects more highly, as shown in Figure 14. Per Figure 15, people who were low in impulsivity, unexpectedly, rated their enjoyment and desire to play again more highly than more impulsive participants.

• In sum, people who already play EGMs appear most attracted to skill-based gambling machines. In addition, younger people and people with gambling problems are most attracted to all features of these games.

"How accurate are gamblers in understanding the level of skill involved in skill-based gaming, and the odds of winning?" RQ 3

Figure 16 shows that people playing the skill-based game, as opposed to the reel-based game, were significantly more likely to believe skill affected their outcomes. However, objectively and by design, player skill had no role in determining outcomes in either type of game. In addition, people were more likely to believe that they exercised some control over winning or losing in the skill-based game, whereas (again) objectively they could not influence these outcomes. They were also more likely to

believe that practice would help them win in the skill-based game. Practice could not have helped in improving outcomes in either game.

 In short, people were inaccurate in their assumptions about both the skill-based and reel-based game. However, their erroneous beliefs were more inaccurate for people who played the skill-based game, where participants showed elevated belief in skill, control, and the utility of practice when evaluating the skill-based game.

"Does skill-based gaming increase the 'illusion of control' and what is the potential impact?" RQ 4

As noted above, Figure 16 shows people, on average, falsely believe they have control over winning and losing in both games (skill and reel-based); although this belief is significantly higher for the skill-based game.

Per Figure 17, feelings of control, which are objectively erroneous, are associated with a lower rate of misses, which for any given rate-of-fire will add to long-term losses. Bet speed, on the other hand, is only slower at intermediate beliefs in control. Average bet sizes are larger with high perceived control. Figure 17 thus shows that belief in control is related to more intensive gambling on this skill-based game. Additionally, Figure 18 shows that the perception of control is highest for people who are working full time and who are male.

• In sum, our skill-based game showed increased illusions of control over the reel-based game, and behavioural indicators related to higher long-term losses from high belief in control. People with higher beliefs in control are particularly at risk for behaviours that increase long-term losses.

"What is the potential impact on the pattern of play e.g., length and frequency of playing sessions, player loss per session, loss of control of gambling, gambling intensity and level of immersion?" RQ 5

As shown in Figure 19, people who played the reel-based game, as opposed to the skill-based game, had faster-bet speeds, although this should be interpreted as at least partially resulting from structural features of the two games. EGMs are fast by design, whereas skill-based gambling machines are slowed by skill-failures resulting in "no bet". It may be theoretically possible to produce a skill-based game that has faster betting than a reel-based game. Nevertheless, this is difficult to achieve in practice. By design, our skill-based game had a higher "fire rate" of attempted bets, but since most attempted bets were ultimately failed (i.e., were misses or duds) the actual speed of betting was still lower overall. To avoid skill-based gambling machines being more problematic than EGMs, actual speed of betting may need regulatory control. This control on speed of betting would be similar to reel-speed limitations (e.g., 6 second spin-rate) that are typically placed on EGMs by a regulatory authority.

There was no evidence that people placed larger (or smaller) bets on the skill-based game. In addition, there was no evidence for a difference between skill and reel-based players in their likelihood of attempting the double-or-nothing bonus bet. This bonus bet, which is highly risky, can be seen as a proxy for loss of control. Nevertheless, Figure 16 showed that participant in the skill-based game found it to be more immersive in comparison to rating by others who played the reel-based game.

 In sum, there is no evidence for overall greater betting intensity behaviourally induced by skillbased gambling machines. Nevertheless, the skill-based game was more immersive. Further evidence, described below, addresses the question of whether these games appeal more to people with gambling problems or who have other vulnerabilities.

"Do different types of skill-based games have different harm implications, for example those based on skill-based features as compared with games where skill is incorporated throughout play?" RQ 7

Our initial exploration found that the most popular games implemented skill-based gambling machines as features. Consequently, this report focused on the VICES framework in identifying what game features were associated with more intensive betting behaviour that led to greater long-term losses. Table 23 in Appendix B (pg. 223) shows that the VICES features of Visual & Audio, Skill, and Speed contributed to differences in gambling intensity.

Figure 20 shows that the novel game (SpaceFox) had a higher ratio of misses, which for any fixed rate of fire would tend to reduce the number of bets made. However, despite this fact, speed of betting on this novel game was higher. The speed of betting calculation omits misses. Thus, in balance, the novel game, SpaceFox, contributes to greater losses when other factors are held constant. Notably, SeaFox and SpaceFox were functionally identical, with only the visuals and sound differing between the two games.

Figure 21 shows that the skill condition, where at least some misses are impossible, contributed to higher rate-of-fire, and consequently, higher bet speeds. Thus, games that reduce the possibility for misses, or null bets placed, are likely to lead to greater long-term losses.

Figure 22 shows that a faster game (i.e., where the ships move faster), unsurprisingly, is associated with more missed shots. Bet speed is correspondingly lower, potentially because of people taking more careful aim. Thus, a game that is "hard" is likely to lead to fewer successful bets, and correspondingly more null bets placed, and lower long-term losses. Easier games, in contrast, will lead to greater long-term losses.

Figure 23 shows that people who only had played only EGMs, and not videogames, within the last 12 months, are likely to miss more shots. Relatedly, and more importantly, people who play videogames are likely to bet faster, which is associated with more long-term losses.

Figure 24 shows that people with many gambling problems (PG and MR) are likely to have high rates of fire, but also miss more shots. Consequently, there was no significantly greater tendency for a higher rate of betting speed. In short, there is no strong evidence of more intensive betting amongst people with gambling problems on skill-based gambling machines as opposed to others playing the same skill-based gambling machines. Of course, the betting stakes were low for this game, so this null result should be interpreted with caution.

Figure 25 shows that younger people, aged 18-49, are more likely to make successful bets (i.e., hit the targets). Relatedly, younger people have higher betting speeds. Lastly, younger participants were apt to bet larger amounts. In combination, therefore, younger people, aged 18-49, are more likely to bet intensively on the skill-based game.

Figure 26 shows that males were more likely to place successful bets, have a higher betting speed and to bet larger amounts. Thus, males are more intensive bettors on the skill-based game.

Lastly, Figure 27 showed an interaction between gender and the Visual condition on missed bets as well as rate-of-fire. Males had particularly careful shots on the Nostalgic game (SeaFox), which was evidenced by lower rates of misses. Fewer misses equate to more bets placed in the long-run and higher losses in any given period of gambling.

• In short, novel games as well as games that are easy to play (i.e., fewer missed shots) result in behaviours that increase long-term losses. People who are male, young, and who play videogames are likely to gamble more intensively on skill-based gambling machines than others.

#### Limitations

Experimental studies, including the present study, sacrifice some external validity to maintain the benefits of internal validity. That is, the study simplifies aspects of the natural environment for the purposes of maintaining experimental control and the ability to make strong inferences about causality. One of the main simplifications is the use of games, both reel-based and skill-based, that were developed for the purposes of this study. These games, necessarily, are not entirely representative of all games that exist in real casino environments. Consequently, it is not possible to be certain that some details of the games are not critical to the results that were found, and these unknown details may not

always be replicated in real-world games (e.g., the shoot-em-up format of the game, the graphical themes of space and sea, etc.). In particular, our comparison between the skill-based gambling machines (SGMs) and the reel-based game may be infected by some differences in desirability between the two that is not always true between real-EGMs and skill-based gambling machines in casinos. One addition detail that could matter is the low stakes of our gambling game, which was necessary for ethical reasons. Furthermore, our sample is not necessarily representative of all people who might be interesting in playing these gambling-games. The online nature of the study, and the use of panel providers, necessarily limited the reach of our sample to people who were willing to be part in panel studies for marginal compensation. The study thus assumes that these persons are psychological similar in their motivations and behaviours to people who might access these games in the real world.

Comparisons between the reel-based game and the skill-based game need to be interpreted with extra caution. For pragmatic reasons described above, only people recruited through PureProfile were assigned to the reel-based game and only people recruited through Qualtrics were assigned to skill-based conditions. Consequently, any comparisons between reel and skill-based gambling machines are not based on random assignment of participants to condition. Nevertheless, our demographic profiles are very similar between the two groups, providing some confidence in the validity of comparisons.

The examination of features of games that impact on behaviours is based on cognitive theorising, specifically the VICES framework (Armstrong et al. 2015). There are likely other, yet unexplored, factors that substantially influence people's attraction to, and behaviour towards, these games.

Lastly, the experiment used a unique proxy measure for gambling persistence in the form of a final double-or-nothing bet. While picking the option to take this bet is literally a demonstration of persistence, people may have been motivated by risk-preference rather than only a desire to continue. This measure should therefore only be considered an imperfect proxy for the kind of persistence that people may exhibit in more naturalistic environments, such as in a casino.

#### Conclusion

This study found new evidence with which to evaluate the attraction to, and behavioural consequences of, use of skill-based gambling machines (SGMs). People who already play EGMs and people who have gambling problems are most attracted to these games. These findings replicate what our prior focusgroup research has found with respect to who already plays these skill-based gambling machines in the United States. Our results suggest that people appear to believe they can have better control over positive outcomes on skill-based gambling machines, even though our skill-based game was designed to have no such control. Our environmental scan previously found that the amount of control people exercise in skill-based gambling machines is minimal or non-existent, so this finding is germane to an understanding of the psychology of these games: they largely provide an illusion of control rather than an actual ability to exercise skill to affect outcomes. There was no evidence in the experiment that people bet greater amounts, bet faster overall, or persisted longer at the skill-based game when compared to the reel-based game. However, there was greater immersion in the game. Moreover, there was evidence that a particular cohort of people do bet more intensively on skill-based gambling machines. These include males, young people, and people with prior experience playing video games.

Skill-based gambling machines are an evolving product category, and despite not having widespread popularity in the United States yet, they may only need time to be optimised for a break-through in demand. Our experiment revealed evidence that these games can be more attractive than a similarly themed reel-based alternative and have the greatest appeal for people already playing EGMs. Nevertheless, there is some concern that these games are also appealing to people vulnerable groups, including young male video gamers. Regulatory approval of these games must consider these dangers against the potential recreational benefits of these new products.

# Interviews with skill-based gambling machine (SGM) gamblers in the US

#### **Key findings**

- Participants reported being attracted to skill-based gambling machines (SGMs) by their dynamic audio-visual effects, interactivity, novelty aspects, and the challenge involved.
- Motivations for playing SGMs included: for entertainment, because they are: interactive, fun and exciting; have nostalgia linked to retro themes and fond memories of video gaming; and provide novelty-seeking within familiar EGM play.
- There was limited understanding that skill has little actual impact on game outcomes for SGMs. Most participants overestimated, and the rest were unsure of, the degree to which skill influenced wins and losses.
- Illusions of control over SGMs were common, particularly for participants with a gambling problem.
  They reported repeated play in attempting to improve their skills. Winning on SGMs was said to affirm these cognitive distortions.
- Participants reported no difference in the safer gambling strategies they used when they gambled on SGMs and on other gambling activities.
- SGMs are likely to increase gambling harm because they create illusions of control and encourage repeated play among people with a gambling problem; target young adults (young men in our sample), who are a vulnerable group for gambling harm; and increase opportunities for greater gambling involvement which also increases the risk of gambling problems.

#### Background

This stage of the project aimed to better understand SGMs though qualitative interviews with people with lived experience of playing these machines. The present study was primarily devised to answer the following research questions:

- Will skill-based gaming attract a new group of people who generally do not gamble? Which gamblers find skill-based gaming machines appealing? RQ 2
- How accurate are gamblers in understanding the level of skill involved in skill-based gaming, and the odds of winning? RQ 3
- > Does skill-based gaming increase the 'illusion of control' and what is the potential impact? RQ 4

- What is the potential impact on the pattern of play e.g., length and frequency of playing sessions, player loss per session, loss of control of gambling, gambling intensity and level of immersion? RQ 5
- What effect does skill-based technology in gaming machines have on gambling-related harm? Is interest in these games associated with problem gambling? RQ 6
- How do responsible gambling behaviours, such as taking breaks in play, setting limits and so on differ for skill-based gaming? RQ 8
- > What are the options for mitigating the risks associated with skill-based gaming machine technology? RQ 9

This project stage also aimed to address some of the limitations of the experimental study by gathering qualitative data that could improve an understand people's interactions with- and attraction to SGMs. Interviews with 20 people in the United States (US) who regularly gambled on SGMs were conducted to explore their beliefs, perceptions, and motivations related to gambling on these skill-based products.

#### **Methods**

#### Recruitment

Participants were recruited by Pure Profile, a US-based online panel provider. Purposive sampling was required to ensure participants met the following inclusion criteria:

- aged 21 years or older
- played at-least-monthly on skill-based gambling machines (SGMs)
- living near or travelling regularly to a jurisdiction where SGMs have legally operated in venues for the last five years (Nevada and Atlantic City, New Jersey), and
- willing to take part in an online interview

Participants were pre-screened by the panel provider using periodic surveys conducted for this purpose, and in our case to identify persons who fit the above inclusion criteria. These periodic surveys may have included additional questions about other non-affiliated projects that PureProfile scoped for other clients.

#### Procedure

Potential participants were recruited into an online screening survey hosted on the Qualtrics survey platform. The survey contained a participant information sheet, screening questions, and an informed consent preamble. The screening survey screened for at-least monthly SGM play and collected basic demographic information and contact details. The screening survey was also used to establish loose

quotas to obtain a final sample that was as diverse as possible with respect to age, gender, and gambling problems (i.e., PGSI status). Potential participants were sent an email by the interviewer to schedule a suitable time for an online one-on-one interview. The interviews were conducted remotely from Australia via the Zoom video-conferencing platform. Participants were provided a US\$37 (AU\$50) honorarium payment for participating. All interviews were audio-recorded and transcribed via Zoom. Each transcript was checked for accuracy and edited by the interviewer as needed.

#### Interview discussion guide

The interviews were semi-structured and lasted for between 45 minutes and one hour. The discussion guide was developed using insights from the previous phases of the project: the literature review, environmental scan, and expert submissions and interviews. Given that the peer-reviewed academic literature on SGMs is relatively sparse, the environmental scan and the expert interviews and submission provided important information on current market trends.

The discussion guide included the following topics:

- Participants' involvement in casino-based SGMs, as well as other gambling activities (e.g., traditional EGMs, sports betting, poker, etc.)
- Factors motivating participants' initial decision to try SGMs, and factors motivating their continual engagement with SGMs
- Attractive structural characteristics of the skill-based elements in the products they frequently use (e.g., whether the skill element fosters cognitive distortions such as the illusion of control), as well as the more conventional structural characteristics of the EGM (e.g., audio-visual effects, ease of use, and speed of play)
- Perceived risks and potential returns from SGMs, and how these compare to traditional EGMs and other gambling products
- Participants' use of safer gambling strategies and any difference in how these are applied between products
- Actions that governments or gambling providers could take to reduce harm from SGMs

The characteristics of skill-based gambling machines (SGMs) that the interviews explored were identified from the theoretical framework developed from the environmental scan and literature review.

Additional areas of exploration were added as the interviews proceeded. Participants were prompted to provide specific examples and to reflect on their recent gambling sessions.

#### Participants

Twenty participants, aged between 28 and 68 (M = 48), completed an interview. Despite efforts to balance the gender profile of the sample, most respondents were male (70%, n = 14). Incidentally, half of the sample (50%, n = 10) met criteria for problem gambling as measured by the PGSI. Of the 10 remaining participants, three were gamblers without problems, five were low-risk gamblers, and two were moderate-risk gamblers. Table 3 summarises these key characteristics.

ID	Age	Sex	PGSI status
01	30	М	LR
02	64	F	PG
03	39	М	PG
04	45	Μ	PG
05	57	F	LR
06	28	Μ	PG
07	66	М	NPG
08	66	F	LR
09	58	F	PG
10	48	Μ	LR
11	51	М	MR
12	68	Μ	NPG
13	55	F	PG
14	35	М	PG
15	34	М	PG
16	40	Μ	PG
17	40	М	PG
18	54	Μ	LR
19	33	F	NPG
20	46	М	LR

Table 5. Key characteristics of participants

Note: PG = problem gambling; MR = moderate risk gambling; LR = low risk gambling; NPG = non-problem gambling.

#### Analysis

Interview transcripts were analysed using a combination of interpretative phenomenological analysis (IPA; Larkin & Thompson, 2012) exploratory thematic analysis, and confirmatory thematic analysis (Braun & Clarke, 2006; Guest et al., 2011). IPA was used to explore, in detail, how participants perceive and interpret their experiences relating to SGMs (Smith et al., 1999). Utilising this interpretive approach, the explorative analysis commenced with open coding of each interview transcript to identify initial features that were potentially relevant to the research aims. Explorative thematic analysis was used for this phase as little is known about attitudes, behaviours, and user experiences relating to SGMs. This

coding of words, phrases,122 sentences, or paragraphs, as appropriate, was an iterative process involving the constant comparative method to add, modify and refine codes and to recode data as the analysis progressed. A subsequent process generated themes by grouping or collapsing codes that shared some unifying feature. This process added new codes, modified existing codes, and recoded data, as appropriate. However, as more is known about innovations in gambling products and how they influence people's gambling behaviours and cognitions, a confirmatory thematic analysis was used to interpret the themes that related to the VICES framework. A confirmatory approach suited the hypothesis-driven nature of the application of the VICES framework. This combined analysis approach ensured that the resultant themes captured meaningful patterns in the data that were supported by recurring evidence, while also providing the ability to present contrasting participant experiences where relevant. Participants' quotes were selected to enrich the explanation of the themes and sub-themes. These are tagged with the participant ID, and their PGSI status (PG = problem gambling; MR = moderate risk gambling; LR = low risk gambling; NPG = non-problem gambling).

#### **Ethics**

This stage of the study was approved by the Central Queensland University Human Research Ethics Committee (approval number 23622).

#### **Results**

The analysis identified several themes and sub-themes that pertained to the participants' experiences and perceptions of playing skill-based gambling machines (SGMs, see Table 4). These are discussed below.

#### Table 6. Themes and subthemes derived from the data

Theme 1. Gambling involvement

- Frequent involvement in many other gambling forms
- Initial exposure to SGMs creates interest in trying them
- Ease of access to SGMs influences frequency of play

Theme 2. Motivations for playing SGMs

- Entertainment because SGMs are interactive, fun and exciting
- Feelings of nostalgia, linked to earlier memories and video gaming
- Novelty and different experiences within familiar EGM play
- Mixed views on whether SGMs produce more wins, but they cost more to play

Theme 3. Design features of SGMs

- Visual and audio enhancements are strong attractors for both players and spectators
- Illusions of control over SGMs were common, particularly for those with a gambling problem
- Greater cognitive complexity of SGMs attracts some players but deters others
- Mixed views on whether SGMs expedited play and gambling losses

Theme 4. Attraction and potential for harm for different demographics

- Targeted to a young demographic
- Child-like themes to attract a younger demographic

Theme 5. Safer gambling strategies

• No difference in safer gambling strategies used for SGMs

Theme 6. Harm minimisation

- US participants viewed harm minimisation as an individual responsibility
- Gambling help service information was the main harm minimisation measure seen
- Suggestions for harm minimisation measures for SGMs and younger people

#### Theme 1. Gambling involvement

#### Frequent involvement in many other gambling forms

All participants reported engaging in multiple forms of gambling, as well as skill-based gambling machines (SGMs). The most common other activity they engaged in was traditional EGMs (referred to as 'slots' by participants, which is the US terminology). In addition, most participants mentioned participating in a range of other activities, including traditional table games, innovated table games,

bingo, keno, sports and race betting, poker, and online gambling: 'I'd probably do a little bit of everything' (06-PG). Similarly:

Some people like to play a bit of table games, a bit of skill-based slot. Some people are just all slot machines. I play a mixture, probably have a little bit of everything. (19-NPG)

#### Initial exposure to skill-based gambling machines (SGMs) creates interest in trying them

Initial exposure to SGMs occurred through seeing other casino patrons play them, being introduced by family or friends, reading about them online, and through casino promotions. This created interest in the product and demonstrated the features of the games.

Most participants reported being first exposed to SGMs in a casino. This participant described a typical first experience with these types of machines:

Seeing it for the first time, I knew nothing about advertisements or reading about it...There were people that were forming a half circle around the guy that was playing it. And so, from there you're able to watch...and it just kind of helps me to know what to expect and do I think that I could do something and have fun. (05-LR)

Another participant mistook the game for a traditional video game while watching another casino patron play:

I thought it was a regular video game...I didn't even consider the gambling aspect of it or the slot machine part of it, until I saw that come through. And then I stood there and checked it out a little bit. And like I say, figured I'd give it a shot. It seemed interesting. (11-MR)

Other people described being introduced to SGMs by family or friends, while some had previously read about them online:

My son was playing it and I was surprised that he was playing it. Like what are you playing bingo for? And he said, 'oh, it's not just bingo though, it's like slots'. (13-PG)

One participant recalled being introduced to SGMs through a promotion in a casino email:

All the casinos will have like different promotions...they'll release a new game, and they'll let you know that [you can] have, you know, five free spins on this new game. (19-NPG).

#### Ease of access to skill-based gambling machines (SGMs) influences frequency of play

Ease of access was said to influence how often participants played SGMs. Many participants who lived near casinos with SGMs reported that they frequently gambled on them: 'Every day. Every single day' (04-PG). One participant, when asked about his frequency of play, replied: 'I literally almost missed this interview, just put it that way' (14-PG). Participants who lived out-of-state reported less frequent gambling on SGMs but, in line with the inclusion criteria, did so at least once a month:

It's not as often as just basic slot machine area and that's because the location is not...within a half hour drive...we might decide to make a trip like once a month or maybe it's just like, 'hey, let's get away...two times during the month'. (05-LR)

Nonetheless, distance did not necessarily prevent access. For example, one participant explained how US casinos facilitated visits from Hawaii which enabled him to gamble on SGMs monthly:

In the state of Hawaii, we don't have gambling...But surprisingly, there are tens of thousands of us that flock to Vegas every week. The casinos, they know that we love to go there so they have really good deals and package deals. So, like chartered fights and hotels...ground transportation provided, and even the meals. So, I do that on a monthly basis. (01-LR)

#### Theme 2. Motivations for playing skill-based gambling machines (SGMs)

#### Entertainment because skill-based gambling machines (SGMs) are interactive, fun and exciting

Entertainment was the primary reason participants cited for gambling on SGMs, reporting that they are fun and exciting. Participants reported that the interactive nature of the machines and the visual and audio features made the games more fun than 'sitting at a table and just hitting a spin button' (15-PG). Some participants said that SGMs gave them 'a rush' (14-PG) and aroused intense emotions because they were 'exciting, like some people get like really crazy and screaming and banging on the machine' (08-LR).

Many participants acknowledged that winning money was an obvious and potentially positive consequence of gambling, but that 'it's probably a combination of both. I don't count on winning' (13-PG). One participant asserted that:

The entertainment factor should be primary. Monetary factor is definitely up there but I'm not trying to play the games just to make money, because in the end you're probably not gonna make a lot. (01-LR).

Skill based gambling machines (SGMs) were also seen as entertaining, even when losing money, and this could encourage continued play for the entertainment value alone:

A game that I'm losing but I'm having fun, I'm probably gonna look at it more like entertainment, as like I'm gonna continue to spend this money because I'm having fun doing it. (17-PG)

#### Feelings of nostalgia, linked to earlier memories and video gaming

Another strong theme around motivations for playing SGMs was the feeling of nostalgia they aroused. Participants reported that the retro ambience the machines created, the memories they elicited, and their fondness for video games were linked to these feelings.

This strong presence of a nostalgic ambience was summed up by one participant: 'If you were to actually walk into some casinos, you could easily think it was like an arcade' (17-PG). Another participant who was motivated to play SGMs due to 'the video game aspect' (05-LR) talked fondly about her history with video games and how they had been present in different periods of her life:

I had two children that were in the heyday...of the handheld devices since they were like, five years old...When I was, gosh, 16/17... [a local] building was transformed into video games. And that was something that I got fascinated by...it's just fun to have something a little bit different, but to bring those things that I've mentioned and meld them together...it's just a variation of something that's always been around for me since I've been 16/17. (05-LR)

The fondness that this nostalgia created for participants was apparent in many descriptions of the SGMs games. For example:

They were new, but still retro because of them like using Space Invaders or Star Wars...stuff from when I was growing up that was like video games and movies. (20-LR)

An older participant animatedly described how his longstanding love of video games underpinned his motivation to play SGMs:

I enjoy it...I grew up with video games when I was a kid, you know, 40 years ago. That's when games like Pac Man, Space Invaders...were big...Pong on TV...I still play video games...I'm 54 years old. I'm a retired attorney. I have a PlayStation 5. I still have my PlayStation 4, PlayStation 3, 2, 1, Sega Genesis, you know. I like video games. (18-LR)

#### Novelty and different experiences within familiar EGM play

The novelty of SGMs was another strong theme linked to participants' motivations to play them: 'They're newer, more interesting' (08-LR), and 'it was gemstones and there were animals in there and it was just bizarre, the experience, because you don't know what to expect (09-PG). One participant described the novelty of the machines as 'probably the most important factor' (07-NPG) in why he played SGMs. Other participants expanded upon their attraction to novelty: 'It's better than just doing something basic, the old things that have been going on for years in casinos' (03-PG). Another participant described SGMs as novel, while also containing an element of familiarity:

You get kind of tired of that [traditional EGMs], then you wanna try something, so like a skill-based game was something a bit different. But in that same type of electronic type of game. (01-LR)

Some participants seemed to want even more novelty and felt that the underlying game of most SGMs was the same, despite the different graphics. They expressed a desire for more variety: 'You're either shooting fish, you're shooting spaceships, or you're shooting animals...it gets a little old doing the same thing with the same pictures' (06-PG)

## Mixed views on whether skill-based gambling machines (SGMs) produce more wins, but they cost more to play

There were mixed views about the win schedule that SGMs offer and how it motivated participants to play SGMs. Some participants thought that SGMs offered better odds of winning through smaller but more consistent wins, while traditional EGMs offered larger, but rarer, jackpots:

As far as winning on a consistent basis, you're not gonna be doing very well playing with the traditional slots. There are big, big wins, but not very frequent. So, from my experience, the skill-based games pay not as much, but more frequently. (01-LR)

However, some participants found that, in their experience, the SGMs offered bigger wins than traditional slot machines:

I think the skilled ones offer bigger payouts and jackpots because you can go into the game within the game. And then, you know, if you keep winning in the game, you'll get more free games and more free games, so it all adds up the more you can win. (08-LR)

Some participants noted that the cost of play on SGMs was higher than for traditional EGMs: 'Yeah you usually spend more money because each game is more money' (08-LR). Participants also described being unable to find SGMs where the lowest bet was on par with that of traditional EGMs:

You'll see some slot machines that are like penny and nickel and dime, you know, and you really don't see those in the skill-based ones...you generally don't see anything really in the skill-based that is less than a quarter. (18-LR)

Some participants were deterred from playing frequently on SGMs due to this higher price: 'Some of them are a little more expensive because I usually play the penny machines. And the newer ones, most of them are between 75 and \$1' (08-LR).

Overall, participants reported different views on whether the odds of winning on SGMs were higher or lower than for traditional EGMs. However, most thought that the cost of play was higher because SGMs did not offer low-denomination play.

#### Theme 3. Design features of skill-based gambling machines (SGMs)

#### Visual and audio enhancements are strong attractors for both players and spectators

Participants typically identified the visual and audio effects of SGMs as strong attractors to the games: 'I like the aesthetics, I like when it's aesthetically pleasing to the eye with, you know, bright fun colours. And good music is always a plus' (19-NPG). Another participant asserted that the 'main point of playing these games is just to have the entertainment factor, hearing the different sounds and all the visuals going on' (01-LR).

SGMs were said to represent a step up in quality from traditional EGMs for most participants: 'the machine animation is a better class...you know it's quite an upgrade' (05-LR), or, as one creative participant put it: 'it's like eating hamburger compared to steak' (09-PG). One participant described the change in scale from traditional EGMs to SGMs: 'they have all these different speakers that are surrounding you. You have a really comfortable chair, big, big screens that go from the floor to about 6 feet high' (01-LR).

The loud audio effects were a polarising topic, with some participants enjoying them: 'They make a lot of noise. You win like \$3, and it sounds like you win a million...I put the sound up as loud as can be' (08-LR). However, some felt that the audio effects drew unwanted attention: 'it's really loud, I mean it's really loud, the skill-based ones...everybody stops, you know?' (09-PG). Another participant felt that the overwhelming 'flashiness' of the games made the machines, and those who played them, an unwitting attraction for spectators:

Like the one that was the big one. I tried playing it one night. I walked away with like 10 bucks [still] in it, because it was just like everybody watching me, and...I can't stand that...it's like no, I don't want to be your zoo. (10-MR)

Most participants who expressed a strong aversion to the attention that the audio effects brought them were moderate-risk or problem gamblers, which may reflect a desire for more privacy with their gambling.

Illusions of control over skill-based gambling machines (SGMs) were common, particularly for those with a gambling problem

The most pervasive theme throughout the interviews was control over game outcomes. Most participants believed that the outcome of a SGM was, as the name suggests, dependent on the player's skill:

I had thought it was just another themed slot game because it kind of looks and feels the same way. But once you start playing it, you seem to have a little bit more control over the outcome. (01-LR)

Participants often compared their experience to that of playing traditional EGMs: 'I can determine the outcome of this more so than just pulling a lever' (17-PG), believing that 'it actually depends on your dexterity, it gives me better leverage...helps me win those games' (15-PG).

Opinions differed as to the amount of control the player had over the outcome in SGMs, with those experiencing problem gambling being far more likely to report considerable illusions of control, compared to the non-problem and low-risk gamblers: 'I know that I can, it's not luck, I can get a better chance of winning' (03-PG). Another explained:

It takes time to learn those tricks and moves, and everything that pertains to it. But it would make me more satisfied because I pushed my luck, so to speak. I just didn't rely on it [luck]. I could do something with it. (02-PG)

SGMs were also seen as a way to 'actually make you a lot of money' (15-PG). One participant explained that when he needed money, 'I can actually use my skill and play whenever I need to and try to win' (03-PG). The illusion of control that many participants with a gambling problem held over the outcome of SGMs led to these games being seen by some as an 'insider's' game:

All machines are set up the same way when they make them for profits for the casino. But for skill games, it has profit for someone who knows how to do it. (04-PG)

A subtheme was the belief that players could become more successful and win more on SGMs if they played them more often. This concept was expressed through participants saying they had to train or study to hone their skills. One participant in the problem gambling group explained:

And you have to study... Being totally unprepared...probably wouldn't make any difference at all...You have to develop your skills to be up to winning streak, because it just doesn't happen just automatically. (02-PG)

This belief that 'the more you play it, the more you learn about it' (04-PG) and that 'practice makes perfect' (12-NPG) indicated that some individuals were repeatedly playing SGMs to try to improve their chances of winning money.

However, some participants also acknowledged the role of luck in SGMs, with many seeing these games as a combination of luck and skill: 'They call it hybrid as well, because a little bit of luck, a little bit of skills...still need luck, plenty of it. But still, you have a little leverage' (02-PG). The amount of luck compared to the amount of skill that participants believed influenced the outcome of SGMs varied, with some asserting that '60% of it is luck' (14-PG) and 'the skill is kind of minimal. It gives you...a little extra bump but not a lot' (19-LR). A few participants were undecided, with one referring to the return-toplayer regulations that governed casino games: 'I think there is some skill definitely behind it...a lot of it is pretty much, I guess, whatever the government regulates how much they can beat you by' (17-PG). In this way, participants were unsure how much the skill portion of the game affected wins and losses. They knew the house had the edge in gambling, but the marketing of these games as requiring skill appeared to confuse their understanding. Well, I think that the odds are, I mean I don't know how much more in your favour. But I would say, are more in your favour because obviously it's relying more on skill versus relying on luck, purely luck alone. (19-NPG)

I think you...have the opportunity to control your winning a little bit more. But I think you still are going in with the idea that...they're going to win eventually...you still know that the odds are stacked against you. (20-LR)

Non-problem and low-risk gamblers discussed the potential harm from believing that skill enabled control over game outcomes, because some people may become overconfident in their skills:

Someone might become a little too sure of themselves or maybe a little too cocky...with how much skill they think they have acquired, and think that they have it completely in control, and that the odds are in their favour entirely, and they may, I guess, let that affect them. And it ends up being a negative thing...betting too much or losing too much money. (19-NPG)

You could have some people think that 'hey, maybe I could get so good that I could win a lot of money.' So, people are going to just put in more money than they should because they're thinking like 'I'm learning how to do this'...not realise that...the effect you're really having is kind of small...no matter how good you are, how much you play it, you're never going to...be able to dominate any skill-based game that the opponent is the casino. (18-LR)

A few participants subscribed to cognitive fallacies about other aspects of SGMs compared to traditional EGMs. One participant thought that the payout ratio on traditional EGMs was varied by the casino, depending on how busy it was, whereas he believed that this was more consistent for skill-based machines (01-LR). Another participant described moving away from playing predominantly on skill-based gambling machines (SGMs) and back to traditional slots because he felt that the skill-based gambling machines were 'rigged' by the casinos and not a true representation of his skills (06-PG).

Alternatively, some participants talked about experiencing a kind of empowerment that this feeling of control gave them. SGMs helped some participants 'feel smarter because you have something to do with that [win]' (02-PG). The impression that the outcome 'depends on your dexterity and on your skill as a person...your mental competency' (15-PG) can lead to illusions of control. The following participant explained feeling that he had played a part in 'earning' a win on an SGM. Conversely, he also felt that

losing was easier to accept because at least he was attempting to do something to positively impact on his chances:

If I win \$100 on a skill-based machine, I do feel better about it than if I won \$100 on a nonskilled machine, because that's just complete random luck. At least on a skill-based machine I had something to do with it. You know, and I feel better playing a skill-based machine if I lose. On a non-skill, when I lose money I think, you know why did I do that? I'm just hitting a button. What did I really get out of that, you know? Why did I put a couple hundred dollars in? (18-LR)

Conversely, this empowerment, stemming from control, was said to deter one participant from chasing her losses:

There is always something satisfying about knowing that you influenced the win...There is something about that, that keeps you drawn to it. And I think that's also the thing that will push you away from it as well, like if...you weren't doing so good, you'll say, 'okay well, it's me clicking it so it's got to be me'. (06-PG)

## Greater cognitive complexity of skill-based gambling machines (SGMs) attracts some players but deters others

All participants found skill-based gambling machines (SGMs) more cognitively complex, compared to traditional EGMs and other games of chance. As discussed above, many participants attributed the outcomes of the games as dependent on their knowledge and skill, which could be honed through practice so they could outsmart the game. Most participants considered this cognitive complexity to be a positive attribute, citing the challenge and the attention required as something they sought out:

It makes me think, you know. You kind of got to plot things out...I can play bingo and the lady can call the balls out...but this gives you time to think and really interact...It puts my brains to work. (13-PG)

Conversely, some participants discussed that this cognitive complexity resulted in a product that was too stressful and undermined the relaxation they were looking for when gambling. One participant described adapting her play, depending on her mood and whether she wanted the cognitive challenge of a SGM or to simply 'relax there and play the machine and not really worry about anything else' (13-PG) by playing a traditional EGM. One participant spoke of trying to convince her friends to play SGMs instead of traditional slots, but felt that they were put off by the apparent complexity: '[It can be] intimidating...I say, 'oh, you have to think something, you have to decide'...[but they might say] 'Oh, I just go with pure luck, it's no pressure, it's more fun, and I still win'' (02-PG).

#### Mixed views on whether skill-based gambling machines (SGMs) expedited play and gambling losses

SGMs were seen by most participants as no faster or slower than traditional EGMs. However, some participants felt that play was expedited in the sense that money could be lost more quickly: 'I think skill-based is, as the money just goes quicker. And then if you're like me and you only bring a certain amount, you're like, ah, you should have brought more money' (09-PG).

Conversely, some participants believed that play was slower on SGMs as they offered an 'extension of the game' (05-LR), with another saying: 'It seems to be for me that the money that I put in lasts longer. So, you have a lot longer gaming experience' (01-LR).

Some participants suggested that this slower rate of play on SGMs could make the product safer as it could potentially reduce a person's overall gambling spend:

Well, a gamble is a gamble; the risk is going to be the same. But for someone that does have a gambling problem, perhaps the skill-based one could lesson that blow. They're spending more time on one particular game, rather than going through a whole bunch of games or a whole bunch of rounds or turns or rolls or spins...and losing so much more. (11-MR)

#### Theme 4. Attraction and potential for harm for different demographics

#### Targeted to a young demographic

Many participants saw skill-based gambling machines (SGMs) as designed to appeal to the younger demographic: 'I don't think I've ever seen anybody who I would consider older than me [55 years] playing skill-based machines. And you know I go a lot.' (18-LR). Numerous participants spoke about observing only younger people gambling on SGMs, with older gamblers preferring traditional slot machines:

The two types of machines attract a completely different crowd. I would say that the more elderly crowd would probably be happy with the traditional slot machine, and I'd say a younger crowd would probably be more interested in the skill-based. (07-NPG)
Some participants nominated reasons for this difference, with older people being 'not so into the graphics and all the sound effects going on' (01-LR). The novelty and dynamism of the games was said to appeal to the younger generation: 'Younger people...who would like to learn new things instead of just playing the old same old things...and getting bored with them.' (13-PG). Another reason proposed for why younger people are more attracted to SGMs was their similarities to video gaming, an activity commonly played by children and adolescents: 'It kind of mimics the video games they play whether it's PlayStation or Xbox. So just a natural transition from playing at home versus playing in the casino'. (01-LR)

One participant had observed gender differences in the use of SGMs, with younger men attracted to them, but not older women:

Mostly it's like guys and I think like the 20s, late mid-40 range...Like the older ladies you know are sitting there with their hands turning purple from playing the nickels and dimes and pennies slots. (17-PG)

#### Child-like themes to attract a younger demographic

Several participants characterised many SGMs as having child-like themes that are likely to appeal to children and a young demographic: 'You have to rescue the princess or there's actually even an elf' (13-PG) and 'It's like Aladdin and he's on a carpet and...then you got the mermaid that flies in' (14-PG). Another participant pointed to the colourful graphics as being particularly attractive to children and youth, and saw this as a casino strategy to attract young people:

When they put in flashy colours or they cater something towards kids, the colours and the music, the flash. It's almost like they are doing that to try to get maybe the younger crowd more attracted to the casinos with the skill-based ones for sure. (10-MR)

One participant explained how her young grandchildren like to watch her play SGMs at the casino and talk to her about the games. She also discussed elements that she thought attracted the children to these games:

[The grandchildren] get very fascinated by the lights and everything and don't understand that that's not for children...when we talk about it, I think they feel involved in it also. And it's nice to see that they can actually enjoy it, without really knowing it's gambling...It's a cartoon animation, you know. They're always smiling and sparkly little things and they see these little coins floating around and here's a unicorn...I just think that they liked it because it's...animated and...they think of it as cartoons, that they can play with them. (13-PG)

#### Theme 5. Safer gambling strategies and Theme 6. Harm Minimisation

#### No difference in safer gambling strategies used for skill-based gambling machines (SGMs)

There was no difference between the personal safer gambling strategies that participants reported using when they gambled on SGMs and on other gambling activities. The only strategies mentioned were limiting the amount of cash they took to the casino and leaving their bank cards at home: 'Anytime I'm going to go to the casino. Whatever games that I'm planning to play. I figure...how much I'm going to take. And that's it.' (11-MR). Similarly:

When I go gamble, I take my money with me. And that's it. I'm not borrowing money off of people. I'm not, you know, going to the ATM machine or you know using the credit card. (18-LR)

Some participants viewed gambling as simply a form of entertainment that they budget for like other leisure activities:

We would say, 'if we would've gone to the movies, we would have spent like \$60 for us' so we go with that \$60 [to the casino] and we play. If we win, that's fun, we take that \$60 and put it back in our pocket. We lose \$60, okay well, we had a good fun time anyway and then we'll leave. (17-PG)

Some safer gambling strategies were said to be difficult to implement due to certain venue practices. One participant recounted a recent gambling session where he had left his bank cards at home to prevent him overspending, but was thwarted by some limited harm minimisation requirements at US casinos:

I did that [strategy]...but they have it set up there [at the casino] now...You can log into your accounts there. They...have a personal account concierge service where they can literally call your bank...And they'll give you the funds right then and there. They'll print out the thing you sign...If you want to spend money, they're gonna let you. (14-PG)

Another participant described his discomfort on hearing a rumour about a new payment system coming to his hometown of Las Vegas:

You can actually just put your credit or debit card into the slot machine, without having to go to an ATM, and you can just play off that way or you know you can just transfer money straight to it, which I think is pretty dangerous. (20-LR)

#### US participants viewed harm minimisation as an individual responsibility

The main subtheme in relation to harm minimisation was that a person's gambling, be it on SGMs or traditional forms of gambling, was their own personal responsibility and that government or industry interventions would not make a difference. This quote sums up most participants' views on preventing gambling harm: 'If somebody really wants to do something, you really can't stop them' (13-PG). The following participant subscribed to a disease model of gambling to explain why it was a personal responsibility:

I don't really think there's something obvious that the government could do...my personal belief...as far as drugs and gambling go, I think it's more like a disease so...no matter what the government do...I think it's...more on the person. (17-PG)

This attitude was seemingly at odds with the lack of industry support for personal safer gambling strategies that some participants mentioned earlier. However, the lack of safer gambling strategies noted does align with the laissez faire attitude of most of the participants regarding harm minimisation. Importantly, most participants viewed SGMs as no different from any other type of gambling in it's potential to cause harm: 'You can get addicted to any kind of gambling. You just got to limit yourself. I go with a certain amount of money. I lose that money, I'm done' (08-LR).

These attitudes may be grounded in more libertarian attitudes in America that prioritise personal freedom and oppose government intervention, particularly in comparison to Australian attitudes:

I'm not about illegalising things. I'm about, you know, letting it all go, letting people experience what they want to, as long as they're not harming anybody. If they harm themselves, that's on them...it's not my right to say anything about that. (10-MR)

One participant likened the responsibility of governments to regulate casinos to prevent gambling harm to that of regulating food outlets to prevent obesity:

Do we close grocery stores and restaurants because people overeat? No. Or do we tell them, you can't buy that food now because you're fat?... I don't see how we can save people from themselves in every single situation. (07-NPG)

Another participant expressed cynicism towards the stated desire of governments and casinos to reduce harm: 'They can shut down casinos and the manufacturers to make something good for people, if they really want to do it' (04-PG).

#### Gambling help service information was the main harm minimisation measure seen

Education or advertisements for gambling help services were the most frequently mentioned harm minimisation measure the participants had seen. Many believed that it was the most effective intervention that could be implemented by governments or casinos:

At all the casinos...there's always like cards or signs, flyers, you know, little things here and there, that basically advertise 'If you think you have a problem'...call this number (19-NPG)

However, some participants were critical of these efforts to channel gamblers into treatment: 'I don't really see that as being very effective, but it might be a rule that the government has' (05-LR); and 'I don't think anybody really pays attention to those kind of things' (18-LR).

# Suggestions for harm minimisation measures for skill-based gambling machines (SGMs) and younger people

Despite the libertarian views on harm minimisation that much of the sample appeared to have, some participants suggested ways that SGMs, and gambling in general, could be made safer. Dovetailing with the theme that younger people tend to be more attracted to SGMs, one participant suggested using channels suited to young people for safer gambling education: 'Try to gravitate more towards social media because that's what the young folks pay attention more to rather than in the regular TV' (01-LR). This same participant suggested that early intervention in young people attracted to SGMs may be important for preventing future gambling problems:

Because they [SGMs] seem to be paying out a lot more, that's attracting more people, especially the younger crowd. So, you kind of have to educate the young people to control their spending...once they get hooked at a young age, it's going to be more difficult for them to wean them off as they grow older. So, if you catch them when they're young and when they're starting, it can be a lot easier to control that type of negative behaviours. (01-LR)

A few participants described player tracking and pre-commitment as measures that could reduce the risk of harm from SGMs:

I don't know about in Australia, but we have cards for every casino...a loyalty card that you put into the machine...And they know exactly how much you're spending. So, if they see somebody putting in an excessive amount of money, maybe they should like block it. (08-LR)

Another participant suggested that:

It should be made mandatory when you play in the casino to put a limit for the amount of money you can actually use in a day, like \$1,000 or \$2,000 a day. (15-PG)

#### Discussion

In-depth interviews with 20 US residents who gambled at-least monthly on SGMs provided valuable insights that can inform some of the research questions for this study. Importantly, these interviews were based on participants' lived experience in relation to playing SGMs, which adds ecological validity to the project findings. Key findings are discussed below in relation to these research questions.

# Will skill-based gaming attract a new group of people who generally do not gamble? Which gamblers find skill-based gaming machines appealing? RQ 2

The interview findings indicated that, in the opinion of the participants, SGMs are most appealing to a younger demographic, ranging from young to middle-aged adults. Several features of SGMs were said to be particularly attractive to this younger cohort, compared to an older demographic. These features included the dynamic visual effects, loud sound effects (for some), the novelty and surprise aspects of the games, their youth-oriented imagery, and the challenge and dexterity involved in playing the skill-based features. Their similarities to video games present a natural progression from these games to SGMs and can attract this cohort for nostalgic reasons linked to the retro ambience the machines created, the fond associations they elicited, and a love of video games. SGMs were said to be fun, exciting, interactive and interesting. This presents a type of gambling that is more attractive to a younger demographic, who were predominately male in our sample, and who are more likely to prefer skill-based forms of gambling that arouse positive emotions (Browne et al., 2019; Hing et al., 2016; Rockloff et al., 2020). In contrast, traditional EGMs are typically played for relaxation, dissociation, and escape from negative mood states; all of which an older demographics, and particularly women, tend to prefer (Hing et al., 2016; Merkouris et al., 2016; Thomas et al., 2009).

Skill-based gambling is targeted to a younger cohort (Gainsbury et al., 2020a; Pickering et al., 2020) and may therefore attract a new group of gamblers. Although this could not be observed among the interviewees, who all gambled on multiple forms, some participants felt that SGMs were designed to attract the next generation of gamblers through an exciting and interactive product that resembles the video games they routinely play.

### How accurate are gamblers in understanding the level of skill involved in skill-based gaming, and the odds of winning? RQ 3

There was very little evidence that the interviewees understood that skill has minimal impact on game outcomes for SGMs. This has been found in previous research (Gainsbury et al., 2020b; Pickering et al., 2020). In particular, those people in the problem gambling group vastly overestimated the role that skill plays in the odds of winning. While they recognised that game outcomes on traditional EGMs are based on chance, they perceived SGMs to offer a very different opportunity for increasing their chances of winning, through applying skill to optimise game outcomes. They were typically confident that, with sufficient skill, they could be assured of winning, or at least markedly improve their likelihood of winning. These findings are consistent with previous observations that SGMs can elicit illusions of control in players, which may contribute to the development of gambling problems (Pickering et al., 2020).

Some participants, including from all PGSI groups, also acknowledged the role of luck in SGMs, with many seeing these games as a combination of luck and skill. However, these participants still tended to overestimate the role of skill, and to underestimate the role of chance. None of the interviewees expressed confidence that they understood how much the skill portion of the game affected wins and losses. Some recognised that the house still had the edge in SGMs, but the marketing of these games as requiring skill appeared to confuse their understanding.

### Does skill-based gaming increase the 'illusion of control' and what is the potential impact? RQ 4

Illusions of control are common amongst gamblers and are a predictor of gambling problems and harm (Mackillop et al., 2006; Steenbergh et al., 2002). Consistent with this observation, illusions of control over wins on SGMs were also common amongst the interviewees, particularly those with a gambling problem. Based on this cognitive illusion, these participants tended to view SGMs as a way they could make money by using their skill to overcome the house edge. Naturally, these beliefs foster increased

gambling on SGMs, which (in isolation) increases the risk of gambling problems. People experiencing problems with their gambling are more likely to make gambling choices based on their likelihood of winning money, rather than on other factors (Thorne et al., 2016). SGMs may, therefore, be particularly attractive to people with a gambling problem or contribute to the development of a problem (Gainsbury et al., 2020a; Pickering et al., 2020).

Participants attributed their perceived control over skill-based gambling machines to knowledge, dexterity, practice, and skills that were said to override chance or extend upon luck. Those experiencing a gambling problem particularly described how they frequently played SGMs in order to 'train', 'study', 'learn', 'practice' and hone their skills. This suggests that games that are promoted as having a skill element may contribute to fostering harmful cognitive distortions and encourage more frequent play, since in fact, skill contributes little to these game outcomes. It is well established that more frequent gambling, especially on continuous forms such as EGMs, increases the likelihood of gambling problems and harm (Currie et al., 2006; Rockloff et al., 2012, 2021). Hence, the presentation of SGMs as having outcomes heavily influenced by skill encourages repeated play, which in turn increases the risk of gambling problems and harm.

Further, winning on SGMs can affirm these illusions of control. Participants discussed feeling empowered by these wins, because they could attribute them to their own 'dexterity', 'mental competency', 'knowledge' and skilled play. Accordingly, winning can strengthen the salience of wins because it provides positive feedback on the person's abilities and performance. The increased cognitive complexity of SGMs, and the resultant impression that the outcome depends on personal skills, can lead to illusions of control (Goodwin et al., 2017) and more harmful gambling (Armstrong et al., 2016). Ironically, some participants also reported that they more easily accepted their losses on SGMs, because they had at least tried to improve their chances of winning by gambling on a SGM instead of a traditional EGM.

# What is the potential impact on the pattern of play e.g., length and frequency of playing sessions, player loss per session, loss of control of gambling, gambling intensity and level of immersion? RQ 5

As discussed above, cognitive distortions about the influence that skill has in determining wins can foster increased play, in an attempt to improve skills to optimise gambling wins. This was particularly observed among participants with a gambling problem. The small sample size for the interviews precludes other conclusions about the impact of SGMs on patterns of play. In fact, there were mixed views among participants about whether these machines resulted in faster or slower rates of play and expenditure. Some participants noted that low denomination SGMs were not available, which therefore presents a higher cost of entry compared to traditional EGMs, which may increase gambling losses.

### What effect does skill-based technology in gaming machines have on gambling-related harm? Is interest in these games associated with problem gambling? RQ 6

As discussed above, SGMs and their marketing can nurture cognitive distortions that increase the likelihood of gambling harm, because they foster the belief that players can control what are primarily random game outcomes (Gainsbury et al., 2020a; Pickering et al., 2020). This increases the risk of harm through encouraging repeated play to hone the skill that players believe will help them win. This effect was most prominent among participants in the problem gambling group, indicating that they are especially vulnerable to these effects, and are attracted to these games in the hope of exerting some control over gambling wins.

SGMs also increase the potential for gambling harm because they mainly attract young adults, especially males in the opinions of the interview participants. Young people are more vulnerable to experiencing problems with gambling compared to older age groups. For example, Australians aged 18-24 are nearly twice as likely to be moderate risk or problem gamblers, compared to the general population, with the risk declining linearly with age (Rockloff et al., 2020). Males are also more likely to experience problems with gambling compared to females (Hing et al., 2016; Rockloff et al., 2020). Targeting a gambling product to a population with a heightened propensity for gambling problems is highly likely to increase gambling harm. Further, the next generation of young adults may be particularly attracted to SGMs because of their similarities to the video games that they currently play, whereas traditional EGMs lack the audio-visual and interactive features that this generation has become accustomed to in their gaming experiences.

SGMs may also increase gambling-related harm because they provide another form of gambling. Research has consistently found that people with a gambling problem are more likely than others to participate in a higher number of gambling activities (Binde et al., 2017; Mazar et al., 2020; Rockloff et al., 2020). SGMs therefore provide new opportunities for increased gambling involvement (gambling on more forms), with increased gambling involvement being a strong predictor of problem gambling (Afifi et al., 2014; Baggio et al., 2017; Hing et al., 2022). While causal directions are uncertain, it is clear that new forms of gambling attract vulnerable customers with a heightened propensity for gambling problems.

# How do responsible gambling behaviours, such as taking breaks in play, setting limits and so on differ for skill-based gaming? RQ 8

The interview participants reported no difference in the safer gambling strategies they used when they gambled on SGMs and on other gambling activities. The only strategies they mentioned using when visiting a casino were limiting the amount of cash they took and leaving their bank cards at home.

# What are the options for mitigating the risks associated with skill-based gaming machine technology? RQ 9

The participants provided few insights into how the risks of SGMs could be mitigated. This partly reflects the libertarian values conveyed by most participants, reflecting a general preference in the US to protect personal freedoms and limit government intervention. The few suggestions for additional harm minimisation measures included player tracking, pre-commitment, and consumer education targeted at young people since they are the most likely demographic to use SGMs.

#### Limitations

The sample for this study was drawn from people who are members of an internet panel where people fill out surveys for minimal compensation. Consequently, the sample is likely not entirely representative of people in the targeted population of people who live in areas where SGMs are widely available. Moreover, people who ultimately volunteer for interviews may be different from persons who were otherwise eligible but who ultimately could not be contacted for a successful interview.

Given that gambling is a sensitive and potentially stigmatising subject, there may have been selfpresentation bias where participants could be motivated to exaggerate harms associated with gambling products to be a "good subject" and provide answers that the interviewee may expect the researchers wish to find. Conversely, there might also be a tendency to minimise any issues from gambling that may occur to the participant from their gambling to minimise embarrassment or shame associated with their conduct.

#### Conclusion

In-depth interviews with US residents who gamble on SGMs provide valuable insights into the appeal of these games and their understanding of the role of skill and chance in determining outcomes. The findings indicate that one of the main drawcards of SGMs is the higher entertainment value. This is due to the novelty, the more sophisticated graphics and sounds, and nostalgic themes common to SGMs. SGMs are thought to appeal to a younger demographic, who are at a greater risk of experiencing problems with gambling. SGMs appear to increase the risk of players overestimating the role of skill and underestimating the role of chance in determining game outcomes. This leads to an illusion of control over the outcome of the gamble, which can contribute to greater gambling intensity, an increased risk of gambling-related harm, and the development of gambling problems. Highly concerning was the behaviour of 'training' on SGMs to improve one's skills, a behaviour that was raised as a possibility by regulators in a previous stage of this study, and the belief that SGMs can be used as a way to make money when participants were in a poor financial position. These results highlight the importance of educating gamblers on the limitations of the skill component in SGMs and the dominant role of chance in determining game outcomes.

### **Skill-based Internet Survey**

### **Key findings**

- US persons who play SGMs have higher rates of gambling-harm and problem gambling than other bettors who have not played these games.
- People with severe gambling problems (PGSI 8+) showed a greater future interest in playing SGMs (i.e., 40.1% were "extremely interested") than gamblers with lessor or no problems (only 15.7% of people without gambling problems were likewise "extremely interested").
- The use of safe gambling practices (SGPs) was generally lower amongst gamblers who played SGMs.
- People of Hispanic background and people with psychological vulnerabilities (e.g., psychological distress) were found to have a higher interest in playing SGMs, demonstrating a potential for these games to exacerbate pre-existing inequities in society.
- Almost forty percent (39.1%) of non-gamblers showed at least some interest in playing SGMs in the future, showing the draw of these games amongst people who otherwise might not gamble.

### Background

Skill-based gambling in Australia is limited in scope, providing little opportunity to explore Australians' experiences with these games. In contrast, skill-based gambling machines (SGMs) have been approved for some time and are more commonly found in the US states of Nevada and New Jersey. To better understand the impact of skill-based gambling on gambling-related harm and problem gambling, a survey was conducted using a sample of 1,134 people recruited from online panels via Qualtrics. The survey included measures of gambling harm, problem gambling, and participants' experience with and attraction to skill-based gambling. The results of this survey, as discussed below, were used to examine the relationship between skill-based gambling (interest and usage), and gambling harm and problem gambling, as well as the potential appeal of skill-based gambling to at-risk groups.

Descriptions of popular skill-based gambling machines (SGMs) that are likely to seek regulatory approval in Australia were shown to participants to gauge their interest. From our prior environmental scan, these included four types of game categories: shoot'em up, gemstone, fast-reaction and classic home games. These types are described in more detail below. The survey aimed to address several research questions posed by GRA, including "Do different types of skill-based gambling machines (SGMs) have different harm implications, for example those based on skill-based features as compared with games where skill is incorporated throughout play?" (RQ 7). Further, our examination of these game-types allowed us to determine whether individuals with gambling-related harm or pre-existing gambling problems are attracted to and tend to play certain types of skill-based gambling machines (SGMs), providing an answer to the research question posed by GRA ""What effect does skill-based technology in gaming machines have on gambling-related harm? Is interest in these games associated with problem gambling?" (RQ 6). In short, these findings provide insight into whether different types of skill-based gambling have varying implications for harm.

Hing et al. (2019) studied protective "safer gambling practices" (SGPs), including actions such as leaving credit cards at home, and found a set of nine practices more often used by frequent and at-risk gamblers who generally experience less harm. A checklist of these practices was used in the survey to understand their relationship with people who use skill-based gambling machines, helping to answer the GRA question, "How do responsible gambling behaviours, such as taking breaks in play, setting limits and so on differ for skill-based gaming?" (RQ 8).

The survey also explored the potential appeal of skill-based gambling to at-risk groups, including people with gambling problems, youth, males, culturally and linguistically diverse (CALD) persons, non-gamblers, and individuals with psychological vulnerabilities, helping to address the GRA research question "Will skill-based gambling attract a new group of people who generally do not gamble? Which gamblers find skill-based gambling machines appealing?" (RQ 2). The survey assessed the desirability of skill-based gambling machines for these groups over more traditional EGMs.

In summary, this study aimed to examine the relationship between skill-based gambling, and the outcomes of gambling-related harm and problem gambling. The survey included descriptions and images of popular skill-based gambling machines (SGMs) to assess participants' experiences and attraction to these games. The findings of this study provide insight into the potential harm implications of different types of skill-based gambling machines and the appeal of these games to at-risk groups.

#### **Methods**

#### Recruitment, inclusion and exclusion criteria

Participants were recruited via online market research panels, facilitated by Qualtrics, and were reimbursed in line with the usual practice of each panel. An initial soft launch started on November 8<sup>th</sup>, 2022, with full launch the following day. Fieldwork finished on December 5<sup>th</sup>, 2022.

Participants were required to have lived in, or travelled to, the states of Nevada or New Jersey in the last 12 months, as SGMs are most common in these states. Participants were also required to be aged 21 or older, as this is the legal age for gambling in land-based casinos in these states. Survey respondents were required to take the survey from an IP address that indicated they were in the United States at the time of taking the survey.

The final total of good completes was 1,134. The completion rate of eligible respondents is given by 1134 / (1134+290) = 79.6%.

A description of quotas, data screening, completion rates and screen-outs is provided in the appended Technical Report (see pg. 260).

#### **Recruitment Groups**

Potential participants were pre-screened by the panel provider to include sets of past-12-month EGM gamblers, other gamblers who do not play EGMs, and non-gamblers. These recruitment groups were specified for the purposes of understanding the appeal of SGMs to these different groups. Soft quotas were set to recruit an approximate 50% of past 12-month EGM gamblers, and equal numbers of other persons. We had no good baseline expectation for how many SGM players we could recruit, and therefore we recruited a larger number of EGM gamblers in the expectation that at least some of these people would have played on SGMs. The overall sample consisted of 1,134 good responses. From these good completes, 609 (53.7%) were in the EGM players group, 300 (26.5%) in the "other gamblers" group (e.g., sport betting, race betting, etc.), and 225 (19.8%) in the non-gamblers group. Of the 609 people in the EGM players group, 409 had played SGMs in the previous 12 months.

#### Measures

#### Screening and quota questions

Participants were shown a participant information statement, and then asked to provide their consent to continue with the survey. Participants were then asked their age (in years), and whether they had travelled to or lived in Nevada or New Jersey in the last 12 months.

#### Frequency of gambling on EGMs

Participants were asked how frequently they had gambled on regular slot machines, console-style games based on traditional casino games, and hybrid or skill-based gambling machines (SGMs), with response options from "not at all in the last 12 months" to "4 or more times a week" (see the survey on pg. 262). These three types of EGMs were presented in the same order for all participants (regular then console-style casino games then hybrid or skill-based), as this progression was likely to help participants understand and distinguish between each type of machine. In addition, a brief description of each type was provided, and images of popular examples of each type were shown. Regular slots were described as those "with spinning reels". Console-style machines were described as "machines in a casino, not online, for playing roulette, poker, dice/craps, big wheel, blackjack…". Hybrid and skill-based gambling machines (SGMs) were described as games that often resemble popular video games, where players bet on the outcomes. Hybrid machines were additionally defined as slot-machines where a skill-based game is embedded within a bonus round. Participants who reported gambling on one or more of these three types of EGMs were included in the EGM group, regardless of any other gambling.

#### Frequency of other types of gambling

Participants were also asked the frequency of their gambling on other popular gambling products in the last 12 months, such as casino games played at a table with a croupier, casino-style games played on a computer or mobile device (betting real money), betting on sports, races, esports, fantasy sports or other events, lotteries or scratch cards, keno or bingo, and informal gambling, such as playing cards at home for money. The response options were the same as for frequency of gambling on EGMs. Participants who gambled on one or more of these products could be in the EGM group if they had also played any of the EGM-types, or in the "other gambling" group if they had not played EGMs in the last 12 months. Participants who did not gamble on EGMs, or on any of these forms, were in the "nongambling" group.

#### Frequency of playing video games

Participants reported how often in the last 12 months they had played video games on a computer, video games on a mobile device, or video games on a console (e.g., Xbox, PS4, etc), using the same response options. These questions had no bearing on allocation to groups.

#### Appraisal of four common skill-based gambling machines (SGMs)

Participants were asked about each of four common SGMs: shoot-em-up games (using hand-eye coordination), gemstone/jewel puzzle games where players manipulate tiles to make them disappear, fast reaction games where buttons must be pressed at designated times, and classic home games such as solitaire or scrabble. For each form, images of two specific games that were typical of the category were shown to participants, to help participants understand the nature of the games.

The questions for all four categories of games were the same, and all participants answered questions for all four categories of games, even if they had not played them before. First, participants were asked if they had seen similar games as a casino or other gambling venue, and how often they had played them in the last 12 months, using the same frequency response options as other gambling frequency questions above. Participants were asked their interest in playing a game like the one shown (not interested, slightly interested, very interested, extremely interested).

Using the VICES framework (Rockloff et al., 2016), participants were asked how important each of the following features of each game were to them: graphics, artwork and sound; use of skill; use of strategy; fast-paced action; competition with others; and the ability to win money. Response options were collected on a five-point Liikert scale, from: not important (1) to very important (5). Finally, participants were asked how desirable each game type was compared to a typical slot machine, using a four-point Likert scale from: prefer typical slots (1) to prefer the game shown above (4).

*Barratt Impulsiveness Scale – Brief version* (Steinberg et al., 2013). The BIS-Brief consists of eight items rated on a four-point Likert scale, with four of the items reverse-scored. Cronbach's alpha for this scale was .67, with higher scores indicating higher levels of impulsiveness.

*Problem Gambling Severity Index (PGSI)* (Ferris & Wynne, 2001) – The PGSI was administered in relation to the last 12 months. It consists of nine items, each rated on a four-point Likert scale, from never to almost always. Scores are summed for a total between 0 and 27, with higher scores indicating higher problem severity. In addition, participants are classified into groups based on their score (0 = non-

problem gambling, 1-2 = low-risk gambling, 3-7 = moderate-risk gambling, 8-27 = problem gambling). Cronbach's alpha for the PGSI in this study was .96.

Short Gambling Harms Screen (SGHS) (Browne et al., 2017) – The SGHS was administered in relation to the last 12 months. The screen consists of 10 items, with response options no (0) and yes (1). Scores are summed for a total between 0 and 10, with higher scores indicating higher levels of gambling harm. Cronbach's alpha for this scale in the study was .90.

*Gambling Outcomes Expectancies Scale (GOES) (Flack & Morris, 2015, 2016)* – The GOES consists of 18 items, each rated on a six-point Likert scale from strongly disagree to strongly agree. Items are scored into five subscales, assessing motivations for gambling. These are *social, money, excitement, escape* and *ego enhancement*. Cronbach's alpha for the five subscales were .83, .86, .78, .88 and .89 respectively.

*Gambling Fallacies Measure* (Leonard et al., 2015) – Gambling fallacies were assessed by 10 multiple choice questions, each designed to test different gambling fallacies. The number of correct items is summed for a total between 0 and 10. Therefore, *lower* scores indicate higher levels of gambling fallacies. Due to the nature of the scoring on this scale, Cronbach's alpha was not calculated.

Safer Gambling Practices (Hing et al., 2019) – The use of safer gambling practices was assessed via nine questions with four-point Likert scale responses from "never" to "almost always". The last three practices were reverse-scored, and Cronbach's alpha on this scale was .60, with higher scores indicating higher use of safer gambling practices. It is important to note that this scale is most useful amongst people who are vulnerable to gambling harm (based on numerous risk factors) since people who are less vulnerable to gambling harm have less need to use these practices to keep them safe.

*Dissociation – DES-B* (Dalenberg & Carlson, 2010) – The Dissociation Questionnaire consists of eight items with five-point Likert response options from "not at all (0)" to "more than once a day (4)". Scores are summed for a total between 0 and 32, and also averaged, for a total between 0 and 4. A clinical interpretation of the mean score is 0 = no dissociation, 1 = mild, 2 = moderate, 3 = severe and 4 = extreme. Reliability for this scale was .91.

Kessler 6 (K6) (Kessler et al., 2010) – The Kessler 6 scale, assessing psychological distress experience within the last 30 days, consists of six items, each rated from "none of the time" (0) to "all of the time" (4). Using the original scoring method, items were summed for a total between 0 and 24, with higher scores indicating higher psychological distress. In addition, participants were categorised into two

groups: "no psychological distress" (K6 from 0 to 12), and "probable psychological distress" (K6 from 13 to 24).

#### **Demographics**

Participants reported their age, gender (man, woman, other, prefer not to say), zip code of main residence, race (captured as per the US Census via two questions: e.g., Hispanic/Latino/Spanish origin and race), marital status, highest educational qualification, work status, personal pre-tax income and whether they have been diagnosed with a mental health condition or if they believe they have had mental health problems (yes/no). All participants were also shown the contact details for US-based gambling help lines and for US crisis services.

#### Results

#### Gambling harm and the use of skill-based gambling machines (SGMs)

Table 7 shows gambling harm amongst people who played SGMs with different frequencies during the last 12 months. The analysis excludes non-gamblers. The majority of participants who have not been harmed by gambling within the last 12 months have also not gambled on skill-based gambling machines (SGMS) (66.0%). In contrast, the majority of participants who **have** been harmed by gambling in the last 12 months have played SGMs (68.1%).

Chi-square comparisons of column proportions show that people who played SGMs once a month or more often were more likely to have experienced gambling harm. In contrast, people who did not play SGMs at all in the last 12 months were more likely to report no gambling-related harm.

In short, these results help answer the first part of the following Gambling Research Australia question (see below) by suggesting that play on SGMs is reliably related to the experience of gambling-related harm:

"6. What effect does skill-based technology in gaming machines have on gambling-related harm? Is interest in these games associated with problem gambling?"

#### Table 7. Gambling harm and SGM gambling frequency<sup>\*</sup>

#### Short-gambling harms screen (SGHS)

	No harm		1+ harms	
	Count	%	Count	%
Not at all in the last 12 months	194 <sub>a</sub>	66.0%	196 <sub>b</sub>	31.9%
Less than once a month	35 <sub>a</sub>	11.9%	75 <sub>a</sub>	12.2%
Once a month	27 <sub>a</sub>	9.2%	93 <sub>b</sub>	15.1%
2-3 times a month	11 <sub>a</sub>	3.7%	98 <sub>b</sub>	15.9%
Once a week or more	27 <sub>a</sub>	9.2%	153 <sub>b</sub>	24.9%

Note: Values in the same row and sub-table not sharing the same subscript are significantly different at p<.05 in the two-sided test of equality for column proportions. Cells with no subscript are not included in the test. Tests assume equal variances.<sup>1</sup>

\* Tests are adjusted for all pairwise comparisons within a row of each innermost sub-table using the Bonferroni correction.

#### Problem-gambling and use of skill-based gambling machines (SGMs)

Problem gambling is related to, although somewhat distinct from, gambling harm. People with severe gambling problems are likely to experience gambling-harm, but they also have symptoms of addiction to gambling that may suggest a mental health condition of disordered gambling. Thus, it is important to explore separately the relationship between use of SGMs and symptoms of problem gambling.

Table 8 shows the PGSI categories amongst people who play SGMs with different frequencies (e.g., once a month, 2-3 times a month, etc.). As illustrated, people without gambling problems are most likely to have NOT played SGMs at all in the last 12 months (76.0%). People with severe gambling problems were most likely to have played SGMs compared to all other risk groups, with 75.5% reporting playing them during the last 12 months, compared to 43.8% for moderate-risk, 58.0% for low-risk and 24.0% for nonproblem gamblers.

Supporting these observations, chi-square comparisons of column proportions showed that people in the non-problem category were less likely to have played SGMs once a week (or more) than people in

the low-risk, moderate-risk and problem groups. People with severe gambling problems were also more likely than people with low-risk problems or no problems to play SGMs weekly or more frequently.

In short, there is a clear pattern connecting frequency of use of SGMs and the experience of problem gambling symptoms. People with progressively higher levels of problems are significantly more likely to play SGMs, and to play them more frequently, than other risk groups. This provides a positive answer to the second part of the Gambling Research Australia question:

"What effect does skill-based technology in gaming machines have on gambling-related harm? Is interest in these games associated with problem gambling?" RQ 6

#### Table 8. Gambling problems and skill-based gambling frequency<sup>\*</sup>

	Non-Problem		Low-risk		Moderate risk		Prob. Gambling	
	Count	%	Count	%	Count	%	Count	%
Not at all in the last 12 months	165 <sub>a</sub>	76.0%	29 b	42.0%	77 <sub>b</sub>	56.2%	119 <sub>c</sub>	24.5%
Less than once a month	25 <sub>a</sub>	11.5%	14 a	20.3%	16 a	11.7%	55 <sub>a</sub>	11.3%
Once a month	12 <sub>a</sub>	5.5%	12 <sub>b</sub>	17.4%	12 <sub>a,b</sub>	8.8%	84 <sub>b</sub>	17.3%
2-3 times a month	6 <sub>a</sub>	2.8%	3 <sub>a,b</sub>	4.3%	15 <sub>b,c</sub>	10.9%	85 <sub>c</sub>	17.5%
Once a week or more	9 <sub>a</sub>	4.1%	11 <sub>b,c</sub>	15.9%	17 <sub>b</sub>	12.4%	143 <sub>c</sub>	29.4%

#### Problem Gambling Severity Index (PGSI)

Note: Values in the same row and subtable not sharing the same subscript are significantly different at p< .05 in the two-sided test of equality for column proportions. Cells with no subscript are not included in the test. Tests assume equal variances.<sup>1</sup>

\* Tests are adjusted for all pairwise comparisons within a row of each innermost subtable using the Bonferroni correction.

#### Problem gambling and future interest in playing skill-based gambling machines (SGMs)

One indicator of "interest" in SGMs is whether people have played them within the last 12 months. This question has been explored above. However, another important and related question is whether future

interest in playing these games is associated with gambling problems. This analysis is restricted to people who gambled in the last 12 months. An examination of this variable of future interest is important to explore as a more subjective indicator of whether these games are likely to continue to be popular amongst subsets of the population. Ultimately, realising these behavioural intentions, of course, is complex and may be under the influence of attitudes towards SGMs, subjective norms around playing SGMs and perceived ability to profit from- or resist the temptations of SGMs (Ajzen, 1985). The survey recorded future interest in four different types of SGMs: Shoot'em up, Gemstone, Fast reaction and Classic home games. For simplicity in this analysis, the highest rated interest amongst these sets of games was recorded as the variable of concern: future interest in SGMs.

As shown in Table 9 below, 28.6% of non-problematic gamblers (i.e., PGSI = 0) report no interest in playing any SGMs in the future. In contrast, only 2.5% of people with severe gambling problems have no such interest. Conversely, only 15.7% of people with no gambling problems indicated that they are extremely interested in playing at least one of the types of SGMs in the future, whereas 40.1% of people with severe gambling problems reported such an extreme interest.

Chi-square tests of column proportions indicate that people without any problem gambling symptoms (i.e., PGSI = 0) are significantly less interested in playing SGMs than people with two or more symptoms. In addition, proportionally more people with low, moderate or severe gambling problems are 'extremely interested' in at least one of these types of SGMs when compared to people gamblers without problems.

In short, there is a strong relationship between future interest in playing SGMs and current gambling problems. By focusing on future interest, Table 8 provides another answer to the second part of the Gambling Research Australia question:

""6. What effect does skill-based technology in gaming machines have on gambling-related harm? *Is interest in these games associated with problem gambling?*"

#### Table 9. Gambling problems and future interest in playing skill-based gambling machines\*

	Non-problem		Low risk		Moderate Risk		Prob. Gambler	
	Count	%	Count	%	Count	%	Count	%
Not interested	62a	28.6%	4 <sub>b</sub>	5.8%	5 <sub>b</sub>	3.6%	$12_{b}$	2.5%
Slightly interested	76 <sub>a</sub>	35.0%	20 <sub>a,b</sub>	29.0%	26 <sub>b,c</sub>	19.0%	76 <sub>c</sub>	15.6%
Very interested	45 <sub>a</sub>	20.7%	23 <sub>a,b</sub>	33.3%	52 <sub>b</sub>	38.0%	203 <sub>b,c</sub>	41.8%
Extremely interested	34 <sub>a</sub>	15.7%	22 <sub>b</sub>	31.9%	54 <sub>b</sub>	39.4%	195 <sub>b</sub>	40.1%

Problem Gambling Severity Index (PGSI)

Note: Values in the same row and sub-table not sharing the same subscript are significantly different at p< .05 in the two-sided test of equality for column proportions. Cells with no subscript are not included in the test. Tests assume equal variances.<sup>1</sup>

\* Tests are adjusted for all pairwise comparisons within a row of each innermost sub-table using the Bonferroni correction.

#### Problem gambling and preferences for skill-based gambling machines (SGMs) by game type

A Mixed Design ANOVA was calculated with Game Preferences (1 = prefer typical slots to 4 = prefer this [SGM] type) as the repeated measures dependent variables (cf., Carifio & Perla, 2008). Game preferences were recorded separately, within-subjects, for the main game types found in the environmental scan, including: Shoot'em up, Gemstone, Fast reaction and Classic home games.

Predictor variables included the four levels of game type, noted above, as well as problem gambling status (i.e., PGSI category) as a between-subjects factor. Lastly, age and gender were covariates included

for helping to equalise comparisons. This analysis was restricted to people who gambled within the last 12 months.

Table 24 in Appendix C (pg. 225) shows tests of within-subjects and between-subjects effects. There were no significant differences between the game types in overall desirability. In addition, the desirability of game types was not significantly different between older and younger participants. However, there were significant interactions between game type preferences and gender. Lastly, there were also significant differences in game type preferences by problem gambling status.

Despite these multivariate findings, tests of contrasts revealed that there were no large differences between people identifying as either a man or woman regarding preference for different game types. The findings for gender, instead, reflected that people who refused to answer the question on gender preferred Gemstone and Classic home games. This has no clear interpretation, and therefore detailed results on gender are withheld for brevity and clarity of exposition.

As shown in Figure 7 below, there was a general trend for people with greater problem gambling severity to have a greater relative preference for SGMs over typical slot machines. People in the non-problem gambling group, on average, showed a preference for typical slot machine games over skill-based gambling machines (SGMs). The largest differences in preferences between people with- and without gambling problems were for Shoot'em up and Fast reaction games.

It is notable that people with severe gambling problems uniformly preferred all these skill-based gambling machines (SGMs) over typical slot machines (on average) but showed no clear preference for any one type of skill-based game.





Note: Scale ranges from 0 = prefer traditional slots to 4 = prefer skill-based game, where 2 represents the midpoint of relative indifference.

# Frequency of playing skill-based gambling machines by game type and problem gambling status

A Mixed Design ANOVA was calculated with frequency of playing skill-based gambling games (1 = not in the last 12 months to 7 = four or more times a week) as the repeated measures dependent variables. Frequency of playing skill-based gambling games was recorded separately, within-subjects, for the four game types: Shoot'em up, Gemstone, Fast reaction and Classic home games.

Predictor variables included the four game types, noted above, as well as problem gambling status (i.e., PGSI category) as a between-subjects factor. Lastly, age and gender were included as covariates to help equalise comparisons.

As shown in Table 25 in Appendix C (pg. 226) there was a significant main effect for game type. Examining pairwise comparisons, Gemstone and Classic home style games were played marginally more often within the last 12 months across participants, p < .05. There were no large differences between men and women in the frequency of what skill-based gambling machines (SGMs) they played. However, people who refused to divulge their gender more frequently played Fast-reaction and Classic home style games. In addition, people who nominated a gender other than male or female more often played Gemstone style games. Since these results did not have a clear interpretation, the pairwise comparisons are not included here in the interests of brevity and clarity of exposition.

As shown in Figure 29 below, there was a significantly greater reported frequency in playing each game type (Shoot'em up, Gemstone, Fast reaction and Classic home) amongst people with greater problem gambling severity. On average, people with severe gambling problems reported playing each of these types of skill-based gambling machines a little more than once a month. In contrast, people in the non-problem gambling category reported playing each type of skill-based game either 'once a month' or 'not at all' in the last 12 months. Frequency of playing Shoot'em up and Fast reaction games showed the same pattern as game preferences. In particular, the most significant difference in use was between people with fewer or no problem gambling symptoms, and people with many or severe symptoms, for these two types of games. The differences for Gemstone and Classic home games, in contrast, were less extreme.



Covariates appearing in the model are evaluated at the following values: What is your age? (Please enter a whole number) = 42.3, What is your gender? = 1.64

Error bars: +/- 1 SE

## Figure 29. Frequency of Playing Skill-based gambling machines (SGMs) by Game Type and Problem Gambling Status

These results help answer the Gambling Research Australia question:

### Do different types of skill-based gambling machines (SGMs) have different harm implications, for example those based on skill-based features as compared with games where skill is incorporated throughout play? RQ 7

In direct answer to the question, all explored types of games have a similar appeal and high usage among people with severe gambling problems and thus are at least implicated as similarly harmful. However, Shoot'em up and Fast reaction games are attractive to people with problem gambling symptoms, while being less attractive to people without any symptoms at all. Our interviews with regulators indicated that hybrid games predominate in the marketplace, and therefore we did not attempt to answer the question about whether hybrid games were perceived differently to standalone SGMs.

### Use of safe gambling practices amongst people who either play or are interested in skillbased gambling machines (SGMs)

A mixed design ANOVA was calculated with nine Safe Gambling Practices (SGPs) as the repeated measures dependent variables (see Table 26 in Appendix C, pg. 228). This analysis was restricted to people who had gambled within the last year. Independent variables included whether someone had gambled using a Skill-based gambling machine within the last 12 months (yes, no) and the covariates of Age and Gender.

The results revealed that women were slightly, although significantly, more likely to use safe gambling practices overall. In addition, older participants were more likely to use safe gambling practices.

As shown in Figure 30 below, there was a significant difference in usage of six safe gambling practices between people who either did or did not use these types of games within the last 12 months. Test of simple effects revealed the following. Firstly, 1) people who played SGMs (compared to other gamblers) were more likely to keep a gambling budget, which is a positive safe gambling practice.

In contrast, people who gambled on skilled based gambling machines (SGMs), when compared to other gamblers, were 2) slightly less likely to make time for other activities, 3) **more** likely to research gambling systems, 4) **more** likely to gamble to try and supplement their income, and 5) **more** likely to use cash advances with which to gamble.



Figure 30. Use of Safe Gambling Practices by people who did and did not gamble on skillbased gambling machines within the last 12 months

This analysis provided an answer to the following question posed by Gambling Research Australia:

# How do responsible gambling behaviours, such as taking breaks in play, setting limits and so on differ for skill-based gaming? RQ 8

In direct answer to this question, people who play SGMs are less likely to use 4 of the 9 safe gambling practices (SGPs) that have been shown to be protective from gambling harm (Hing et al., 2019). As a minor exception, however, people who played SGMs were more likely than other gamblers to keep a budget for gambling, which is one positive safe gambling practice.

#### Interest in skill-based gambling amongst at-risk persons

A univariate general linear model was calculated using overall future interest in skill-based gambling (1= not interested, 4 = extremely interested) as the dependent variable. The primary independent variable

of interest was player-group, based on the recruitment groups, but with EGM players split into those who play skill-based machines compared to those who do not. More specifically, the four groups were 1) EGM players (but not skill-based), 2) SGM players, 3) gamblers who did not play EGMs, and 4) nongamblers. Age and gender were entered as covariates. See Table 27 In Appendix C (pg. 229) for tests of between-subjects effects.

Tests of simple effects showed, unsurprisingly, that both male and younger participants showed greater overall future interest in playing SGMs. More importantly, however, future interest in playing SGMs was highest amongst people who already played them, but almost as high amongst people who had only played traditional EGMs (see Figure 31). On average, both groups rated themselves as being moderately interested in playing these games. In contrast, people who were gamblers but not EGM players were, on average, only "slightly interested" in playing these games. Even amongst non-gamblers, 39.1% expressed at least some interest in playing SGMs.

This analysis provides an answer to the Research Question posed by Gambling Research Australia:

# Will skill-based gambling attract a new group of people who generally do not gamble? Which gamblers find skill-based gambling machines appealing? RQ 2(d)

Our findings suggest that these skill-based gambling machines (SGMs) have a reasonably strong attraction for people who have not gambled within the last 12 months. The appeal is still much higher amongst current gamblers. Nevertheless, there is still evidence that these games are at least somewhat attractive to almost 40% of non-gamblers.



#### Figure 31. Interest in skill-based gambling machines (SGMs) by recruitment group

#### Interest in skill-based gambling machines (SGMs) by racial background

A univariate general linear model was calculated using overall future interest in skill-based gambling (1= not interested, 4 = extremely interested) as the dependent variable. Hispanic background (vs. non-Hispanic) was included as one variable of interest. Separately, racial categories of white, black, Asian and other (combined) were also included. Age and gender were included as covariates.

Table 28 in Appendix C (pg. 230) shows the univariate ANOVA table showing a significant effect for all factors included.

Figure 32 below shows that people of Hispanic background are significantly more interested in playing SGMs than people with a non-Hispanic background. Figure 33 below shows that differences by racial background were minor. Despite overall differences, as indicated by Table 28, only Black and Asian participants proved significantly different using LSD comparisons, whereas more conservative post-hoc comparisons (e.g., Bonferroni correction) showed no differences.



Error bars: +/- 2 SE





Figure 33. Interest in skill-based gambling by self-identified racial background

#### Psychological vulnerability and interest in skill-based gambling

A standard regression model was calculated with interest in future skill-based gambling as the dependent variable (see Table 10). Independent variables included psychological risk factors of 1) gambling fallacies, 2) dissociation, 3) Kessler 6 psychological distress, and 4) five factors of the GOES gambling motivations scale. This analysis excluded non-gamblers.

	Unstandardised Coefficients B	Std. Error	Standardised Coefficients Beta	t	Sig.
(Constant)	1.102	0.122			
Gambling fallacies – lower = more fallacies	-0.067	0.013	-0.147	-5.063	p<0.001
Dissociation score, sum	0.009	0.005	0.068	1.981	0.048
Kessler 6, higher = more distress	0.019	0.005	0.120	4.027	0.000
Gambling motivations – social, higher = stronger agreement	0.097	0.040	0.103	2.436	0.015
Gambling motivations – money, higher = stronger agreement	0.091	0.030	0.118	3.073	0.002
Gambling motivations – excitement, higher = stronger agreement	0.046	0.037	0.053	1.235	0.217
Gambling motivations – escape, higher = stronger agreement	0.070	0.037	0.086	1.875	0.061
Gambling motivations – ego, higher = stronger agreement	0.121	0.039	0.153	3.091	0.002

#### Table 10. Regression of interest in skill-based gambling against psychological vulnerabilities

Note: Dependent Variable: Max Interest In Skill Overall

As shown in Table 10, greater interest in future gambling on SGMs was associated with 1) more gambling fallacies, 2) greater scores on dissociation, 3) higher psychological distress (Kessler 6), and

stronger motivations to gamble for 4) social reasons, 5) money reasons, and 6) ego-enhancement reasons.

In short, this analysis showed a strong indication that psychological vulnerabilities are associated with interest in skill-based gambling.

#### Discussion

#### Gambling harm and the use of skill-based gambling machines (SGMs)

The results of this study indicate a relationship between gambling-related harm and the use of Skillbased Gambling Machines (SGMs). As shown in Table 7, the majority of participants who reported experiencing gambling-related harm in the last 12 months also reported playing SGMs, while the majority of those who did not experience harm reported not playing these games. Chi-square comparisons further showed that those who played SGMs at least once a month were more likely than others to experience gambling-related harm.

These results provide insight into the first part of the question posed by Gambling Research Australia: "What effect does skill-based technology in gaming machines have on gambling-related harm?" Our findings suggest that the use of SGMs is associated with an increased risk of gambling-related harm. Playing these machines may increase the risk of gambling harm, or people experiencing gambling harm may be disproportionately attracted to SGMs. A third-variable explanation is also possible.

#### Problem gambling and use of skill-based gambling machines (SGMs)

The results of this study also indicate a relationship between the use of SGMs and problem gambling. Problem gambling is an arguably broader concept than gambling harm, since it includes behavioural indicators of addiction to gambling products, as well as harmful consequences. As shown in Table 8, non-problem gamblers were most likely to have *not* played SGMs at all in the last 12 months, while those with severe gambling problems were more likely to have played these games at least once a week. Chi-square comparisons further showed that those without problem gambling symptoms were less likely to have played SGMs either weekly or more often, whereas those with severe gambling problems were more likely to have done so.

These findings suggest that frequent use of SGMs is associated with an increased risk of problem gambling. This provides evidence for a critical Gambling Research Australia question for this project;

indicating that interest in these games is indeed associated with problem gambling, although further research is needed to identify causal directions.

#### Problem gambling and future interest in playing skill-based gambling machines (SGMs)

The results of this study indicate a relationship between future interest in playing SGMs and current gambling problems. As shown in Table 9, 97.5% of people with severe gambling problems show an interest in playing at least one type of SGMs in the future, whereas a lessor 71.4% of people without gambling problems have such an interest. This finding is concordant with the frequent observation in the literature that people with gambling problems more often participate in a variety of gambling activities. Thus, people with severe gambling problems may be simply more interest in future gambling on all potential forms. Chi-square tests further showed that those without gambling problems were less interested in skill-based gambling machines (SGMs) than those with two or more gambling problems. These findings suggest that individuals with gambling problems are more likely to be interested in playing skill-based gambling machines in the future.

This provides further evidence for the association between interest in skill-based gambling machines and problem gambling. By focusing on future interest, this analysis offers additional insight into whether these games are likely to continue to be popular among subsets of the population. Further research is needed to understand the underlying reasons for this relationship and potential interventions to prevent problem gambling among those who are interested in playing skill-based gambling machines. One potential intervention is to simply not approve such games in Australia. There is no large forgone opportunity in preventing access, since these games are generally not yet widely available in Australia. In addition, there is no substitute channel for access other than overseas trips by a consumer.

#### Problem gambling and preferences for different types of skill-based gambling machines

A mixed design ANOVA showed that there were no significant differences in overall desirability of different game types (see Table 24 Appendix C, pg. 225). However, there were significant interactions between game type preferences and problem gambling status, with people with more gambling-related problems showing a greater relative preference for SGMs over typical slot machines. Figure 28 further showed that people with no gambling problems generally preferred typical EGMs, while those with severe gambling problems on average preferred all types of skill-based gambling machines over typical EGMs.

These findings suggest that individuals with gambling problems are more likely to prefer SGMs to traditional EGMs. Further research is needed to understand the underlying reasons for this relationship. However, as discussed in a prior chapter, our interviews have suggested that some gamblers see SGMs as an opportunity to gain a winning edge over typical EGMs.

#### Hybrid vs. standalone skill-based gambling machines

Most SGMs in Nevada and New Jersey are hybrid games where the skill-based component is limited to a "won" bonus round of play. Consequently, this survey did not examine differences between hybrid vs. standalone machines. Nevertheless, some comments on this distinction are useful here. The presence of skill-based components in reel-based EGM, so-called hybrid machines, may cause confusion among players regarding the extent to which their skills can impact the outcomes. Whether hybrid or standalone, SGMs may seem more skill-based than they are, as the inclusion of a significant chance component is necessary for operators to prevent highly skilled players from consistently winning money. Therefore, if skill-based gambling machines give players the impression that they can be won through practice and investment, it can lead to irrational thinking and excessive spending. This applies whether the skill-based elements are limited to the bonus rounds of the game or form the main feature of the game. Any inclusion of skill-based components in the gameplay is likely to strengthen the illusion of control. Hybrid games may also have the disadvantage of encouraging players to bet on the chancebased reels to trigger the bonus round, resulting in higher persistence and accumulated losses. Hybrid games are the most popular form of SGMs in Nevada and New Jersey, and therefore current observations in this chapter on the attractiveness of SGMs apply to hybrid machines and not just standalone SGMs.

#### Problem gambling and frequency in use of skill-based gambling machines

The results of this study suggest a relationship between frequency of playing SGMs and problem gambling. A mixed design ANOVA showed a significant main effect for game type, with Gemstone and Classic home style games being played more often. This may, however, only reflect a difference in availability of such machines. Per our findings above, there was no overall difference in preference for different types of games. Additionally, Figure 29 showed that individuals with more gambling-related problems reported playing each game type more often, with those persons with severe gambling problems playing each type of skill-based gambling machine a little more than once a month, on

average. In contrast, individuals with no gambling-related problems typically reported playing each type of skill-based gambling machine either once a month or not at all.

These findings suggest that individuals with gambling problems are more likely to play skill-based gambling machines more frequently, which conforms with their previously found modest preference for these skill-based gambling machines over traditional EGMs.

#### Use of safe gambling practices amongst people who play skill-based gambling machines

Nine safer gambling practices were surveyed (Hing et al., 2020) and compared with respect to their use by people who either *do* or *do not* play SGMs. People who play SGMs are less likely to use safe gambling practices overall. In particular, people who played skill-based gambling machines were substantially more likely to research gambling systems, to gamble as a source of income, and to take cash-advances for gambling. Each of these behaviours should be avoided to maximise protection against gambling harm.It is notable that people with more gambling problems tend to both use fewer safe gambling practices and play SGMs more frequently, thus these findings do not necessarily suggest a functional relationship between the use of SGMs and forgoing safe gambling practices.

Consequently, in addition to the evidence that people with greater problem gambling severity are drawn to SGMs and play them more often, people who play these skill-based gambling machines also tend to avoid using safer gambling practices at the same rate as others. It would be helpful to know if these games may encourage people to use fewer safe practices, or if – instead – people who avoid these practices are drawn to these games.

#### Future interest in skill-based gambling machines across demographics

A univariate general linear model was calculated to examine future interest in skill-based gambling amongst demographically at-risk groups. The results indicated that both male and younger participants had a higher overall interest in playing SGMs. Additionally, interest in SGMs was highest amongst people who already play them but was almost as high amongst people who only played traditional EGMs. People who were gamblers but not EGM players (e.g., casino game players, sports bettors) were, on average, only slightly interested in playing these games. Lastly, a strong minority of non-gamblers were at least slightly interested in playing skill-based gambling machines in the future. Thus, there is some evidence that these games may draw in new people to commercial gambling, and to the most harmful form: EGM gambling.

#### Interest in skill-based gambling machines by race and ethnic background

Barry et al. (2011) found that Hispanic adults have a greater problem gambling prevalence than white adults in the United States. The results of this study indicated that interest in playing SGMs is significantly higher amongst people of Hispanic background. Other differences by racial background were marginal. These findings provide insight into the potential appeal of skill-based gambling machines and their potential for harm amongst different demographic groups. It points to the potential for inequities based on ethnic background introduced by the unique appeal of these games.

#### Interest in skill-based gambling machines amongst people with psychological vulnerabilities

The results of the study show that there is a strong relationship between interest in SGMs and psychological vulnerabilities. People with higher levels of gambling fallacies, dissociation, psychological distress, and stronger motivations to gamble for social, money, and ego-enhancement reasons are more likely to be interested in skill-based gambling. These findings suggest that skill-based gambling may be particularly appealing to people with psychological vulnerabilities, and thus may be associated with an increased risk of gambling harm.

#### Conclusion

The research discussed in this chapter focused on the relationship between SGMs and gamblingproblems, as well as gambling-related harm. The results indicate that people who play SGMs have higher rates of gambling harm and problem gambling. Additionally, people with gambling problems have a greater interest in playing SGMs in the future. The use of safe gambling practices was also generally lower amongst people who played skill-based gambling machines. Furthermore, certain demographic groups, such as people of Hispanic background and people with psychological vulnerabilities, were found to have a higher interest in playing SGMs, demonstrating a potential for exacerbating pre-existing inequities in society. As with many high-intensity gambling products, young males have a greater interest in- and participation with- these types of games. These findings have high concordance with prior findings in this report, showing that skill-based gambling presents some unique risks to existing players as well as the potential to attract new players. In fact, almost 40% of non-gamblers showed at least some interest in playing SGMs in the future.
### **Report Conclusion**

Skill-based gambling machines (SGMs) are a new form of EGM that differ from traditional EGMs in that the gameplay is presented as one in which a player's skill or perceived skill, rather than pure chance, has a role in determining wins and losses. However, these games present unique risks that are not present in other EGMs, despite similar game mechanics. This report provides evidence that skill-based gambling machines are particularly attractive to vulnerable groups, including people with gambling problems, young people and culturally and linguistically diverse (CALD) populations. The protection of these vulnerable groups should be a priority to prevent gambling-related harm.

This report presents a different conclusion from that made in a previous study on *Innovation in Traditional Gambling Products*, published by Gambling Research Australia (see Rockloff et al., 2016). The 2016 study focused on innovated gambling products, which are automated versions of traditional casino games, like Craps or Big Wheel, using electronic gaming machine (EGM) technologies. Our 2016 research report found that innovated products are predominantly played by those who already play the traditional versions of the games and, in general, people prefer the traditional forms. Importantly, although both skill-based and innovated casino games use similar technologies, only skill-based gambling machines appear to attract vulnerable persons.

Moreover, there is a concern that the inclusion of skill-based elements in these games can create confusion for players about how much skill can influence the outcomes. Typically, these games appear to be more skill-based than they are. The large chance component is almost a logical necessity for operators, since otherwise even a small minority of highly skilled players could play the games intensively to reliably win money from operators. Thus, if skill-based gambling machines give the *impression* of being winnable, given enough practice and investment, this creates an additional mechanism for encouraging irrational cognitions and excessive expenditure. This observation is true regardless of whether the skill-based elements are confined to the bonus-round of the game (so-called hybrid machines) or are the core feature of the game. Any introduction of skill-based elements of play will heighten illusions of control. Hybrid games may suffer an additional disadvantage of encouraging players to persist in betting on the chance-based reel component of the game, accumulating losses, to win the bonus round where some skill applies.

Skill-based gambling machines can be compared to carnival or fete games, where the outcome appears to be governed by skill but is largely influenced by chance. One popular example is the fete game of ring

toss. Any player who throws a ring at a bottle is likely to see the ring simply bounce off. Only a lucky pitch will result in winning a prize, which is not - by-and-large - influenced by skill. Skill might marginally affect the outcome but not by much. Similarly, no superior skill set can greatly change the chance-based outcomes on skill-based gambling machines. There is a good likelihood, however, that players will be misled about the extent to which skill can affect their outcomes. In addition, carnival games involve small, often trivial, outlays of money, whereas the potential for losses from SGMs is orders of magnitude greater.

Although skill-based gambling machines appeal mostly to people who are already playing EGMs, they still generate a substantial interest among non-gamblers, drawing new consumers and particularly young males into gambling. This may add unnecessary risks to the community and increase existing inequities in society experienced by marginalised groups. While an argument could be made for improving the sustainability of the industry through the introduction of these games, it should *not* be attempted with a product that appeals to vulnerable persons and/or people who would not otherwise consider gambling as something they would be interested in doing.

Finally, there is no unique opportunity lost in temporarily forgoing skill-based gambling machines as they represent only a small fraction of the EGM market in places like Nevada and New Jersey where they are widely available. These games may become more compelling in the future but currently represent a high risk to players without clear evidence for compensating rewards in the form of broad-based player enjoyment. In fact, as noted, these games have the highest appeal for people already experiencing gambling problems. Therefore, it is essential to prioritise the protection of vulnerable populations and consider the potential risks to the community before introducing any new form of gambling that will increase gambling harm in the Australian community.

## **Glossary of Terms**

Term	Definition
Barratt Impulsiveness Scale (BIS)	The Barratt Impulsiveness Scale (BIS) is a psychological assessment
	tool used to measure an individual's level of impulsivity.
Brief Sensation Seeking Scale (BSSS)	The Brief Sensation Seeking Scale (BSSS) is a psychological
	assessment tool used to measure an individual's level of sensation
	seeking behaviour.
Culturally and Linguistically Diverse	Culturally and Linguistically Diverse (CALD) is a term used to
(CALD)	describe communities and individuals who have different cultural
	and linguistic backgrounds from the dominant culture and language
	in a given society.
Electronic Gaming Machines (EGMs)	An Electronic Gaming Machine (EGM) is a type of gambling device
	that uses electronics and digital technology to create games of
	chance. EGMs are often referred to as slot machines, video poker
	machines, video lottery terminals (VLTs) or pokies, and are
	commonly found in casinos, bars, and other gambling venues.
House edge	House edge refers to the mathematical advantage that a casino,
	sportsbook, or any other gambling operator has over the players in a
	particular game or bet. It is usually expressed as a percentage and
	represents the average amount of each bet that the casino or
	bookmaker expects to win over the long run.
Hybrid Gambling Machines (HGMs)	Hybrid gaming machines are electronic gaming machines (EGMs)
	that combine elements of traditional slot machines with skill-based
	games. These machines often offer a mix of chance-based games
	(such as slot reels) and skill-based games (such as trivia or puzzle
	games) in order to provide players with a more interactive and
	engaging experience. The skill-based component of play is often
	present in a "won" bonus round of play.
Illusion of control	The illusion of control in gambling refers to a cognitive bias where
	players overestimate their ability to control the outcomes of games
	of chance. It is a belief that a player's skill, knowledge, or experience
	can influence the results of a random event or game.
Kessler 6 (K6)	The Kessler 6 (K6) is a brief screening tool used to assess an
	individual's level of psychological distress or mental health
	problems.
Loot box	A loot box is a type of microtransaction in video games, where
	players can purchase virtual boxes or crates containing random
	items or rewards, such as weapons, cosmetic items, or in-game
	currency. The contents of each loot box are usually generated
	randomly and can vary in value, rarity, and usefulness to the player.
Low risk (LR)	The Problem Gambling Severity Index (PGSI) defines a low-risk
	gambler as an individual who scores 1-2 points on the nine-item
	scale.
Moderate risk (MR)	Ine Problem Gambling Severity Index (PGSI) defines a moderate risk
	gambler as an individual who scores 3-7 points on the nine-item
	Scale.
wuitiway betting	Nuitiway betting is a type of betting in which bettors can place
	wagers on multiple outcomes within a single event or game. In
	contrast to traditional betting, where a bettor places a single bet on

Term	Definition
	one particular outcome, multiway betting allows bettors to bet on
	multiple possible outcomes simultaneously.
Non-problem gambler (NPG)	The Problem Gambling Severity Index (PGSI) defines a non-problem
	gambler as an individual who has gambled at least once in the past
	year but scores 0 points on the nine-item scale.
Problem Gambler (PG)	The Problem Gambling Severity Index (PGSI) defines a problem
	gambler as an individual who scores 8 or more points on the nine-
	item scale.
Problem Gambling Severity Index (PGSI)	The Problem Gambling Severity Index (PGSI) is a screening tool used
	to assess the severity of gambling-related problems in individuals.
Research Question (RQ)	Research questions that were designed by Gambling Research
	Australia for exploration in the current set of studies.
Return to player (RT)	Return to Player (RTP) is a term used in the gambling industry to
	describe the percentage of all money wagered on a particular game
	that is expected to be paid back to players over time. RTP is a
	theoretical calculation and is based on the long-term average of the
	game's payout. For example, if a game has an RTP of 95%, this
	means that over time, players can expect to receive \$0.95 back for
	every \$1 wagered on the game.
Safe gambling practices (SGPs)	Safe gambling practices (SGPs) are a set of practices that best
	predict non-harmful gambling amongst gamblers who are otherwise
	most susceptible to experiencing gambling harm.
Short Gambling Harms Screen (SGHS)	The Short Gambling Harms Screen (SGHS) is a psychological
	assessment tool used to measure an individual's level of gambling-
	related harm.
Skill-based gambling machine (SGM)	A skill-based gambling machine is a type of electronic gaming
	machine (EGM) that allows players to use their skill, rather than just
	chance, to influence the outcome of the game. In contrast to
	traditional gambling machines, where the outcome is determined
	solely by a random number generator, skill-based gambling
	machines offer players the opportunity to use their physical
	dexterity, strategy, or knowledge to improve their chances of
Structurel Characteristics	Winning.
Structural Characteristics	Structural characteristics refers to the design features of gampling
	products of environments that innuence the behaviour of the
	of wins, the presence of near misses, and the availability of various
	fosturos and options
	The VICES framework is a set of five key factors that have been
VICES	identified as contributing to the development and maintenance of
	gambling-related problems. Each letter in the acronym "VICES"
	represents one of these factors
Virtual Reality (VR)	Virtual Reality (VR) is a technology that creates an immersive
the dathed they (they	computer-generated simulation of a three-dimensional environment
	that can be experienced and interacted with hy a person using
	special equipment, such as a headset and handheld controllers
Virtual Reality Cube (VRC)	VR cube is a small, enclosed space that provides a fully immersive
	virtual reality experience.
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## Appendix A. Desktop scan results

Product Name	Manufacturer	Game description	Mode	Level of Skill (1 low - 4 high)	No. simultaneous players	Visual/Audio	Illusion of Control	Cognitive Complexity	Expedited Play	Social Customisation	Nostalgia
Super Charged 7s Classic Quick Spin	Ainsworth	Slot machine main game but can win a wheel spin to receive extra credits. Wheel can be spun by swiping the wheel (or pressing a button)	In-venue with personal video screen and EGM-type buttons	1	1	Standard EGM graphics with spinning wheel on top. Wheel spin graphics have lightening and moving images	Ability to swipe the wheel element of control over how the wheel is spun.	No added complexity beyond started EGM rules	EGM rates of play but potential to multiply winnings x5 on wheel spin if x5 wheel symbol is received	Private gambling as with EGMS, spinning wheel on top may attract attention when receiving bonuses.	Low
Pac-Man Battle Casino	Gamblit	Giant shared screen. Each player has a lectern-type standing control desk. Choose bet amount (buy-in) then random prize pot is up for grabs from spin of wheel. Try to be the last Pac- Man standing. If you eat a power pellet you can eat/kill another player and ghosts can also eat players.	Giant shared screen. Joystick controls. Spectators can watch.	3	2-4 players compete	Loud nostalgic arcade sound effects similar to original Pac-Man and big celebratory sounds and graphics when there is a win.	Active control, immediate feedback.	Low: need to avoid ghosts and direct your character around the maze.	Fast moving. A game can be over in less than one minute. Quick reflexes. Gets adrenaline pumping.	Made to draw in spectators and for players to interact and compete.	High
Pac-Man Cash Chase	Gamblit	Same format as traditional Pac-Man. Chomp pellets, avoid ghosts and try to win the jackpot. Every time you eat enough pellets (about 6 seconds worth of play), it runs a wager (like an EGM in the bottom corner of the screen). The more jackpot keys you eat, the bigger bonus round you can unlock. In the jackpot round, you try to eat as much fruit as you can and the more fruit you get, the higher jackpot you can get.	In-venue with personal video screen and EGM-type buttons	3	1	Loud nostalgic arcade sound effects similar to original Pac-Man and big celebratory sounds and graphics when there is a win.	Active control, immediate feedback.	Low: need to avoid ghosts and direct your character around the maze.	Fast moving. A game can be over in less than one minute. Quick reflexes. Gets adrenaline pumping.		High
Deal or No Deal Poker Special and/or Poker	Gamblit	Poker game. Pick briefcases to determine cards and build your hand.	Multi-player video table (top of the table is a touchscreen). Players sit at the table.	3	4	Suspenseful music during card selection. Immediate audio and visual feedback when you select a card. 'Sexy lady' graphics imitating Deal or No Deal briefcase ladies from the TV show.	Active control, immediate feedback. Have some control over which cards you select and how fast you can select those cards.	Player must keep track of the cards in their hand and the cards that they need to win. Also keep track of other players' cards which enables players to assess the odds of particular cards being dealt. Must keep track of the countdown clock as well. Before player's briefcase can be opened, get to see what was in losing players' briefcases so can again assess odds.	The game is fast moving but there is no way to increase the rate of play other than one player winning early. Average game lasts approx. 1 and a half mins.	Encourages competition and communication between players.	High
Cover Fire	Gamblit	Third person shooter (human vs. robots). Adapted from a popular mobile phone game. Every time you shoot a robot you make a wager (essentially you bet that you will hit the target). If you hit the target, you win points based on the amount you wagered. A lim is to graduate to higher levels like a traditional video game	2 hand touch screens (like a huge iPad). One hand aims, one hand shoots.	3	1	High quality video game graphics. Suspenseful music plus shooting sounds, explosions.	You control the aiming and shooting and amount you bet.	Need to keep track of multiple targets and enemies, where to take cover, as well as your character's health and amo supplies.	No ability to speed up play. Game can last a relatively long time, like a traditional video game. However, games are made every time one hits a target so being good at shooting targets speeds up loss of funds.	May encourage spectators due to loud sounds and lower position of the screen (more like a large iPad rather than an EGM terminal).	Low
Catapult King	Gamblit	Each time you launch the catapult is a bet. Need to knock over stuff. Adapted from highly successful social media game.	Big touch screen that has multiple games loaded on it	1	1	Nature sounds when planning your shot (set in an outdoor fantasy kingdom) then explosion when hit your target.	The player is apparently responsible for the accuracy of the catapult so gives a sense of control.	Very little.	Each round is 15 secs to 1 min depending on the player's success.	None.	Low

Product Name	Manufacturer	Game description	Mode	Level of Skill (1 low - 4 high)	No. simultaneous players	Visual/Audio	Illusion of Control	Cognitive Complexity	Expedited Play	Social Customisation	Nostalgia
Lucky Words	Gamblit	Scrabble-type game. Match different words to unlock different payouts. Words earn stars and each star increases chance of winning jackpot. Adapted from highly successful social media game	Big touch screen that has multiple games loaded on it	2	1	Normal EGM-type background music, celebratory graphics, coin sounds and a leprechaun shouting 'yay' when the player wins.	No control over the letters that appear on the screen, but it is up to the player to think of the words to input some control.	The only complexity is thinking of the possible words.	Each game is 30 seconds. No ability to increase the speed.	None.	Low
Into the Dead	Gamblit	First person shooter. Adapted from highly successful video game. Try to run as far as you can, as fast as you can. Dodge and shoot zombies. When you choose how much to initially stake, different stakes unlock different advantages or features, e.g., \$2 baseline, \$5 extra ammo, \$10 extra ammo, companion dog, weapon, access higher pay table. Run ends when you get 'eaten' by a zombie.	2 hand large touch screen. One hand directs the running/aiming, one hand shoots.	4	1	High quality video game graphics. Suspenseful music plus shooting sounds, grusome zombie sounds (grunting, wheezing) and graphics (zombie blood, zombies exploding/dying).	The player is apparently responsible for their success, i.e., the number of zombies they are able to kill, so gives a sense of control.	Need to keep track of which zombies to kill, navigation, ammo supplies, game statistics that determine payout.	Game length depends on player success (which is increased if bet more money as that gives you better weapons/advantages). Wager is set at beginning of game, no opportunity to increase wagers during play.	At end of your run, you get a screen summarising your performance (yards run, zombies killed, total points) plus the top 5 runs (high scores) for this game. Increases competitiveness (both with yourself and with high scorers).	Low
Playboy Pinball	Gamblit	Looks like an old-fashioned pinball machine on the screen. The theme is 1960s Playboy. Choose your wager amount. Make a wager and pull the pinball 'plunger.' Use the on-screen paddles to direct the pinball to hit the gold coins to score points.	Big touch screen that has multiple games loaded on it	1	1	Old fashioned graphics to correspond with original Playboy pinball machine. Exploding coin graphics when win credits.	Play is determined by the pinball paddles so some control but a lot of 'luck' as to where the ball lands (as in traditional pinball)	None.	Each game is 30 seconds. No ability to increase the speed.	None.	High
Dragon Dice Baccarat	Gamblit	A four-player game on a large electronic table. Players wager S5 and the prize poilt § 515. In the middle electronic dice are 'rolled' and players try to grab the dice they want first by pushing their 'grab' button. Try to get three dice that add up to a particular number to get puzzle picces of a 'dragon.' The first player to create a full dragon wins the prize pot.	Multi-player video table (top of the table is a touchscreen). Players sit at the table.	3	4	Music when the dice are rolled. Sounds and firework graphics when the dice are grabbed and celebratory music and graphics when a player wins.	You 'choose' the dice that you grab, and it is the fastest player to grab the dice that get them.	Player must keep track of the dice in their hand and the dice that they need to win. Also keep track of other players' wins.	The game is fast moving but there is no way to increase the rate of play other than one player winning early. Average game lasts approx. 1 and a half mins.	Encourages competition and communication between players.	Low
Navy Blitz	Gamblit	Naval warfare - traditional EGM spin reels where win unlocks a bonus round and earns weapons to destroy ships and win.	Big touch screen that has multiple games loaded on it	1	1	High quality graphics, nautical jolly music, traditional EGM sounds for wins and the highlighting of winning lines. Torpedo and explosion sound when sink battleships.	Gives some illusion of control through choice of battleship squares in bonus skill round.	Low.	No ability to speed up play.	None.	Medium
Gem Flux	Gamblit	Pick 3' game: match 3 or more of the same animal to win cash rewards and power ups. Every "evolution" triggers a bet and takes you closer to winning the evolutionary chain. Says you can strategically select where to evolve your animals to collect progressive payouts quickly.	Big touch screen that has multiple games loaded on it	1	1	High quality graphics, traditional arcade game music, celebratory tones and explosion of gems when player matches three. A female voice commentates.	Player uses their skill to choose where to place the gem but the type of gems falling is random.	Low.	No ability to speed up play. Game appears to last for one minute or until the pile of gems exceeds the highest level of the grid (whichever occurs first).	None.	Low

Product Name	Manufacturer	Game description	Mode	Level of Skill (1 low - 4 high)	No. simultaneous players	Visual/Audio	Illusion of Control	Cognitive Complexity	Expedited Play	Social Customisation	Nostalgia
Dice Arena	Gamblit	Tactical fighting game. Take turns to roll dice to determine your "damage" and winnings. Keep rolling to increase winnings but can't roll a 1. If you "slay the monster" you win the "bounty"	Big touch screen that has multiple games loaded on it	1	1	Moderately sophisticated cartoon-style graphics with limited movement. Loud EGM-style music with coin sounds for wins and fighting sound effects.	Player chooses how many times to roll the dice but is highly chance based.	Low.	No ability to speed up play. Game appears to last for one minute or until the character 'dies' (whichever occurs first).	None.	Low
Match 3volution	Gamblit	Pick 3' game: matching 3 animals unlocks a bet on a simplified slot machine. The animals 'evolve' with each matching.	Big touch screen that has multiple games loaded on it	1	1	Moderately sophisticated cartoon-style 'cute' graphics set in safari or under the sea. EGM-style music with coin sounds for wins and animal sound effects.	Player uses their skill to choose where to place the animals to match them up but appears to be largely random.	Low.	No ability to speed up play.		Low
Doodle Jump	Gamblit	Based on mobile game - journey up a piece of graph paper with no end and collect power-ups while avoiding obstacles as you jump on platforms to get to the top.	Big touch screen that has multiple games loaded on it	1	1	Simple cartoon graphics.	The player decides where to jump and can land on a green (good) square or brown (bad) square, but placement of the squares is random.	Low.	No ability to speed up play. Game appears to last until character falls.	None.	Low
Cannonbeard's Treasure	Gamblit	Similar to blackjack. Themed like pirate treasure hunt. Everyone buys in with the same amount. Starts with a wheel spin that decides the prize all the players are trying to win, i.e., the amount of money on offer, which is randomly generated. Single cards then pop up on the screen and players need to decide if they want that card then touch their grab' button as quickly as they can to beat the other players to grab the card. Aim to get 21, etc. If there is a draw, the win is split between those players.	Multi-player video table (top of the table is a touchscreen). Players sit at the table.	3	4	Pirate treasure graphics	Your reaction time determines if you get the card that you want	Low	Game moves relatively fast - cards pop up with little break between. Length of play depends on the speed that one person gets all their cards (a countdown starts after that). Average game is approx. 40 seconds.	Very social as playing with up to 4 players. Encourages competition and communication between players.	Low
Soul Calibur II	Game Co	Fighting game based on highly successful video game - first to exhaust health bar loses. Select bet to start. No in game betting.	In-venue personal screen and gaming console. Buttons/joystick	4	Has multiplayer mode Can be configured into a multiplayer area like esports	High quality video game graphics. Like a gaming console, type fighting game. Traditional video game fighting sounds and commentary.	Active control, immediate feedback.	Player must keep track of their health and the time countdown.	Game lasts for 50 seconds or until a player 'dies.'	Multiplayer function creates a competitive area	Low
Danger Arena	GameCo	First person shooter. Choose bet amount. 45 secs to shoot as many robots as possible. Must get to a certain number to get a payout. 10,000 maps (scenarios of different difficulty) from which each game is randomly selected.	In-venue with personal video screen and gaming console	3	1	Top screen = pay table; Bottom screen = game. EGM-size screen, fully animated	Active control, immediate feedback.	No additional options for players (side bets, etc.).	45 seconds per game.	None.	Low

Product Name	Manufacturer	Game description	Mode	Level of Skill (1 low - 4 high)	No. simultaneous players	Visual/Audio	Illusion of Control	Cognitive Complexity	Expedited Play	Social Customisation	Nostalgia
Terminator 2 Judgement Day	GameCo	First person shooter game based on successful movie. Set in Terminator universe, shooting robots. Go secs to shoot as many robots as possible. Some robots have power cords inside them that you can collect to get the highest payout.	In-venue with personal video screen and gaming buttons/joystick	3	1	Top screen pay table. Bottom screen typical high-quality first- person shooter graphics. Suspenseful music and shooting, explosion sounds.	Active control, immediate feedback.	Free tutorial to familiarise with game play. Player must keep track of their ammo and health as well as attend to navigation and shooting enemies as they appear.	No way to expedite play. Each game lasts 60 seconds or until character 'dies.'	None.	High
Steve Aoki's Neon Dream	GameCo	Infinite runner game set in space. Choose bet amount. 60 seconds to collect gold records and tiles (points), avoiding red barriers. Set to music from Steve Aoki's record label.	In-venue with personal video screen and gaming console	2	1	Features DJ Steve Aoki - plays his music. Intense, club vibe graphics	Active control, immediate feedback.	Requires concentration, not complex	Running speed seems very fast. Imagine triggers adrenaline.	None.	Low
All-Star hoops	GameCo	Compete against house, place a bet choosing bet amount and pick one of three basketballs to win cash, tokens or chance to enter mini-game or bonus round. Tokens can be used to win instantly in bonus rounds or in a mini- game to with the maximum reward. Mini-games are triggered by linking up the same symbol across all basketballs (at random). Bonus rounds are awarded at random, successful dunk, receive bonus win.	In-venue, personal video screen and control board (buttons?)	1	1 or multiplayer mode up to 7 Can be configured into a multiplayer area	Large playing screen showing basketballs and for bonus rounds a court as would be seen on a gaming console. Background music, sounds of money and a digital calculator sound for when balls spinning	Outcomes on basketballs by chance, ability to shoot/dunk to win bonus rounds	None	Bets would occur fairly rapidly, bonus/mini-games might slow down/interrupt continual betting	Can choose single or multi- player creates competition in an arena	High
Nothing but Net	GameCo	Outcome based on basketball shots. Place bet at start of game. You get 12 shots. Different number of points depending on difficulty of shot (further from basket).	In-venue with personal video screen and gaming buttons/joystick	2	1 or multiplayer	Large playing screen showing urban court graphics	Players influence the outcome via their 'skill' in making shots but it is likely that outcomes are also randomised.	Low. Simply try to get the ball in the hoop.	No ability to speed up play but each shot is a bet which means it is very fast paced, more like a traditional EGM. Bets can occur approx. every 5 seconds.	Can choose single or multiplayer. Compete against each other. Winner takes pot, casino takes a percentage. Sudden death overtime for tiebreak.	High
Nothin but Net 2	GameCo	Each catch is a bet, outcome based on basketball shots. Make 10 out of 15 shots to spin multiplayer wheel. Win tokens and spend to guarantee winning shot. Bonus for winning streaks.	In venue with personal video screen and gaming buttons/joystick	3		Large playing screen showing urban court graphics. Moderately sophisticated but likely 'dumbed down' to create nostalgia of past video games and arcade games. Suspenseful music, celebratory sounds when make basket, male commentating.	Players influence the outcome via their 'skill' in making shots but it is likely that outcomes are also randomised. Bigger bets increase odds on jackpot wheel.	Low. Simply try to get the ball in the hoop.	No ability to speed up play but each shot is a bet which means it is very fast paced, more like a traditional EGM. Bets can occur approx. every 5 seconds.	Can choose single or multiplayer. Compete against each other. Winner takes pot, casino takes a percentage. Sudden death overtime for tiebreak.	High
Mystery of the secret temple	GameCo	Match gemstones by tapping 3 or more adjacent gems of the same colour. Make a match, receive a reward. Each match makes a bet to trigger a cash or token reward. Tokens then used to purchase "power-ups" to make bigger matches.	In venue with personal video screen	3	1	Indiana jones style graphics, touch screen, one main display. Graphics include gold and hems - associated with riches	Better performance = more bets.	Limited beyond matching gems	Likely slower than EGMs - betting speed based on speed of matches. Marketing includes "tap more, win more"	None.	Low

Product Name	Manufacturer	Game description	Mode	Level of Skill (1 low - 4 high)	No. simultaneous players	Visual/Audio	Illusion of Control	Cognitive Complexity	Expedited Play	Social Customisation	Nostalgia
Sweet Spot Golf	GameCo	Press an image of golf ball to spin EGM style reels and place a bet to win free spins, power-ups or mini-games for cash prizes. Mini games are determined by chance and allow player to drive, chip or putt to receive greater cash prizes. In mini-games, the player must time the shot by stopping the ring in the "sweet spot" by pressing a button. Power ups make the "sweet spot" bigger, making it easier to hit.	In-venue Large playing screen with single button	2	1	Large playing screen with 1 set of spinning reels. One button for spinning reels and for initiating game play in bonus round. EGM style graphics with golf course scenes for bonus rounds	Limited. Control over when to press button in bonus rounds	None	Similar to EGMs except for bonus rounds. Bonus rounds would also be fast as only need to press a button	None.	Low
Destination Tiki	GameCo	Player has a set of coloured tiles below and must pon tiles on the playing board to change the colour with one from the tiles below. Matching tile must be in the same colourn. Bets are placed when three or more adjoining tiles of the same colour are matched. Successful matches trigger rewards - bigger matches = bigger payouts. "Tokens" (not sure how your ceeive tokens) are used to buy power ups that help to make bigger matches. Says players are rewarded for skill/strategy by clearing the bottom tray, matching & or more tiles of the same colour, or can be awarded at random. Chance based access to bouns round (spinning wheel to win cash or free bets).	In-venue large playing screen	4	1	Touchscreen? Bright graphics	Awards provided for greater skill (e.g., clearing the tile tray/large matchups). Some control, the ability to match more tiles = greater payouts	Need for strategy in tile location increases complexity.	Advertised as "fast paced" but assume it would be as fast as it would take someone to make matches. Unclear about how bets work, whether you have a pre-set bet amount for entire game of alter best as you go	None.	Low
Millionaire Solitare	GameCo	Based on Solitaire, have to arrange cards in sequence. Tap cards higher or lower in sequence from game area to move to "foundation pile" Can be of any suit - each correct card is a bet, each bet triggers outcome: reward of cash or tokens. Can build "streaks" on the streak meter to unlock bigger payout (rests if "draw from stockpile"). Tokens can be traded for more cards or wild cards that can lengthen winning streaks by guaranteeing another successful play. Bonus rounds are awarded randomly - involve tapping a pumpkin to reveal a prize. You can then bet on bonus round awards by tossing a coin to double. Greater rewards offered for uncovering a prize card or by chance	In-venue large playing screen	3	1	Touchscreen. Bright graphics	Limited control over outcomes since successful pairs only trigger a bet and don't seem to influence the level of payout or outcome of bet	Some complexity to play strategically to arrange cards in sequence	Likely slower than EGMs, given the need to think about each move	None.	Medium
Pop Fish	GameCo	Tap and match 3 or more bubbles to win. Includes loot boxes which you can gamble on to double money. Betting process is unclear - place a bet before each turn maybe?	In venue with personal video screen	3	1	Underwater theme with bright graphics		Strategy gives perception of complexity but straightforward.	Faster matches bigger prizes - unclear how	None.	Low
Star Trek Voyager Delta Quest	GameCo	Puzzle Game – matching gems and uncovering clues to level up. Win tokens that can be spent on tools to improve outcomes. I think each match is a bet. Bonus rounds shoot asteroids but doesn't appear to be a level of skill	In venue with personal video screen	3	1	Star Trek theme	The ability to use bonus features to improve bet outcomes	Receive feedback on prior turn outcome. Extra features, powerup bars etc increase level of involvement	Complete challenges before time runs out (in advertisement but not clear in game)	None.	High
Riches of the Golden Dragon	GameCo	Pick and win. Pick dragon card to win cash, tokens and unlock mini-games. Place a bet and then literally just select one card from three	In-venue screen with three buttons representing each card	1	1	Chinese themed graphics	Immediate feedback	None.	Fairly rapid games	None.	Low

Product Name	Manufacturer	Game description	Mode	Level of Skill (1 low - 4 high)	No. simultaneous players	Visual/Audio	Illusion of Control	Cognitive Complexity	Expedited Play	Social Customisation	Nostalgia
Beat Square	Konami Gaming	'Whack-a-mole to music.' Choose bet amount. Hit the squares (4x4 square buttons) as they light up in time with the beat of the music. Each hit receives a score (miss, late, perfect), those points add up to cash prize at end of game. Approx. 45 secs?	In-venue with personal video screen and EGM-type buttons	2	1 or 2-8 multi- player (tournament mode)	Top screen with pay table and projects button press video for tournament play. Bottom small score screen and buttons.	Immediate feedback from each score.	None.	Approx. 45 secs per game? Seems very fast. Imagine triggers adrenaline.	Can be put into 'tournament mode' where lots of players play against each other {in person}.	Low
Frogger: Get Hoppin'	Konami Gaming	Based on a traditional arcade game. Use the controllers to 'hop' the frog across the road and the river course avoiding the vehicles and the alligators. Try to pick up coins on the way to get points. At the end of the game (approx. 20 seconds), pick a Lilypad (select from 5 on screen) to spin a particular wheel to get bonus points. Get a certain number of points to win the bet.	In-venue with personal video screen and EGM-type buttons	2	1	Simple cartoon graphics, like in the original arcade game. Traditional arcade/EGM-type theme music with celebratory sounds when you get coins and whistle blows when the time is up.	Player has control over movement of the frog and over which Lilypad is chosen. However, it is likely that the difficulty of the game is randomised.	Very little.	Entire game lasts for approximately 30 seconds (including the bonus round). No ability to expedite play.	None.	High
Vegas 247 Pinball	Nanotech Gaming	Like an old-fashioned pinball machine. Exact same presentation on a sloping table but electronic. Competing against low, average, high scores.	In venue with traditional pinball controls.	4	1	Old-school pinball sounds	Completely adjustable bet amount, pay amount (even- money, etc.). Probability of winning shown on red/green pie chart.	None		Open to spectators due to position of screen.	High
CasinoKat	Nanotech Gaming	Similar to retro Pac-Man. Same physical set-up as pinball machine. Cat needs to eat up little circles to get points and avoid ghosts. Randomly selected movement of ghosts. Slot machine in the middle which decides which 'prize' symbol will pop out on the game route. Can tries to eat this prize. Eating prize gives you points.	In venue, standalone. Joystick and buttons to operate	2	1	Retro Pac-Man- type graphics. Very colourful, lots of flashing lights.	Completely adjustable bet amount, pay amount (even- money, etc.). Probability of winning shown on red/green pie chart. Bar graph of score database to see what score needed to get what pack back percentage.	Very little. Guide cat around screen without being 'killed.'	Game lasts for approximately 1 minute. No ability to expedite play.	Open to spectators due to position of screen. Are provided with player average and high scores prior to start of play.	Low
Bust-a-Move	Next Gaming	Match three game. After selecting level of difficulty, players start each level with a layout of coloured bubbles. The player has to launch another bubble using a harpoon to match and pop three bubbles of the same colour. The player must clear as many before the ceiling descends to the floor.	In venue, standalone. Joystick and buttons to operate	3	1	One large playing screen. Bright graphics, led lights	Active control with joystick	Can choose level of difficulty: easy, normal, hard	Unclear - but race against clock	Similar to some arcade games, can add your name to leader board which increases competition with others (despite playing solo)	High
Asteroids	Next Gaming	Based on space shooter game from Atari. The player controls their spaceship in an asteroids field which is periodically traversed by flying saucers. Shoot and destroy the asteroids, collect power ups and eradicate the flying saucers to advance through the next levels.	In venue, standalone. Joystick and buttons to operate	3	1	One large playing screen. Bright graphics, led lights Bright intense graphics, with fireworks and flashing lights. Audio designed to increase adrenaline	Active control with buttons	Can choose level of difficulty: easy, normal, hard	Each shot is a bet so everything moves really fast and it's difficult to keep track of what you're spending and winning.	Similar to some arcade games, can add your name to leader board which increases competition with others (despite playing solo)	High

Product Name	Manufacturer	Game description	Mode	Level of Skill (1 low - 4 high)	No. simultaneous players	Visual/Audio	Illusion of Control	Cognitive Complexity	Expedited Play	Social Customisation	Nostalgia
Arkanoid	Next Gaming	Fast-paced brick-breaking game based on game from Atari. Control the paddle to deflect the energy balls to break bricks while collecting power ups and destroying aliens. Players will play through multiple levels to try to defeat the boss.	In venue, standalone. buttons	3	1	One large playing screen. Bright intense graphics, with fireworks and flashing lights. Audio designed to increase adrenaline	Active control with buttons	Choose difficulty level-easy medium hard	Each shot is a bet so everything moves really fast and it's difficult to keep track of what you're spending and winning. Given you can move on to higher levels - may encourage prolonged gambling as an attempt to meet the boss.	Similar to some arcade games, can add your name to leader board which increases competition with others (despite playing solo)	High
ZForce	Next Gaming	Space shooter games of the 1980s - destroying alien ships. Select difficulty level and control the spaceship, collect power ups and fire weapons to destroy the ship. Play through multiple levels to try to beat the Boss.	In venue, standalone. Joystick and buttons to operate	3	1	One large playing screen. Bright intense graphics, with fireworks and flashing lights. Audio designed to increase adrenaline	Active control, using buttons and joystick	Choose difficulty level-easy medium hard	Each shot is a bet so everything moves really fast and it's difficult to keep track of what you're spending and winning. Given you can move on to higher levels - may encourage prolonged gambling as an attempt to meet the boss.	Like some arcade games, can add your name to leader board which increases competition with others (despite playing solo)	High
Missile Command	Next Gaming	Based on space shooter game from Atari. the player must defend their six cities from being destroyed by a hail of ballistic missiles. Defend your cities, collect power ups and shoot down the enemy missiles to advance through the next levels. Similar to Asteroids.	In venue, standalone. buttons and maybe one of the balls like in a mouse.	3	1	One large playing screen. Bright intense graphics, with fireworks and flashing lights. Audio designed to increase adrenaline	Active control, using buttons and swivel ball	Choose difficulty level-easy medium hard	Each shot is a bet so everything moves really fast and it's difficult to keep track of what you're spending and winning.	Similar to some arcade games, can add your name to leader board which increases competition with others (despite playing solo)	High
Tempest	Next Gaming	Three-dimensional shooter game from Atari. The player's mission is to survive as long as possible and score as many points as possible by clearing the screen of enemies that have appeared in the multiple playing fields. Rapid- fire down the tunnels, use warp power ups and destroy the enemies to advance through the next levels.	In venue, standalone, buttons	3	1	One large playing screen. Bright intense graphics, with fireworks and flashing lights. Audio designed to increase adrenaline	Active control, using buttons and joystick	Choose difficulty level-easy medium hard	Each shot is a bet so everything moves really fast and it's difficult to keep track of what you're spending and winning. Given you can move on to higher levels - may encourage prolonged gambling.	Similar to some arcade games, can add your name to leader board which increases competition with others (despite playing solo)	High
Space Hunter	Playtech	Shooter game "shoot for cash" - retro arcade style game. Players control power cannons, shooting spaceshups for wins and the bigger the ship, higher the payout "free shots" mode cannons vary in power level to increase likelihood of getting a hit with features to destroy all ships and boost win.	In venue, standalone. buttons	2	1	N/A	N/A	N/A	N/A	N/A	High
Space Invaders	Scientific Games	Based on arcade/video game. Slot machine bonus space invaders feature. Similar to original alien shooter game, bonus allows players to control laser cannon, moving it across the bottom screen to shoot rows of descending aliens while collecting credits, advancing levels and trying to get a multi-level jackpot pool. Can bypass slot game and "Buy a bonus" on demand - taking them directly to the bonus game where they play with higher credit win levels than the normal game.	In venue, standalone, touch screen	2	1	Slot machine with space invader screen above. Simple graphics similar to arcade/Atari based games, same visual features and music as the original game	Traditional slot machine aspects of control with larger portion of control in bonus round, including the ability to make decisions on when to access a bonus game.	None	More expenditure related - bonus slot game and on demand game differ in the "credit win level", the latter being higher.	Private betting as with EGMs	High

Product Name	Manufacturer	Game description	Mode	Level of Skill (1 low - 4 high)	No. simultaneous players	Visual/Audio	Illusion of Control	Cognitive Complexity	Expedited Play	Social Customisation	Nostalgia
Lucked & Loaded	Synergy Blue	First person shooter - classic gun arcade. Make a bet every time you hit an alien (spins slot reel at bottom of screen). Can win or lose as you play through. Bonus rounds where if you shoot the boss, you get a bigger possible bonus. Bonus bounty displayed at bottom of screen, builds up as you make wagers. Amour and health bars at top of screen. Health bar decreases when get hit by enemies and if you hit innocent characters. Green items heal. 5-6 mins per level. Timer bar bottom of screen.	Arcade gun attached by cord to machine.	4	1	Classic shooter game graphics, set in old western fun fair with 'cardboard' type targets popping up while walk through fair.	Active control, immediate feedback.	Lots of detail to attend to, e.g., armour and health bars, different targets to shoot and avoid.	Long game in comparison to others (5-6 mins).	Private betting as with EGMs	Low
Pop Shots Witches Coven	Wymac Gaming Solutions	Slot machine with standard reels but can trigger feature to enter skill based "pop shots" game. Have to pop as many bubbles as possible before the timer runs out. Higher score means higher multiplier when win free games during slot play. Can get bonuses to receive extra time.	In venue standard standalone EGM with touchscreen	2	1	Standard slot machine visuals + interactive skill- based game. Bubbles are popped via touch screen.	Speed of popping bubbles increases multiplier during free games.	None	Standard EGM game play but may encourage perseveration in the pursual of free games if score high in pop shots and have a higher multiplier for free games.	Private betting as with EGMs	Low
Pop Shots Wild Mermaid	Wymac Gaming Solutions	Not yet available. Assume it will be the same as Witches Coven but Mermaid themed	In venue standard standalone EGM	1	1	N/A	N/A	N/A	N/A	Private betting as with EGMs	Low
Fortunes of the Brave	Wymac Gaming Solutions	Slot machine with standard reels but can trigger a feature to enter skill based first person battie quest game. Player chooses the armour (aesthetics) of their character. Different styles of armour are available as player progresses up the levels. Alternatively, the player can buy armour with game credit (armour does not affect game performance). The skill component is a 4-minute feature where players compete for a jackpot (separate from the base EGM game). Jackpots are won if player gets a certain number of points.	In venue standalone EGM with gaming console	3	1	Standard slot machine visuals + interactive skill- based game. High quality video game as skill-based feature, similar to popular video games.	Skill-based feature has a separate pot. Text on screen reads "Money earned in the feature is dependent on how well you play."	High - classic gaming console with multiple buttons. Player must battle various enemies while completing quests, health bars, points to win and lose.	Feature lasts for four minutes regardless of progress/skill.	Private betting as with EGMs	High
Jelly Kingdom	Wymac Gaming Solutions	Slot machine with standard reels but can trigger a feature that allows you to choose a chance or skill-based bonus game. The chance game is a lucky wheel spin. The skill game is a 'pick three' game similar to the Candy Crush mobile phone game. Each time the player lines up three or more icons, they score points. The time allotted for the bonus round is based on the amount of 'clock' icons the player received during the EGM round. The player can win bonus credits, free games (spins) and prize multipliers.	In venue standard standalone EGM with touchscreen	2	1	Standard slot machine visuls + interactive skill- based game. Icons are arranged via touch screen.	Speed of matching icons increases player's score, resulting in winning credit, free games and prize multipliers during free games.	Little complexity.	Standard EGM game play but may encourage perseveration in the pursual of free games if score high in skill game and have a higher multiplier for free games.	Private betting as with EGMs	High

Product Name	Manufacturer	Game description	Mode	Level of Skill (1 low - 4 high)	No. simultaneous players	Visual/Audio	Illusion of Control	Cognitive Complexity	Expedited Play	Social Customisation	Nostalgia
The Brookhaven Experiment	Gamblit	VRC (virtual reality cube) - a transparent room with VR headset and hand controls (room-based VR). First person shooter. At the beginning of each game the player is given three challenges. Get points for each challenge, e.g., get a certain number of headshots, etc. Spectators can bet on outcomes.	VRC (virtual reality cube) - a transparent room with VR headset and hand controls (room-based VR).	4	1 plus spectator betters	High quality video game graphics in 30. Room can fill with 'smoke', has a subwoofer speaker under the floor that makes room vibrate when shots are fired. Monsters/zombies die in a gruesome fashion.	Active control, immediate feedback.	Player must attend to game occurrences but is not high in extra aspects to attend to.	Game length depends on how long the player stays 'alive.'	"We wanted to make VR a spectator sport." Designed to draw a crowd. A game screen showing the player's progress is displayed on the outside of the cube so that spectators can see what the gamer is seeing on the screen. Spectator can bet where you bet on the player's success, e.g., the 'challenges' - how many headshots they will get, how long they will survive, etc. These challenges are different for each round to prevent match fixing. You can also not bet on the player to lose for the same reason.	Low
Interstellar Attack	High 5 Games	A traditional EGM but you accumulate points each spin/bet that gives you features that are meant to increase your wins. Based on space invaders.	In venue or online	1	1	Space invaders themes, graphics music etc.	Minimal. Just spin and the shooter shoots wherever they land	None beyond learning what each symbols value is	No different to standard EGM	Private betting as with EGMs	High
Retro to Riches	High 5 Games	A traditional EGM but you line up dots on a grid for the bonus round.	In venue or online	1	1	Colours, retro bright	Minimal, just spin and images land where they land	None	No different to standard EGM	Private betting as with EGMs	Low
Cut the Rope 2	Gamblit	A licensed version of the popular mobile game of the same name, in this game players use a touchscreen to get an object to land on the character's head by cutting the rope from which the object is hanging. If they succeed, they are directed to a screen showing 9 bags. One bag has the win amount written on it. The player can choose this bag or take a risk and choose an unmarked bag that may contain more or less, or a jackpot round.	In venue, standalone, touchscreen.	1	1	High quality graphics and simple 'cute' cartoon characters. Small sound effects for in-game actions.	Get to choose when to cut the rope and the prize bag.	limited	Each game is fast, approx. 10 seconds depending on how fast the choice of bag is made.	None.	Low

## Appendix B. Statistical test results for experimental study

Pillai's Trace	Value	F	Hypothesis df	Error df	Sig.					
Intercept	0.312	68.296 <sup>.</sup>	6	904	0.00					
Age 50 Plus? (yes,no)	0.012	1.896	6	904	0.08					
Gender (Male, Female)	0.009	1.416 <sup>.</sup>	6	904	0.21					
PGSI (MR/PG, Other)	0.044	6.969 <sup>.</sup>	6	904	0.00					
ATSI Status (yes,no)	0.012	0.592	18	2718	0.91					
Marital (5 categories)	0.038	1.442	24	3628	0.08					
Education (7 categories)	0.032	0.975	30	4540	0.50					
WorkStatus (8 categories)	0.075	1.649	42	5454	0.01					
Group_4 (EGM, VideoGm, Bth,	0.074	3.832	18	2718	0.00					
None)										
a. SkillOrReel = Skill-based ONLY										
b. Design: Intercept + Age50_Plus_or_	Design: Intercept + Age50_Plus_or_Less + Gender + PGSI_MR_PG_VS_OTH + ATSI + Marital +									
Education + WorkStatus + Group_4										

#### Table 12. Multivariate Testsa, b Association of Game Features with Demographics

c. Exact statistic

d. The statistic is an upper bound on F that yields a lower bound on the significance level.

Table 13. Tests of Between-Subjects Effects for Demographics related to features
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Source		Type III Sum of	df	Mean	F	Sia
Corrected Model	Graphics, Artwork and Sound	126.483 <sup>b</sup>	25	5.059	4.913	0.000
	Use of skill	56.906 <sup>.</sup>	25	2.276	2.632	0.000
	Use of strategy	66.852ª	25	2.674	2.989	0.000
	Fast-paced action	84.721 <sup>.</sup>	25	3.389	3.378	0.000
	Competition with others	304.429 <sup>,</sup>	25	12.177	9.219	0.000
	The ability to win money	<b>147.915</b> <sup>₅</sup>	25	5.917	4.570	0.000

Intercept	Graphics, Artwork and Sound	258.012	1	258.012	250.544	0.000
	Use of skill	304.486	1	304.486	352.066	0.000
	Use of strategy	312.306	1	312.306	349.140	0.000
	Fast-paced action	301.180	1	301.180	300.178	0.000
	Competition with others	210.947	1	210.947	159.698	0.000
	The ability to win money	309.950	1	309.950	239.394	0.000
Age50_Plus_or_Less	Graphics, Artwork and Sound	0.057	1	0.057	0.055	0.815
	Use of skill	0.180	1	0.180	0.208	0.649
	Use of strategy	0.187	1	0.187	0.209	0.648
	Fast-paced action	1.180	1	1.180	1.176	0.278
	Competition with others	8.381	1	8.381	6.345	0.012
	The ability to win money	6.986	1	6.986	5.396	0.020
Gender	Graphics, Artwork and Sound	1.324	1	1.324	1.286	0.257
	Use of skill	0.546	1	0.546	0.631	0.427
	Use of strategy	0.170	1	0.170	0.190	0.663
	Fast-paced action	0.619	1	0.619	0.617	0.432
	Competition with others	1.219	1	1.219	0.923	0.337
	The ability to win money	2.032	1	2.032	1.569	0.211

PGSI_MR_PG_VS_OTH	Graphics, Artwork and Sound	19.817	1	19.817	19.243	0.000
	Use of skill	4.441	1	4.441	5.135	0.024
	Use of strategy	2.559	1	2.559	2.860	0.091
	Fast-paced action	8.425	1	8.425	8.397	0.004
	Competition with others	39.301	1	39.301	29.753	0.000
	The ability to win money	20.823	1	20.823	16.083	0.000
ATSI	Graphics, Artwork and Sound	4.422	3	1.474	1.431	0.232
	Use of skill	1.527	3	0.509	0.588	0.623
	Use of strategy	0.886	3	0.295	0.330	0.803
	Fast-paced action	2.256	3	0.752	0.749	0.523
	Competition with others	2.814	3	0.938	0.710	0.546
	The ability to win money	3.135	3	1.045	0.807	0.490
Marital	Graphics, Artwork and Sound	9.251	4	2.313	2.246	0.062
	Use of skill	5.619	4	1.405	1.624	0.166
	Use of strategy	9.621	4	2.405	2.689	0.030
	Fast-paced action	5.563	4	1.391	1.386	0.237
	Competition with others	18.909	4	4.727	3.579	0.007
	The ability to win money	1.141	4	0.285	0.220	0.927

0.880	0.354	0.364	5	1.821	Graphics, Artwork and Sound	Education
0.741	0.547	0.473	5	2.366	Use of skill	
0.568	0.775	0.693	5	3.467	Use of strategy	
0.837	0.417	0.418	5	2.090	Fast-paced action	
0.283	1.251	1.653	5	8.264	Competition with others	
0.857	0.388	0.503	5	2.513	The ability to win money	
0.092	1.758	1.811	7	12.675	Graphics, Artwork and Sound	WorkStatus
0.358	1.105	0.956	7	6.690	Use of skill	
0.345	1.124	1.005	7	7.038	Use of strategy	
0.319	1.168	1.172	7	8.202	Fast-paced action	
0.001	3.450	4.557	7	31.898	Competition with others	
0.204	1.394	1.804	7	12.630	The ability to win money	
0.000	8.484	8.737	3	26.210	Graphics, Artwork and Sound	Group_4
0.014	3.551	3.071	3	9.214	Use of skill	
0.001	5.327	4.765	3	14.295	Use of strategy	
0.001	5.831	5.851	3	17.552	Fast-paced action	
0.000	12.080	15.956	3	47.869	Competition with others	
0.001	5.251	6.798	3	20.395	The ability to win money	
	1.168 3.450 1.394 8.484 3.551 5.327 5.831 12.080 5.251	1.172 4.557 1.804 8.737 3.071 4.765 5.851 15.956 6.798	7 7 3 3 3 3 3 3 3	8.202 31.898 12.630 26.210 9.214 14.295 17.552 47.869 20.395	Fast-paced actionCompetition with othersThe ability to win moneyGraphics, Artwork and SoundUse of skillUse of strategyFast-paced actionCompetition with othersThe ability to win money	Group_4

Error	Graphics, Artwork and Sound	936.095	909	1.030	
	Use of skill	786.153	909	0.865	
	Use of strategy	813.100	909	0.894	
	Fast-paced action	912.034	909	1.003	
	Competition with others	1200.707	909	1.321	
	The ability to win money	1176.906	909	1.295	
Total	Graphics, Artwork and Sound	11778.444	935		
	Use of skill	14200.444	935		
	Use of strategy	14460.000	935		
	Fast-paced action	13109.556	935		
	Competition with others	10022.444	935		
	The ability to win money	14636.889	935		
Corrected Total	Graphics, Artwork and Sound	1062.578	934		
	Use of skill	843.058	934		
	Use of strategy	879.952	934		
	Fast-paced action	996.755	934		
	Competition with others	1505.135	934		
	The ability to win money	1324.820	934		
a. SkillOrReel = Skill-I	based				
b. R Squared = .119 (	Adjusted R Squared = .095)				
c. R Squared = .067 (	Adjusted R Squared = .042)				
d. R Squared = .076 (	Adjusted R Squared = .051)				

f. R Squared = .202 (Adjusted R Squared = .180) g. R Squared = .112 (Adjusted R Squared = .087)

# Table 14. Multivariate Tests<sup>a</sup> for Demographics Associated with Enjoyment, Playing Longer,and Playing Again

Pillai's Trace	Value	F	Hypothesis df	Error df	Sig.
Intercept	0.716	580.362b	3.000	690.000	0.000
Age 50 Plus (yes, no)	0.013	3.125b	3.000	690.000	0.025
PGSI (MR/PG, Other)	0.019	4.511b	3.000	690.000	0.004
Group_4 (EGM, VideoGm, Bth, None)	0.069	5.429	9.000	2076.000	0.000
Skill or Reel Game	0.078	19.393b	3.000	690.000	0.000
BSSS (20 +, < 20)	0.003	.654b	3.000	690.000	0.581
BIS8 (2 +, < 2)	0.013	2.946b	3.000	690.000	0.032
IGD (yes, no)	0.002	.376b	3.000	690.000	0.770

a. Design: Intercept + Age50\_Plus\_or\_Less + PGSI\_MR\_PG\_VS\_OTH + Group\_4 + SkillOrReel + BSSS\_Dicot20Plus + BIS8\_Dicto2Plus + IGD\_groups

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

# Table 15. Multivariate Testsa Associating Skill, Control, Practice and immersion to whether people played the reel vs skill-based game

Pillai's Trace	Value	F	Hypothesis df	Error df	Sig.
Intercept	0.899	2803.095	4	1255	0.00
Skill or Reel Game	0.266	113.859	4	1255	0.00

a. Design: Intercept + SkillOrReel

b. Exact statistic
		Type III Sum		Mean		
Source		of Squares	df	Square	F	Sig.
Corrected Model	How important was your skill level, good or bad, in determining the points you were able to score in Spacefox?	231.862ª	1	231.86	210.75	0.00
	How much control were you able to exercise in winning at Spacefox?	187.319 <b>⊧</b>	1	187.32	215.43	0.00
	Would more practice at Spacefox allow you to win more credits?	25.975 <sup>.</sup>	1	25.98	207.40	0.00
	Did you feel immersed or absorbed in Spacefox, forgetting about everything else?	82.644	1	82.64	68.86	0.00
Intercept	How important was your skill level, good or bad, in determining the points you were able to score in Spacefox?	3295.694	1	3295.69	2995.67	0.00
	How much control were you able to exercise in winning at Spacefox?	2911.563	1	2911.56	3348.48	0.00
	Would more practice at Spacefox allow you to win more credits?	952.547	1	952.55	7605.52	0.00
	Did you feel immersed or absorbed in Spacefox, forgetting about everything else?	4103.672	1	4103.67	3419.05	0.00
SkillOrReel	How important was your skill level, good or bad, in determining the points you were able to score in Spacefox?	231.862	1	231.86	210.75	0.00
	How much control were you able to exercise in winning at Spacefox?	187.319	1	187.32	215.43	0.00

## Table 16. Tests of Between-Subjects Effects of Skill or Reel on Skill, Control, Practice and Immersion in the game

	Would more practice at Spacefox allow you to win more credits?	25.975	1	25.98	207.40	0.00
	Did you feel immersed or absorbed in Spacefox, forgetting about everything else?	82.644	1	82.64	68.86	0.00
Error	How important was your skill level, good or bad, in determining the points you were able to score in Spacefox?	1383.992	1258	1.10		
	How much control were you able to exercise in winning at Spacefox?	1093.853	1258	0.87		
	Would more practice at Spacefox allow you to win more credits?	157.557	1258	0.13		
	Did you feel immersed or absorbed in Spacefox, forgetting about everything else?	1509.899	1258	1.20		
Total	How important was your skill level, good or bad, in determining the points you were able to score in Spacefox?	18322.000	1260			
	How much control were you able to exercise in winning at Spacefox?	15806.000	1260			
	Would more practice at Spacefox allow you to win more credits?	4371.000	1260			
	Did you feel immersed or absorbed in Spacefox, forgetting about everything else?	19020.000	1260			
Corrected Total	How important was your skill level, good or bad, in determining the points you were able to score in Spacefox?	1615.854	1259			

How much co to exercise in Spacefox?	ntrol were you able winning at	1281.17	1 1259
Would more p allow you to v	practice at Spacefox vin more credits?	183.53	3 1259
Did you feel ir absorbed in S about everyth	nmersed or pacefox, forgetting ing else?	1592.54	3 1259
ared = $143$ (Adjusted	d R Squared = 143)		

a. R Squared = .143 (Adjusted R Squared = .143)
b. R Squared = .146 (Adjusted R Squared = .146)
c. R Squared = .142 (Adjusted R Squared = .141)

d. R Squared = .052 (Adjusted R Squared = .051)

### Table 17. Multivariate Testsa, b for Perceptions of skill, control, practice and immersion

Pillai's Trace	Value	F	Hypothesis df	Error df	Sig.
Intercept	0.98	8906.411 <sup>.</sup>	5	1141	0.00
skill	0.02	1.053	20	4576	0.39
control	0.04	2.026	20	4576	0.00
practice	0.00	.187 <sup>.</sup>	5	1141	0.97
immersed	0.02	1.029	20	4576	0.42

a. SkillOrReel = Skill-based

b. Design: Intercept + SF\_skill + SF\_control + SF\_practice + SF\_immersed

c. Exact statistic

d. The statistic is an upper bound on F that yields a lower bound on the significance level.

## Table 18. Tests of Between-Subjects Effectsa for Perceptions of skill, control, practice and immersion on outcomes

		Type III Sum		Mean		
Source		of Squares	df	Square	F	Sig.
Corrected Model	Inv_Ln_RatioMisses	1.365 <sup>,</sup>	13	0.11	1.18	0.29
	NumberFires_VF	14109.522 <sup>c</sup>	13	1085.35	0.65	0.82

	Bet_Speed - Number of valid bets divided by time in game times 60	539.919ª	13	41.53	1.28	0.22
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	1966.545 <b></b> ª	13	151.27	1.04	0.41
	Avg_Bet - Total cost of valid bets divided by number of valid bets	31.045 <sup>,</sup>	13	2.39	1.53	0.10
	Attempted DoubleNothing	7.871 <sup>s</sup>	13	0.61	2.47	0.00
Intercept	Inv_Ln_RatioMisses	986.159	1	986.16	11094.58	0.00
	NumberFires_VF	1291541.382	1	1291541.38	769.12	0.00
	Bet_Speed - Number of valid bets divided by time in game times 60	30824.383	1	30824.38	949.90	0.00
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	160502.814	1	160502.81	1103.74	0.00
	Avg_Bet - Total cost of valid bets divided by number of valid bets	1598.637	1	1598.64	1025.27	0.00
	Attempted DoubleNothing	60.777	1	60.78	248.25	0.00
SF_skill	Inv_Ln_RatioMisses	0.090	4	0.02	0.25	0.91
	NumberFires_VF	4928.592	4	1232.15	0.73	0.57

	Bet_Speed - Number of valid bets divided by time in game times 60	66.433	4	16.61	0.51	0.73
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	681.211	4	170.30	1.17	0.32
	Avg_Bet - Total cost of valid bets divided by number of valid bets	4.721	4	1.18	0.76	0.55
	Attempted DoubleNothing	0.267	4	0.07	0.27	0.90
SF_control	Inv_Ln_RatioMisses	1.094	4	0.27	3.08	0.02
	NumberFires_VF	5797.841	4	1449.46	0.86	0.49
	Bet_Speed - Number of valid bets divided by time in game times 60	355.605	4	88.90	2.74	0.03
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	793.597	4	198.40	1.36	0.24
	Avg_Bet - Total cost of valid bets divided by number of valid bets	27.130	4	6.78	4.35	0.00
	Attempted DoubleNothing	0.801	4	0.20	0.82	0.51
SF_practice	Inv_Ln_RatioMisses	0.001	1	0.00	0.01	0.91
	NumberFires_VF	97.394	1	97.39	0.06	0.81

	Bet_Speed - Number of valid bets divided by time in game times 60	2.765	1	2.77	0.09	0.77
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	9.200	1	9.20	0.06	0.80
	Avg_Bet - Total cost of valid bets divided by number of valid bets	1.026	1	1.03	0.66	0.42
	Attempted DoubleNothing	1.631	1	1.63	6.66	0.01
SF_immersed	Inv_Ln_RatioMisses	0.293	4	0.07	0.82	0.51
	NumberFires_VF	1836.713	4	459.18	0.27	0.90
	Bet_Speed - Number of valid bets divided by time in game times 60	137.536	4	34.38	1.06	0.38
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	414.596	4	103.65	0.71	0.58
	Avg_Bet - Total cost of valid bets divided by number of valid bets	0.809	4	0.20	0.13	0.97
	Attempted DoubleNothing	2.231	4	0.56	2.28	0.06
Error	Inv_Ln_RatioMisses	101.775	1145	0.09		
	NumberFires_VF	1922747.179	1145	1679.26		

	Bet_Speed - Number of valid bets divided by time in game times 60	37155.503	1145	32.45	
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	166503.250	1145	145.42	
	Avg_Bet - Total cost of valid bets divided by number of valid bets	1785.321	1145	1.56	
	Attempted DoubleNothing	280.321	1145	0.24	
Total	Inv_Ln_RatioMisses	5347.015	1159		
	NumberFires_VF	8684699.000	1159		
	Bet_Speed - Number of valid bets divided by time in game times 60	182033.797	1159		
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	918398.756	1159		
	Avg_Bet - Total cost of valid bets divided by number of valid bets	10428.252	1159		
	Attempted DoubleNothing	537.000	1159		
Corrected Total	Inv_Ln_RatioMisses	103.140	1158		
	NumberFires_VF	1936856.701	1158		

Bet_Speed - Number of valid bets divided by time in game times 60	37695.422	1158
Fire_Rate - Number of torpedoes fired divided by time in game times 60	168469.794	1158
Avg_Bet - Total cost of valid bets divided by number of valid bets	1816.366	1158
Attempted DoubleNothing	288.192	1158

a. SkillOrReel = Skill-based

- b. R Squared = .013 (Adjusted R Squared = .002)
- c. R Squared = .007 (Adjusted R Squared = -.004)
- d. R Squared = .014 (Adjusted R Squared = .003)
- e. R Squared = .012 (Adjusted R Squared = .000)
- f. R Squared = .017 (Adjusted R Squared = .006)
- g. R Squared = .027 (Adjusted R Squared = .016)

## Table 19. Tests of Between-Subjects Effects

Dependent Variable: How much control?

Source	Type III Sum of Squares	df	Mean Square	F	Sig.		
Corrected Model	58.056ª	21	2.76	2.80	0.00		
Intercept	270.917	1	270.92	274.55	0.00		
ATSI	3.858	3	1.29	1.30	0.27		
Marital	4.197	4	1.05	1.06	0.37		
Education	2.891	5	0.58	0.59	0.71		
WorkStatus	23.289	7	3.33	3.37	0.00		
Gender	10.114	1	10.11	10.25	0.00		
Income	0.019	1	0.02	0.02	0.89		
Error	1152.523	1168	0.99				
Total	15001.000	1190					
Corrected Total	1210.579	1189					

a. R Squared = .048 (Adjusted R Squared = .031)

#### Table 20. Multivariate Testsa for Skill vs Reel games

Pillai's Trace	Value	F	Hypothesis df	Error df	Sig.
Intercept	0.550	324.542 <sup>₀</sup>	4.000	1064.000	0.000
Skill or Reel	0.237	<b>82.480</b> ⁵	4.000	1064.000	0.000
Group_4 (EGM, VideoGm, Bth, None)	0.002	<b>.572</b> <sup>₀</sup>	4.000	1064.000	0.683
PGSI (MR/PG, Other)	0.012	<b>3.116</b> <sup>₀</sup>	4.000	1064.000	0.015
Age 50 Plus (yes,no)	0.067	<b>19.186</b> <sup>b</sup>	4.000	1064.000	0.000
Gender (M, F)	0.023	<b>6.132</b> <sup>₀</sup>	4.000	1064.000	0.000

a. Design: Intercept + SkillOrReel + Group\_4 + PGSI\_MR\_PG\_VS\_OTH + Age50\_Plus\_or\_Less + Gender

b. Exact statistic

### Table 21. Tests of Between-Subjects Effects for Skill vs Reel Games

		Type III Sum		Mean		
Source		of Squares	df	Square	F	Sig.
Corrected Model	Bet_Speed - Number of valid bets divided by time in game times 60	3578.953 <sup>,</sup>	5	715.791	24.162	0.000

	Fire_Rate - Number of torpedoes fired divided by time in game times 60	8559.563∘	5	1711.913	12.870	0.000
	Avg_Bet - Total cost of valid bets divided by number of valid bets	40.358 <sup>.</sup>	5	8.072	5.439	0.000
	Attempted DoubleNothing	2.390₫	5	0.478	1.936	0.086
Intercept	Bet_Speed - Number of valid bets divided by time in game times 60	17775.826	1	17775.826	600.041	0.000
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	29955.753	1	29955.753	225.205	0.000
	Avg_Bet - Total cost of valid bets divided by number of valid bets	824.850	1	824.850	555.867	0.000
	Attempted DoubleNothing	9.007	1	9.007	36.487	0.000
SkillOrReel	Bet_Speed - Number of valid bets divided by time in game times 60	1799.815	1	1799.815	60.755	0.000
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	6115.815	1	6115.815	45.978	0.000

	Avg_Bet - Total cost of valid bets divided by number of valid bets	5.308	1	5.308	3.577	0.059
	Attempted DoubleNothing	0.271	1	0.271	1.100	0.295
Group_4	Bet_Speed - Number of valid bets divided by time in game times 60	21.869	1	21.869	0.738	0.390
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	41.912	1	41.912	0.315	0.575
	Avg_Bet - Total cost of valid bets divided by number of valid bets	0.190	1	0.190	0.128	0.721
	Attempted DoubleNothing	0.301	1	0.301	1.221	0.269
PGSI_MR_PG_VS_OTH	Bet_Speed - Number of valid bets divided by time in game times 60	75.226	1	75.226	2.539	0.111
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	1435.613	1	1435.613	10.793	0.001
	Avg_Bet - Total cost of valid bets divided by number of valid bets	1.269	1	1.269	0.855	0.355

	Attempted DoubleNothing	0.138	1	0.138	0.558	0.455
Age50_Plus_or_Less	Bet_Speed - Number of valid bets divided by time in game times 60	1117.542	1	1117.542	37.724	0.000
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	85.104	1	85.104	0.640	0.424
	Avg_Bet - Total cost of valid bets divided by number of valid bets	28.690	1	28.690	19.334	0.000
	Attempted DoubleNothing	0.010	1	0.010	0.040	0.842
Gender	Bet_Speed - Number of valid bets divided by time in game times 60	149.226	1	149.226	5.037	0.025
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	149.570	1	149.570	1.124	0.289
	Avg_Bet - Total cost of valid bets divided by number of valid bets	6.064	1	6.064	4.086	0.043
	Attempted DoubleNothing	1.631	1	1.631	6.608	0.010

Error	Bet_Speed - Number of valid bets divided by time in game times 60	31609.197	1067	29.624	
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	141927.320	1067	133.015	
	Avg_Bet - Total cost of valid bets divided by number of valid bets	1583.320	1067	1.484	
	Attempted DoubleNothing	263.388	1067	0.247	
Total	Bet_Speed - Number of valid bets divided by time in game times 60	177319.365	1073		
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	806224.870	1073		
	Avg_Bet - Total cost of valid bets divided by number of valid bets	9650.206	1073		
	Attempted DoubleNothing	485.000	1073		
Corrected Total	Bet_Speed - Number of valid bets divided by time in game times 60	35188.150	1072		
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	150486.883	1072		
	Avg_Bet - Total cost of valid bets divided by number of valid bets	1623.678	1072		
	Attempted DoubleNothing	265.778	1072		
a. R Squared = .102 (Adj	usted R Squared = .097)				
b. R Squared = .057 (Adj	usted R Squared = .052)				

c. R Squared = .025 (Adjusted R Squared = .020) d. R Squared = .009 (Adjusted R Squared = .004)

## Table 22. Tests of Between-Subjects Effects for Vices Features

		Type III Sum		Mean		
Source		of Squares	df	Square	F	Sig.
Corrected Model	Inv_Ln_RatioMisses	33.841ª	26	1.30	23.45	0.00
	Bet_Speed - Number of valid bets divided by time in game times 60	10382.441 <sup>,</sup>	26	399.32	17.66	0.00
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	11546.013 <sup>,</sup>	26	444.08	3.26	0.00
	Avg_Bet - Total cost of valid bets divided by number of valid bets	67.988ª	26	2.61	1.70	0.02
	Attempted DoubleNothing	8.189ª	26	0.31	1.28	0.16
Intercept	Inv_Ln_RatioMisses	3613.059	1	3613.06	65102.92	0.00
	Bet_Speed - Number of valid bets divided by time in game times 60	100814.967	1	100814.97	4459.04	0.00
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	531812.679	1	531812.68	3906.11	0.00
	Avg_Bet - Total cost of valid bets divided by number of valid bets	5854.056	1	5854.06	3813.34	0.00
	Attempted DoubleNothing	170.463	1	170.46	691.32	0.00
VICES_Visual	Inv_Ln_RatioMisses	1.141	1	1.14	20.56	0.00
	Bet_Speed - Number of valid bets divided by time in game times 60	119.680	1	119.68	5.29	0.02
	Fire_Rate - Number of torpedoes fired	2753.557	1	2753.56	20.22	0.00

	divided by time in game times 60					
	Avg_Bet - Total cost of valid bets divided by number of valid bets	0.147	1	0.15	0.10	0.76
	Attempted DoubleNothing	0.013	1	0.01	0.05	0.82
VICES_Skill	Inv_Ln_RatioMisses	19.330	1	19.33	348.31	0.00
	Bet_Speed - Number of valid bets divided by time in game times 60	7104.351	1	7104.35	314.22	0.00
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	1006.046	1	1006.05	7.39	0.01
	Avg_Bet - Total cost of valid bets divided by number of valid bets	0.100	1	0.10	0.07	0.80
	Attempted DoubleNothing	0.771	1	0.77	3.13	0.08
VICES_Speed	Inv_Ln_RatioMisses	1.768	1	1.77	31.85	0.00
	Bet_Speed - Number of valid bets divided by time in game times 60	95.713	1	95.71	4.23	0.04
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	341.254	1	341.25	2.51	0.11
	Avg_Bet - Total cost of valid bets divided by number of valid bets	1.497	1	1.50	0.98	0.32
	Attempted DoubleNothing	0.281	1	0.28	1.14	0.29
Group_4	Inv_Ln_RatioMisses	0.799	3	0.27	4.80	0.00
	Bet_Speed - Number of valid bets divided by time in game times 60	405.687	3	135.23	5.98	0.00
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	1158.363	3	386.12	2.84	0.04

	Avg_Bet - Total cost of valid bets divided by number of valid bets	7.322	3	2.44	1.59	0.19
	Attempted DoubleNothing	0.695	3	0.23	0.94	0.42
PGSI_MR_PG_VS_OTH	Inv_Ln_RatioMisses	0.604	1	0.60	10.89	0.00
	Bet_Speed - Number of valid bets divided by time in game times 60	4.846	1	4.85	0.21	0.64
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	623.206	1	623.21	4.58	0.03
	Avg_Bet - Total cost of valid bets divided by number of valid bets	0.174	1	0.17	0.11	0.74
	Attempted DoubleNothing	0.096	1	0.10	0.39	0.53
Age50_Plus_or_Less	Inv_Ln_RatioMisses	2.082	1	2.08	37.51	0.00
	Bet_Speed - Number of valid bets divided by time in game times 60	425.336	1	425.34	18.81	0.00
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	11.854	1	11.85	0.09	0.77
	Avg_Bet - Total cost of valid bets divided by number of valid bets	19.383	1	19.38	12.63	0.00
	Attempted DoubleNothing	0.096	1	0.10	0.39	0.53
Gender	Inv_Ln_RatioMisses	0.965	1	0.97	17.39	0.00
	Bet_Speed - Number of valid bets divided by time in game times 60	129.603	1	129.60	5.73	0.02
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	114.159	1	114.16	0.84	0.36
	Avg_Bet - Total cost of valid bets divided by number of valid bets	6.695	1	6.69	4.36	0.04

	Attempted DoubleNothing	1.336	1	1.34	5.42	0.02
VICES_Visual * Gender	Inv_Ln_RatioMisses	0.607	1	0.61	10.94	0.00
	Bet_Speed - Number of valid bets divided by time in game times 60	30.764	1	30.76	1.36	0.24
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	937.398	1	937.40	6.89	0.01
	Avg_Bet - Total cost of valid bets divided by number of valid bets	0.851	1	0.85	0.55	0.46
	Attempted DoubleNothing	0.166	1	0.17	0.68	0.41
Corrected Total	Inv_Ln_RatioMisses	87.396	991			
	Bet_Speed - Number of valid bets divided by time in game times 60	32200.256	991			
	Fire_Rate - Number of torpedoes fired divided by time in game times 60	142929.825	991			
	Avg_Bet - Total cost of valid bets divided by number of valid bets	1549.409	991			
	Attempted DoubleNothing	246.136	991			
a. R Squared = .387 (Adj	usted R Squared = .371)					
b. R Squared = .322 (Ad	justed R Squared = .304)					
c. R Squared = .081 (Adj	usted R Squared = .056)					
d. R Squared = .044 (Ad	justed R Squared = .018)					
e. R Squared = .033 (Adj	justed R Squared = .007)					

Pillai's Trace	Value	F⋼	df	Error df	Sig.
Intercept	0.995	34827.34	5	961	0.00
VICES_Visual	0.027	5.40	5	961	0.00
VICES_Skill	0.407	131.97	5	961	0.00
VICES_Complexity	0.009	1.79	5	961	0.11
VICES_Speed	0.039	7.71	5	961	0.00
VICES_Messaging	0.004	0.86	5	961	0.51
Group_4	0.041	2.68	15	2889	0.00
PGSI_MR_PG_VS_OTH	0.012	2.36	5	961	0.04
Age50_Plus_or_Less	0.067	13.71	5	961	0.00
Gender	0.030	5.93	5	961	0.00
VICES_Visual * PGSI_MR_PG_VS_OTH	0.007	1.38	5	961	0.23
VICES_Skill * PGSI_MR_PG_VS_OTH	0.011	2.23	5	961	0.05
VICES_Complexity * PGSI_MR_PG_VS_OTH	0.002	0.30	5	961	0.91
VICES_Speed * PGSI_MR_PG_VS_OTH	0.010	1.91	5	961	0.09
VICES_Messaging * PGSI_MR_PG_VS_OTH	0.005	0.94	5	961	0.45
VICES_Visual * Gender	0.015	2.89	5	961	0.01
VICES_Skill * Gender	0.002	0.41	5	961	0.84
VICES_Complexity * Gender	0.005	0.93	5	961	0.46
VICES_Speed * Gender	0.004	0.72	5	961	0.61
VICES_Messaging * Gender	0.009	1.71	5	961	0.13
VICES_Visual * Age50_Plus_or_Less	0.007	1.29	5	961	0.27
VICES_Skill * Age50_Plus_or_Less	0.006	1.20	5	961	0.31
VICES_Complexity * Age50_Plus_or_Less	0.002	0.40	5	961	0.85
VICES_Speed * Age50_Plus_or_Less	0.011	2.17	5	961	0.06
VICES_Messaging * Age50_Plus_or_Less	0.006	1.24	5	961	0.29

### Table 23. Multivariate Testsa (excl. EGM condition) for VICES features

a. Design: Intercept + VICES\_Visual + VICES\_Skill + VICES\_Complexity + VICES\_Speed + VICES\_Messaging + Group\_4 + PGSI\_MR\_PG\_VS\_OTH + Age50\_Plus\_or\_Less + Gender + VICES\_Visual \* PGSI\_MR\_PG\_VS\_OTH + VICES\_Skill \* PGSI\_MR\_PG\_VS\_OTH + VICES\_Complexity \* PGSI\_MR\_PG\_VS\_OTH + VICES\_Speed \* PGSI\_MR\_PG\_VS\_OTH + VICES\_Messaging \* PGSI\_MR\_PG\_VS\_OTH + VICES\_Visual \* Gender + VICES\_Skill \* Gender + VICES\_Complexity \* Gender + VICES\_Speed \* Gender + VICES\_Messaging \* Gender + VICES\_Visual \* Age50\_Plus\_or\_Less + VICES\_Skill \* Age50\_Plus\_or\_Less + VICES\_Complexity \* Age50\_Plus\_or\_Less + VICES\_Speed \* Age50\_Plus\_or\_Less + VICES\_Messaging \* Age50\_Plus\_or\_Less

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

## **Appendix C. Statistical test results for US internet survey**

# Tests of Within-Subjects Effects for preference of SGBs over EGMs by GameType (*Shoot'em up, Gemstone, Fast Reaction, Classic home*)

		Type III Sum of				
Source	Sphericity	Squares	df	Mean Square	F	Sig.
GameType	Sphericity Assumed	1.287	3	0.429	0.961	0.410
	Huynh-Feldt	1.287	2.983	0.431	0.961	0.410
GameType * PGSI_groups	Sphericity Assumed	20.235	9	2.248	5.037	0.000
	Huynh-Feldt	20.235	8.948	2.262	5.037	0.000
GameType * Age	Sphericity Assumed	1.238	3	0.413	0.924	0.428
	Huynh-Feldt	1.238	2.983	0.415	0.924	0.428
GameType * Gender	Sphericity Assumed	11.830	3	3.943	8.835	0.000
	Huynh-Feldt	11.830	2.983	3.966	8.835	0.000
Error(GameType)	Sphericity Assumed	1209.150	2709	0.446		

Huvnh-Feldt	1209.150	2693.211	0.449
i i a y i i i ciac	1203.130	2030.211	0.115

## Table 24. Tests of Between-Subjects Effects for preference of SGMs over EGMs

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	1574.137	1	1574.137	709.211	.000
PGSI_groups	82.775	3	27.592	12.431	.000
Age	116.075	1	116.075	52.296	.000
Gender	12.694	1	12.694	5.719	.017
Error	2004.265	903	2.220		

Source	Sphericity	Type III Sum of Squares	df	Mean Square	F	Sig.
GameType	Sphericity Assumed	23.226	3	7.742	5.731	0.001
	Huynh-Feldt	23.226	2.936	7.910	5.731	0.001
GameType * PGSI_groups	Sphericity Assumed	65.428	9	7.270	5.381	0.000
	Huynh-Feldt	65.428	8.809	7.427	5.381	0.000
GameType * Age	Sphericity Assumed	15.371	3	5.124	3.793	0.010
	Huynh-Feldt	15.371	2.936	5.235	3.793	0.010
GameType * Gender	Sphericity Assumed	52.253	3	17.418	12.893	0.000
	Huynh-Feldt	52.253	2.936	17.795	12.893	0.000
Error(GameType)	Sphericity Assumed	3659.599	2709	1.351		

## Table 25. Tests of Within-Subjects Effects for frequency of playing skill-based gambling machines (1 = not in the last 12 months to 7 = four or more times a week)

Huynh-Feldt	3659.599	2651.511	1.380
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## Test of between-subjects effects for frequency of playing skill-based gambling machines (1 = not in the last 12 months to 7 = four or more times a week)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	858.774	1	858.774	109.786	0.000
PGSI_groups	1397.812	3	465.937	59.566	0.000
Age	32.903	1	32.903	4.206	0.041
Gender	56.176	1	56.176	7.182	0.007
Error	7063.491	903	7.822		

Source	Sphericity	Type III Sum of Squares	df	Mean Square	F	Sig.
SGPs	Sphericity Assumed	98.861	8	12.358	14.558	0.000
	Greenhouse- Geisser	98.861	5.065	19.518	14.558	0.000
SGPs * SkillBasedFreqDicto	Sphericity Assumed	272.671	8	34.084	40.152	0.000
	Greenhouse- Geisser	272.671	5.065	53.834	40.152	0.000
SGPs * Age	Sphericity Assumed	105.704	8	13.213	15.566	0.000
	Greenhouse- Geisser	105.704	5.065	20.869	15.566	0.000
SGPs * Gender	Sphericity Assumed	32.185	8	4.023	4.739	0.000
	Greenhouse- Geisser	32.185	5.065	6.354	4.739	0.000
Error(SGPs)	Sphericity Assumed	6145.778	7240	0.849		

## Table 26. Tests of Within-Subjects Effects for Frequency in use of Safe Gambling Practices(SGPs)

Greenhouse-	6145.778	4583.894	1.341
Geisser	00		

### Tests of Between-Subjects Effects for Frequency in use of Safe Gambling Practices (SGPs)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	2133.665	1	2133.665	1317.484	0.000
SkillBasedFreqDicto	61.123	1	61.123	37.742	0.000
Age	256.712	1	256.712	158.513	0.000
Gender	54.521	1	54.521	33.665	0.000
Error	1465.647	905	1.619		

## Table 27. Tests of Between-Subjects Effects for Future interest in skill-based gambling (1= not interested, 4 = extremely interested) by recruitment group, age and gender

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	563.099a	5	112.620	168.826	0.000
Intercept	649.718	1	649.718	973.979	0.000
RecuitGroups4	380.234	3	126.745	190.000	0.000

Age	49.914	1	49.914	74.825	0.000	
Gender	5.102	1	5.102	7.648	0.006	
Error	752.461	1128	0.667			
Total	9321.000	1134				
Corrected Total	1315.560	1133				
Note: R Squared = .428 (Adjusted R Squared = .425)						

## Table 28. Tests of Between-Subjects Effects for Future interest in skill-based gambling (1= not interested, 4 = extremely interested) by ethnicity

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	195.600a	6	32.600	32.805	0.000
Intercept	904.739	1	904.739	910.426	0.000
HispanicDicot	7.365	1	7.365	7.412	0.007
RaceWhiteBlackAsianOther	6.701	3	2.234	2.248	0.081
Age	136.242	1	136.242	137.099	0.000

Gender	14.429	1	14.429	14.519	0.000
Error	1119.960	1127	0.994		
Tatal	0304 000	1101			
TOTAL	9321.000	1134			
Corrected Total	1315.560	1133			

Note: R Squared = .149 (Adjusted R Squared = .144)

## **Technical Report**

## Semi-structured interview guide in the US (Nevada and New Jersey)

## Introduction

Hello, my name is \_\_\_\_\_\_ from CQUniversity. Thank you for agreeing to take part in this interview about skill-based gambling. Is now still a good time to talk?

I'd like to let you know that this call will be recorded for research purposes. We'll only use your first name to ensure anonymity. The recording will not be included in any research report but will be transcribed into text, compiled and analysed with the other interviews that we are conducting. Do I have your permission to continue?

Can I please confirm you've read and understood the Information Sheet and that you consent to participate in this interview?

In this interview, we will be talking mostly about your experience playing skill-based gambling products.

Do you have any questions before we start?

## Gambling involvement

Can you please tell me a little about the skill-based gambling games that you play? [Prompts: what are they called, what style of game are they, e.g., hybrid slot, pick 3, racing, shooter]

How often do you play skill-based gambling games, as well as other sorts of gambling?

[Prompts: other traditional and emerging gambling formats, such as traditional slots as well as traditional skill-based gambling formats, such as sports betting or poker; number of times per week/month, amount of money per session.]

### Motivations for using SGM

What made you first decide to try skill-based slot machines?

[Prompts: did friends/family tell you about them? Did you see them while you were gambling on other products at a venue? Did you think they offered better payoffs than regular gambling?]

Did you know they were SGM before you started playing? If yes: how did you know they were SGM? If no: what did you think they were?

What is your understanding of the skill involved in SGM? [Prompts: Can you train to get better at SGM, e.g., by playing them more?]

What do you think the odds are of winning when you play SGM? [Prompts: do you feel that you are more likely to win playing SGM than regular slots? Do they offer bigger pay-outs/jackpots than regular slots (and is this offset by a higher cost of play?]

Why do you continue to play SGM?

## Attractive structural characteristics of SGM & regular EGMs

What do you/don't you like about SGM?

What do you/don't you like about regular slot machines?

[Prompts: attractive structural characteristics of the skill-based elements in the products they frequently use, e.g., how the skill element can foster cognitive illusions such as the illusion of control. More conventional structural characteristics of the EGM, e.g., ability to bet frequently and lose track of time when 'in the zone.']

What are the biggest differences between playing on SGM and regular slots?

How does you play differ when you play SGM compared to regular slots? E.g., how long you play for, the speed of play/loss, how often you play, how much you spend when you play? [*Prompts: whether they have feelings of immersion*]

### Perceived risks and potential returns

What do you see as the potential returns from skill-based gaming machines (SGMs)? [Prompt: money won/easier to win money, increased enjoyment. How these relate to traditional slot machines and other gambling products, e.g., sports betting?]

What do you see as the potential risks of skill-based gambling games? [*Prompt: Illusion of control? How* these relate to traditional slot machines and other gambling products, e.g., sports betting?]

Some SGM have the skill element only in the bonus game/ mini game, whereas the machine otherwise is a typical slot machine. These are called hybrid gaming machines. What type of game do you think is more attractive to play – for you or others? What type of game do you think might be more prone to making people spend too much?

## Harm minimisation behaviours

When you gamble, is there anything that you do to limit the time or money that you spend so that you don't accidentally spend too much? [Prompts: taking breaks in play, setting limits, not gambling alone, limiting alcohol consumption]

Do these strategies differ between playing regular gambling games and SGM?

Is there anything you think the government or gambling providers can do to make skill-based gambling games safer?

End

Is there anything else you'd like to tell us about your experiences with skill-based gambling products?

Thank you for participating.

Remind them of help service information on the Information sheet or offer to provide if requested.

Help is available 24/7 from the confidential National Problem Gambling Helpline.

Call: 1-800-522-4700

Chat: ncpgambling.org/chat

Text: 1-800-522-4700

## Details on the skill-based experiment

## Recruitment

Participants were recruited from online panels via Qualtrics and PureProfile. Online panels can provide fast and affordable access to do specific populations, and generally find similar associations between variables as representative samples (Russell et al., 2022). There were two main versions of the task: a skill-based gambling machines (SGMs), and a reel-based EGM. Qualtrics recruited for the skill-based gambling machines (SGMs) but declined to recruit for the reel-based EGM due to the potentially sensitive nature of the task. It was therefore necessary to recruit via another panel, PureProfile, for the reel-based version of the EGM task.

Measure	Qualtrics (Skill-based gambling)	PureProfile (Reel-based EGM)
Started the survey	2,543	224
No consent	416	17
Under 18	10	0
Quota full	72	78
Poor data quality	62	8
Did not complete (B)	824	20
Final total (A)	1,159	101
Completion rate = A / (A+B) * 100	58.6%	83.5%

### Table 29. Completions and exclusions by provider

## Table 30.Skill-based gambling machine (SGM) experiment sample demographics

Variable	Level	Skill-based (Qualtrics, N = 1,159)		Reel-based (PureProfile, <i>N</i> = 101)	
		Mean	SD	Mean	SD
Age	Years	51.5	16.7	46.7	15.6
		n	%	n	%
Gender	Male	621	53.6	54	53.5
	Female	537	46.3	47	46.5
	Other	1	0.1	0	0.0
State	New South Wales	328	28.3	30	29.7
	Victoria	338	29.2	26	25.7
	Queensland	234	20.2	21	20.8
	South Australia	115	9.9	8	7.9
	Western Australia	88	7.6	9	8.9
	Tasmania	31	2.7	3	3.0
	Australian Capital Territory	20	1.7	3	3.0

	Northern Territory	5	0.4	1	1.0
Main language	English	1096	94.6	92	91.1
	Other	63	5.4	9	8.9
Aboriginal or Torres Strait Islander Status	Aboriginal	22	1.9	1	1.0
	Torres Strait Islander	4	0.3	0	0.0
	Both	4	0.3	0	0.0
	Neither	1129	97.4	100	99.0
Marital Status	Single/ never married	271	23.4	28	27.7
	Living with partner/ de facto	129	11.1	16	15.8
	Married	593	51.2	48	47.5
	Divorced or separated	130	11.2	6	5.9
	Widowed	36	3.1	3	3.0
Education	Postgraduate	144	12.4	11	10.9
	Undergraduate	334	28.8	28	27.7
	Trade/tech certificate	344	29.7	27	26.7
	Completed year 12	204	17.6	21	20.8
	Completed year 10 or less	133	11.5	14	13.9
Work status	Working full-time	391	35.9	40	39.6

Working part-time	178	16.3	15	14.9
Home duties	77	7.1	12	11.9
Full-time student	18	1.7	8	7.9
Retired	141	12.9	8	7.9
Pensioner	206	18.9	10	9.9
Unemployed	57	5.2	5	5.0
Other	22	2.0	3	3.0

## Table 31. Skill-based gambling machine (SGM) experiment income by sample

Variable	Level	Skill-based (Qualtrics, N = 1,159)		Reel-based (Pureprofile, <i>N</i> = 101)	
		n	%	n	%
Income	Under \$385 per week (under \$20,000 per year)	164	14.2	20	19.8
	\$386 - \$577 per week (\$20,001-\$30,000 per year)	214	18.5	15	14.9
	\$578 - \$769 per week (\$30,001-\$40,000 per year)	106	9.1	5	5.0
	\$770 - \$961 per week (\$40,001-\$50,000 per year)	86	7.4	7	6.9

\$962 - \$1154 per week	90	7.8	7	6.9
(\$50,001-\$60,000 per year)				
\$1155 - \$1346 per week	81	7.0	6	5.9
(\$60,001-\$70,000 per year)				
\$1347 - \$1538 per week	81	7.0	8	7.9
(\$70,001-\$80,000 per year)				
\$1539 - \$1731 per week	45	3.9	1	1.0
(\$80,001-\$90,000 per year)				
\$1732 - \$1923 per week	52	4.5	13	12.9
(\$90,001-\$100,000 per year)				
\$1924 - \$2308 per week	52	4.5	3	3.0
(\$100,001-\$120,000 per year)				
\$2309 - \$2692 per week	31	2.7	3	3.0
(\$120,001-\$140,000 per year)				
\$2693 - \$3077 per week	22	1.9	4	4.0
(\$141,000-\$160,000 per year)				
\$3078 - \$3462 per week	20	1.7	0	0.0
(\$161,000-\$180,000 per year)				
\$3463 - \$3846 per week	23	2.0	0	0.0
(\$181,000-\$200,000 per year)				
\$3846 and over per week	20	1.7	2	2.0
(\$200,001 and over per year)				
l don't know or wish to disclose my income	72	6.2	7	6.3

### Data Screening

As shown in Table 10, potential participants were screened out if they did not meet the inclusion criteria of consenting to take part or not being aged 18 or older. Participants were also required to be resident in Australia; however, no exclusions were necessary due to lack of residency. Once quotas were full (see below), additional participants that fell into that quota were excluded. Data quality checks included checking for duplicates and inconsistent responses, as well as for straightlining or speeding (i.e., inattention). A total of 70 participants were excluded for one or more of these data quality checks, predominantly straightlining.

### Quotas

Because skill-based gambling machines (SGMs) are essentially video games that involve gambling, we were tasked by Gambling Research Australia to examine whether they appealed to those who already play regular reel-based EGMs, and those who play video games. The original research-plan was to recruit people who played reel-based EGMs only (but not video games), people who played video games only (but not reel-based EGMs), and people who played both. However, feasibility for obtaining the last group from the online panels was low due to the prohibitive expense of pre-surveying potential respondents. Upon consultation with the Gambling Research Australia working group, this last group was thus changed to anyone who did not fit into the EGM only or video games only groups, with the understanding that some would play both EGMs and video games, and some would play neither. Approximately equal numbers of each group were recruited via quotas. For the Qualtrics sample, an additional recruitment effort was made to maximise numbers in the last groups (i.e., anyone who plays EGMs and video games, or neither EGMs nor video games), allowing us to move from an original three group recruitment (EGMs only, video games only, neither, and both).
Survey Instrument for the Experiment

Blue highlight = programming notes

Screen out if no to consent.

SCREENING QUESTIONS

### **BEHIND THE SCENES SCREENING**

Australian only, IP address.

Desktop/laptop only. If responding on a touchscreen device, ask them to change to desktop and resume. (And program the survey accordingly.)

## **Q**1

AGE

What is your age?

(Please enter a whole number)

\_\_\_\_\_ (Open ended)

Screen out if under 18

## **Gambling and Gaming Frequency (for quotas)**

## **Q 1**

### FREQUENCY OF GAMBLING ON FORMS

In the last 12 months, how often did you spend money on the following activities?

- A. Playing pokies
- B. Buying lottery tickets
- C. Betting on horse or greyhound races
- D. Betting on sporting events (such as AFL, Cricket, Soccer, etc.)
- E. Playing in poker tournaments
- F. Betting on casino games (e.g., blackjack, roulette, craps, etc.)
- G. Playing keno
- H. Playing bingo
- I. Buying instant scratch tickets, raffle tickets, sweeps or other competitions
- J. Gambling informally such as playing cards at home
- K. Betting on esports (video game competitions)
- L. Playing fantasy sports
  - 1. Not at all
  - 2. A few times during the year
  - 3. About once a month
  - 4. Two to three times a month
  - 5. About once a week
  - 6. More than once a week

Use pokies frequency for quota

### FREQUENCY OF PLAYING VIDEO GAMES

In the last 12 months, how often have you played each of these types of video games?

(do NOT include crossword, solitaire, puzzle games or social-media games, such as words-with-friends, but DO include strategy, role-playing, action games, adventure games, etc.)

Role-playing games (e.g., Final Fantasy) Shooting games (e.g., Halo, Call of Duty, Doom) Multiplayer online battle arena games (e.g., League of Legends, Dota2) Sandbox games (e.g., Grand Theft Auto, The Sims, Minecraft) Real-time strategy games (e.g., Warcraft, Age of Empires) Role-playing games (e.g., Skyrim, The Witcher, Fallout) Simulation and sports (e.g., racing games, FIFA, NBA2K) Puzzler games (e.g., Portal) Action-adventure (e.g., Assassin's Creed) Survival and horror (e.g., Resident Evil) Platformers (e.g., Mario, Crash Bandicoot)

Social games (e.g., Words with Friends, or games on social media)

- 1. Not at all
- 2. A few times during the year

Q 1

- 3. About once a month
- 4. Two to three times a month
- 5. About once a week
- 6. More than once a week

Must be at least weekly on any of them except social games to meet that quota.

Use for quota - need weekly response option.

## Quota:

- **333** who have played EGMs in the last 12 mnths(but **no WEEKLY** video-games)
- **333** who have played video games at least weekly in the last year (but no EGMs in last 12 mnths)
- **334** who have played an EGM in the last 12 mnths AND played video games at least weekly
- If no **12-mo**, EGMs or **weekly** video games, exclude.

# **Q 1**

## PROGRAMMING FOR RANDOMISATION AND SENDING THEM TO SIMULATOR

Want to do stratified randomisation within these three groups (EGM only, gaming only, both) so that there's an approximately equal number of people in each combination of features.

Reminder to Alex - there are five features, each with two levels. So every person is randomised to one of the 32 combinations. Probably best that I actually code all 32 options and randomise into those

conditions, rather than randomising each pair of conditions separately. More control over balance across the groups, within each stratum.

No other considerations for balance across the groups (e.g., age, etc). We're already dealing with small groups per combination. There will be about 10 people per stratum in each condition, x3 conditions, so about 30 in each group. No room for more movement.

Need to consider that must be fed to the simulator, and ensure that that's captured in embedded data,

and also in the redirection URL. Don't forget the unique identifier per person. Test the hell out of this.

Screen for participants:

[IMPORTANT - PLEASE READ

Thanks for your interest in playing our game! It will begin on the next screen.

With this game, you can win additional survey compensation. Depending on how you go in the game, you can win up to an additional \$6.50.

You will need to use your keyboard to control the game. The first screen includes instructions on how to play.

The game includes sounds. You may wish to adjust your volume before clicking next.

If the game appears to be running slow, please clear your browser's cache and reload the survey.

(The next button will appear in 5 seconds.)]

#### [GAME STARTS AND ENDS HERE]

PROGRAMMING NOTE: Start of new survey. New survey to capture the embedded data that the game feeds out and capture the unique identifier per person.

You finished the game with \${e://Field/credits} credits.

On top of the normal compensation you get for taking part in a survey, you have won **\$** {**e**://Field/winningsRounded} additional compensation today.

Please click next to answer some questions about the game and yourself to finish the survey.

### **SeaFox Questions**

## **Q 1**

Thinking about the game you just played...

Have you played a game that is very similar to SeaFox before? (yes/no)

[if "no" skip to Q3]

# Q 2

Thinking about the game you just played...

As best you can remember, what was the name of the game you played that was like SeaFox?

Or ( x ) cannot recall the name of the game

# Q 3

Thinking about the game you just played...

How important was your skill level, good or bad, in determining the points you were able to score in SeaFox?

Not important Very important

1 2 3 4 5

## Q 4

Thinking about the game you just played...

How much control were you able to exercise in winning at the game?

None	A lot			
1	2	3	4	5

# Q 5

Thinking about the game you just played...

Would <u>more practice</u> at SeaFox allow you to win more points? (yes/no)

# **Q**6

Thinking about the game you just played...

Did you feel immersed or absorbed in the game, forgetting about everything else?

Not at all

Very much

1 2 3 4 5

# Q 7

How much did the following features of SeaFox increase your <u>enjoyment of the game</u>?

	Not	at all			Very much
Graphics, Artwork and sound	1	2	3	4	5
Use of skill	1	2	3	4	5
Use of strategy	1	2	3	4	5
Fast-paced action	1	2	3	4	5
Competition with others	1	2	3	4	5
Ability to win money	1	2	3	4	5

# Q 8

How much did the following features of SeaFox make you want to play longer than you did?

	Not a	at all			Very much
Graphics, Artwork and sound	1	2	3	4	5
Use of skill	1	2	3	4	5
Use of strategy	1	2	3	4	5
Fast-paced action	1	2	3	4	5
Competition with others	1	2	3	4	5

Ability to win money	1	2	3	4	5
	l				

# Q 9

How much did the following features of SeaFox make you want to play again?

	Not a	at all			Very much
Graphics, Artwork and sound	1	2	3	4	5
Use of skill	1	2	3	4	5
Use of strategy	1	2	3	4	5
Fast-paced action	1	2	3	4	5
Competition with others	1	2	3	4	5
Ability to win money	1	2	3	4	5

## **Commercial Gambling Participation and Expenditure (additional info)**

# Q 10

(only show forms they gamble on. If not gamblers, skip question)

## In the last 12 months,

how much money (including cryptocurrency) did you spend on gambling in a typical month, including online, by telephone and at land-based venues?

This includes any forms of gambling, such as lottery or instant scratch tickets, betting on sports or races, casino games, pokies, etc.

(Please enter a dollar figure below)

# Q 12

Do you consider yourself to be experienced at gambling?

#### 1 yes, experienced

2 no, novice or inexperienced

3 not a person who gambles

### **Internet Gambling**

## Q 20

In the last 12 months, which gambling activities have you spent money, skins or cryptocurrency on <u>via</u> the internet (using a smartphone, computer, tablet, gaming console or smart TV)?

{Display all gambling activities participated in the last 12 months, per screener only, as a checklist}

## Gaming info (gamers only)

In the last 12 months, how much money (including cryptocurrency) did you spend on video game credits, video game items (such as skins), or cryptocurrencies, for any of the following: purchasing loot boxes betting with skins playing social casino games (e.g., slots, roulette, etc, where you can't win real money) other gambling-style activities? (Please enter a dollar figure below)

# 9-item Internet Gaming Disorder scale

### GAMING DISORDER SCALE

The next questions are about playing video games and spending time on the internet.

During the last 12 months... (yes, no)

- A. have there been periods when all you could think of was the moment that you could play a game?
- B. have you felt unsatisfied because you wanted to play more?
- C. have you been feeling miserable when you were unable to play a game?
- D. were you unable to reduce your time playing games, after others had repeatedly told you to play less?
- E. have you played games so that you would not have to think about annoying things?
- F. have you had arguments with others about the consequences of your gaming behavior?
- G. have you hidden the time you spend on games from others?
- H. have you lost interest in hobbies or other activities because gaining is all you wanted to do?
- I. have you experienced serious conflicts with family, friends or partner because of gaming?

The next questions are about your gambling in general. Please consider <u>all types of gambling you do</u> when responding (including pokies, casino games, keno, bingo, lotteries, lotto, instant scratchies, race betting and sports betting).

Thinking about the last <u>12 months</u> , how often	(select one option for each row)
--	----------------------------------

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

If gambling is a problem for you or others, please call the Gambling Helpline on 1800 858 858 or go to <u>www.gamblinghelponline.org.au</u> for free, confident advice, available 24/7. If this questionnaire has raised any other issues for you, please call Lifeline on 13 11 14.

## PGSI

## Short Gambling Harms Scale (Browne et al., 2017)

### SGHS

These next questions are about how gambling can affect people in a negative way. In the last 12 months, have you experienced any of the following issues <u>as a result of your gambling</u>...

{Response scale: 0=No; 1=Yes} {Total score = 0-10 of total 'yes' responses selected}

- 1. Reduction of your available spending money
- 2. Reduction of your savings
- 3. Less spending on recreational expenses such as eating out, going to the movies, or other entertainment
- 4. Had regrets that made you feel sorry about your gambling
- 5. Felt ashamed of your gambling
- 6. Sold personal items
- 7. Increased credit card debit
- 8. Spent less time with people you care about
- 9. Felt distressed about your gambling
- 10. Felt like a failure

[Helplines2 If gambling is a problem for you or others, please call the Gambling Helpline on 1800 858 858 or go to www.gamblinghelponline.org.au for free, confident advice, available 24/7. If this questionnaire has raised any other issues for you, please call Lifeline on 13 11 14.]

# Impulsivity

## BIS (Brief)

People differ in the ways they act and think in different situations. This is a test to measure some of the ways in which you act and think. Read each statement and rate on the scale provided. Do not spend too much time on any statement. Answer quickly and honestly.

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

# **Brief Sensation Seeking Scale**

Please indicate your level of agreement or disagreement with how the following statements apply to you:

	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
I would like to explore strange places.	1	2	3	4	5
I would like to take off on a trip with no pre-planned routes or timetables.	1	2	3	4	5

I get restless when I spend too much time at home.	1	2	3	4	5
I prefer friends who are excitingly unpredictable.	1	2	3	4	5
I like to do frightening things.	1	2	3	4	5
I would like to try bungee jumping.	1	2	3	4	5
I like wild parties.	1	2	3	4	5
I would love to have new and exciting experiences, even if they are illegal.	1	2	3	4	5

## Demographics

These last few questions are about you. They help us classify your responses. Your individual data will not be reported.

## Q 24

### What is your gender?

- 1. Male
- 2. Female
- 3. Other

# Q 25

### In which Australian state or territory do you reside?

- 1. New South Wales
- 2. Victoria
- 3. Queensland
- 4. South Australia
- 5. Western Australia
- 6. Tasmania
- 7. Australian Capital Territory
- 8. Northern Territory

# Q 26

### What is the main language spoken at home?

- A. English
- B. Mandarin
- C. Arabic
- D. Cantonese
- E. Vietnamese
- F. Italian
- G. Greek
- H. Other

# Q 27

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

- 1. No
- 2. Yes, Aboriginal
- 3. Yes, Torres Strait Islander
- 4. Yes, both Aboriginal and Torres Strait Islander

# Q 29

### What is your marital status?

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

# Q 30

What is your highest educational qualification?

- A. Postgraduate qualifications
- B. A university or college degree
- C. A trade, technical certificate or diploma
- D. Year 12 or equivalent
- E. Year 10 or equivalent
- F. Completed primary school
- G. Did not complete primary school

# Q 31

What is your approximate total weekly (or annual) **personal** income (before tax - including any government payments)?

Please remember that this survey if anonymous.



 $\bigcirc$  I don't know or wish to disclose my income (18)

[Thank you for taking part in this study.

While we said you would make \$ \${e://Field/winningsRounded} in additional compensation, you will actually be given the maximum possible additional compensation of **\$6.50** instead!

This is on top of your usual compensation for taking part in this survey.

It will come from your online panel and may or may not appear as a separate transaction.

Please click the next button to finish the survey.]

# Skill-based internet survey in the US (NV and NJ)

#### Quotas

The recruitment target was 1,000 participants. Soft quotas were set so that approximately half of the participants had played any type of EGM within the last 12 months, whether skill-based or otherwise, and regardless of whether they had also gambled on other forms (e.g., casino games); a quarter had gambled on other forms of gambling but not on EGMs; and a quarter had not gambled in the last 12 months. For purposes of these recruitment criteria, lottery products were not considered to be gambling, as there are few gambling problems and limited harm typically associated with these types of products.

### Data screening

Proactive survey security measures were implemented to minimise inauthentic survey attempts. These included the use of reCAPTCHA and Relevant ID to detect bots, and Ballot Box Stuffing and Relevant ID Duplicate checks to identify duplicate survey attempts. Duplicate survey attempts were also assessed via manual data checks by both Qualtrics and the research team. Inattention was assessed via checks for speeding (attempts completed in less than one-third the median response time from a soft launch), straightlining, possibly inconsistent responses, and inappropriate or irrelevant responses in open-ended questions. This combination of proactive and reactive screening measures is consistently used by the research team to ensure the highest quality data from online research panels.

### Completion rates and screenouts

This section summarises the screenouts and incompletes for this sample. It is important to note that the sample was required to live in or travel to Nevada or New Jersey, and that it can be difficult for panels to only invite people from specific locations. Our expected exclusion rate for the regions was 78%. Second, with quotas, it is common for there to be many exclusions once the quota groups start to fill because participants who may be eligible for a full group are no longer eligible to complete the survey. This context is important because numerous exclusions may seem to raise concerns about the recruitment, when in fact they are simply the result of the need to recruit specific participants (Russell et al., 2022).

A total of 19,834 potential participants started the survey. Proactive checks removed 1,758 duplicates, 774 bots and 247 people whose IP address was outside the US. Screening questions resulted in the exclusion of 11,875 people who had not lived in or travelled to Nevada or New Jersey in the previous 12 months, 397 people who were under the age of 21, and 937 people who opted not to consent to taking part in the study. Two people were excluded for speeding. Due to quotas, 2,117 people were excluded for being eligible for the EGM players group after it was full, and 197 for being eligible for the "other gamblers" group once its quota was reached. Subsequent data quality checks (straightlining, openended responses, etc) found an additional 106 exclusions. Finally, 290 people started but did not complete the survey.

--

The third group, the non-gambler group, proved to be the slowest to recruit. This was potentially due to the information sheet describing the survey as a gambling survey, which may be of little interest to people who do not gamble. Due to time constraints, this group did not reach the required number, but in consultation with the funding body, recruitment was stopped early. Nevertheless, we over-recruited for the first two groups (EGM players and other gamblers), which partially compensated for reductions in power of the final sample. In short, the final sample size was larger than the 1,000 intended participants, including more people in the group of interest, EGM players.

## Survey Instrument for Skill-based gambling conducted in NJ and NV

#### **Embedded data**

- IP location = US

#### Introduction

Thank you for your interest in this survey! Please read below to see what it will involve.

#### PROJECT BACKGROUND

This survey is designed to provide information to regulators, such as government bodies, about new slot machines/slots that are located in gambling venues and that include skill-based components. These games differ from existing slot machines where outcomes are based purely on chance. This research explores any risk of gambling-related harm associated with skill-based slot machines.

#### **BENEFITS AND RISKS**

Your participation will assist the research team better understand the potential risks and benefits of skill-based gambling games and will contribute to our understanding of gambling-related harm.

You will receive compensation from the panel for your time in completing the tasks in accordance with the terms-and-conditions of the panel provider. Every effort has been made to ensure that the time required for participation is minimal. Some participants may find it difficult or upsetting to answer questions about their past gambling and problems that may have occurred because of gambling.

This survey will take an estimated 10 minutes to complete.

If this study raises issues for you about your gambling, you can get free confidential advice 24 hours a day from the National Council on Problem Gambling by calling or texting 1-800-522-4700 or using the online chat function at ncpgambling.org/chat.

#### CONFIDENTIALITY

All data collected will be de-identified to protect confidentiality. The researchers will not have access to your name or other identifying data. Data will be published as group averages to further prevent recognition of individual results. Data will be securely stored in accordance with CQUniversity policies.

#### PUBLICATION OF RESULTS

The outcomes of the study will be publicly available on the Gambling Research Australia website in 2023 (anticipated): https://www.gamblingresearch.org.au/current-research. Findings will also be published in peer-reviewed journals and presented at academic conferences. Copies of publications and presentations will be available, where permissible by copyright, to participants upon request.

### CONSENT

You will need to complete an online consent form on the next page of this survey should you wish to participate in the study. Consenting to participate will indicate that you have read the information form and understand the nature of the study tasks.

### **RIGHT TO WITHDRAW**

You have the right to withdraw your participation until you complete the survey. If you wish to withdraw during this survey, simply close the browser. This will not affect your relationship with the researchers, the research institution, or the university in any way.

#### QUESTIONS?

Please contact Professor Matthew Rockloff, E-mail: m.rockloff@cqu.edu.au.

### CONCERNS OR COMPLAINTS?

If you have any concerns or complaints about the nature and/or conduct of the study, please contact CQUniversity's Office of Research (Tel: +61 7 4923 2603; E-mail: ethics@cqu.edu.au; Mailing address: Building 32, CQUniversity, Rockhampton QLD 4702, Australia).

### 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 the researcher.
- I am entitled to withdraw from the project at any time before I submit the survey, without penalty, including withdrawal of my participation and/or data.
- The research findings will be included in the researcher's publication(s) on the project, and this may include conference presentations and research articles, as well as other media described in the Information Sheet.
- To protect my privacy, my identifiable information will not be used in publication(s).
- I am aware that the results will be available after the date mentioned in the Information Sheet.
- I am providing informed consent to participate in this project.

Do you consent to participate?

- Yes, I consent
- No, I do NOT consent and would like to exit the survey (Screen out)

### Screeners

(Age)

What is your age?

(Please enter a whole number)

### **TEXT BOX**

- Screen out if under 21

### (Location)

Have you lived in, or have you travelled to Nevada or New Jersey in the last 12 months?

- Yes
- No

### Screen out if no?

### (3forms\_introtext)

We're now going to ask you about three different types of slot machines.

## Please read the descriptions carefully.

### (EGMs)

During the last 12 months, how often have you gambled in a casino on a regular slot machine (with spinning reels, similar to the one pictured)? (do not include online casinos)



### (Innovated games)

During the last 12 months, how often have you gambled in a casino or similar venue (*NOT* online) on a console-style game based on traditional casino games (like the one pictured)?

These include (...ONLY on a console-style machine):

- Poker (on a console style machine) or Video Poker
- Roulette (on a console style machine)
- Dice/Craps (on a console style machine)
- Big Wheel (on a console style machine)
- Baccarat (on a console style machine)
- Blackjack (on a console style machine)
- Keno (on a console style machine)
- Pai gow (on a console style machine)



Not at all in the last 12 months	Less than once a month	Once a month	2-3 times a month	Once a week	2-3 times a week	4 or more times a week
----------------------------------	------------------------------	-----------------	-------------------------	----------------	---------------------------	------------------------------------

### Skill based

During the last 12 months, how often have you gambled in a casino (not online) on a hybrid or "skillbased" console machine that may be similar to, or have bonus features similar to, the ones pictured?

These games often resemble popular video games, where you bet on the outcomes.

Hybrid games are slot-machines where a skill-based game is embedded within a bonus round.









Not at all in the last 12 months	Less than once a month	Once a month	2-3 times a month	Once a week	2-3 times a week	4 or more times a week

Within the last 12 months, how often have you played the following games?

(Gambling) For inclusion and quotas

	Not at all in the last 12 months	Less than once a month	Once a month	2-3 times a month	Once a week	2-3 times a week	4 or more times a week
GAMBLING GAMES							
Casino games played at a table with a croupier, (e.g., poker, blackjack, roulette at a casino)							
Casino-style games played on a computer or mobile device (e.g., betting real money on a slot-machine or roulette via a website)							
Betting on sports, races, esports, fantasy sports or other events (e.g., elections)							
Lotteries or scratch cards							
Keno or Bingo played for money							
Gambled informally (e.g., playing cards at home for money)							
NON-GAMBLING GAMES							
Video games on a computer							

Video games on a mobile device				
Video games on a console (Xbox, PS4, etc.)				

**Detailed skill-based questions** 

Note: The games are arranged into 4 sets based on the skills that a player demonstrates within the game (see Example sets 1-4, below).

## [START LOOP]

Have you <u>seen</u> games similar to the one described below at a casino or other gambling venue? (regardless of whether you played one)

(yes, no)

In the last 12 months, have you <u>played</u> a game that is similar to the one described below?

Not at all in the last 12 months	Less than once a month	Once a month	2-3 times a month	Once a week	2-3 times a week	4 or more times a week

In the future, are you <u>interested</u> in playing a gambling game like the one described below on a console or slot machine within a casino (or similar venue)?

Not interested	Slightly interested	Very interested	Extremely interested

How important are the following features of this game-type to you?

	Not important (1)	(2)	(3)	(4)	Very important (5)
Graphics, Artwork and Sound					
Use of skill					
Use of strategy					
Fast-paced action					
Competition with others					
The ability to win money					

When compared to typical slot machines, how <u>desirable</u> is the type of game described below:

Prefer Typical Slots (1)	(2)	(3)	Prefer this type (4)	

## EXAMPLE SET 1

Shoot-em-up games (using hand-eye coordination)			
Fire Kirin	Z Force		



### EXAMPLE SET 2



#### EXAMPLE SET 3



### **EXAMPLE SET 4**

Classic Home Games (using strategy playing board or card games)			
Video Scrabble Millionaire Solitaire			


#### GFM1-10 - Gambling Fallacies Measure

The next questions ask about your understanding of gambling strategies...

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
- 8, 18, 3, 55, 32, 28
- Each of the above have an equal probability of being selected

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
- Playing a slot machine that had a jackpot an hour ago
- Your chances of winning the jackpot are the same on both machines

How lucky are you? If 10 people's names were put into a hat and one name drawn for a prize, how likely

is it that your name would be chosen?

- More likely than other people
- Less likely than other people
- About the same likelihood as everyone else

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
- A place that has sold few previous winning tickets
- One place is as good as another

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

- Agree
- Disagree

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
- 100 times
- It is just as likely that he or she has gone either 4 or 100 times

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
- Betting small amounts of money on several different bets
- Either strategy gives you an equal chance of doubling your money

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

- Slot machines
- Roulette
- Bingo
- None of the above

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

- Agree
- Disagree

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...

- More than 50%
- 50%
- Less than 50%

GOES - Flack and Morris, 2016

Please rate your agreement or disagreement with each of the following statements.

Gambling...

	Strongly disagree (1)	Dis agr ee (2)	Slig htly disa gre e (3)	Slig htly agr ee (4)	Agr ee (5)	Strongly agree (6)
Provides an opportunity to get along with others favourably						
Is about enjoying intensive feelings						
Is a rush						
Provides an opportunity to be with friends						
Can help clear your mind						
Is about feeling like an expert						
Helps release tension						
Produces a feeling of being powerful						
Provides a good chance to win big with small money						
Is a way to forget everyday problems						
Is a way to make big money						

Provides an opportunity to be with similar people			
Is the best way to relax			
Is a way to win big money immediately			
Produces a feeling of importance			
Is a way to meet new people			
Gives a feeling of being really alive			
Is about feeling in control			

# SGP - Safe gambling practices, Hing et al., 2019

The next questions ask about how you think about your gambling...

	Never	Sometimes	Most of the time	Almost always
If I'm not having fun gambling, I stop				
I keep a household budget				
I have a dedicated budget to spend on gambling				
My leisure time is busy with other hobbies, social activities and/or sports				
If I'm feeling depressed or upset, I don't gamble				
When I gamble, I always set aside a fixed amount to spend				
I research systems or strategies for success at gambling***				
I use gambling to make money / supplement my income <mark>***</mark>				
I have used cash advances on my credit card to gamble ***				

Note: Items marked \*\*\* are reverse-scored.

# DES-B - Brief Dissociative Experiences Scale - Modified

The next questions ask about your habits...

	Not at all	Once or twice	Almost every day	About once a day	More than once a day
I find myself staring into space and thinking of nothing					
People, objects, or the world around me seem strange or unreal					
I find that I did things that I do not remember doing					
When I am alone, I talk out loud to myself					
I feel as though I were looking at the world through a fog so that people and things seem far away or unclear					
I am able to ignore pain					
I act so differently from one situation to another that it is almost as if I were two different people					
I can do things very easily that would usually be hard for me					

# PGSI - Gambling problems

The next questions are about your gambling in general. Please consider all types of gambling you do when responding (including slots, casino-style games, keno, bingo, lotteries, lotto, instant scratch tickets, horse-race betting and sports betting).

Thinking about the last 12 months, how often....

	Never	Sometimes	Most of the time	Almost always
Have you bet more than you could really afford to lose?				
Have you needed to gamble with larger amounts of money to get the same feeling of excitement?				
When you gambled, did you go back another day to try to win back the money you lost?				
Have you borrowed money or sold anything to get money to gamble?				
Have you felt that you might have a problem with gambling?				
Has gambling caused you any health problems, including stress or anxiety?				
Have people criticised you're betting or told you that you had a gambling problem, regardless of whether or not you thought it was true?				

Has your gambling caused any financial problems for you or your household?		
Have you felt guilty about the way you gamble or what happens when you gamble?		

If this study raises issues for you about your gambling, you can get free confidential advice 24 hours a day from the National Council on Problem Gambling by calling or texting 1-800-522-4700 or using the online chat function at ncpgambling.org/chat.

#### SGHS - Gambling harm

These next questions are about how gambling can affect people in a negative way...

#### In the last 12 months, have you experienced any of the following issues as a result of your gambling...

	No	Yes
Reduction of your available spending money		
Reduction of your savings		
Less spending on recreational expenses such as eating out, going to the movies, or other entertainment		
Had regrets that made you feel sorry about your gambling		
Felt ashamed of your gambling		
Sold personal items		
Increased credit card debit		
Spent less time with people you care about		
Felt distressed about your gambling		
Felt like a failure		

If this study raises issues for you about your gambling, you can get free confidential advice 24 hours a day from the National Council on Problem Gambling by calling or texting 1-800-522-4700 or using the online chat function at ncpgambling.org/chat.

#### K6 - Kessler Psychological Distress Scale

The following questions ask about how you have been feeling during the **past 30 days**. For each question, please select the option that best describes how often you had this feeling.

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

	None of the time	A little of the time	Some of the time	Most of the time	All of the time
Nervous?					
Hopeless?					
Restless or fidgety?					
So depressed that nothing could cheer you up?					
That everything was an effort?					
Worthless?					

### BIS\_Brief - Barratt Impulsiveness Scale

People differ in the ways they act and think in different situations. The following statements are designed to measure some of the ways in which you act and think. Read each statement and rate on the scale provided. Do not spend too much time on any statement. Answer quickly and honestly.

	Rarely / never	Occasionally	Often	Almost always / always
I plan tasks carefully				
I do things without thinking				
I don't "pay attention"				
I am self-controlled				
I concentrate easily				
I am a careful thinker				
I say things without thinking				
l act on the spur of the moment				

# Brief Locus of Control Scale - Lumpkin 1985

The next questions are about how you find success...

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
When I make plans, I am almost certain that I can make them work					
Getting people to do the right things depends upon ability; luck has nothing to do with it					
What happens to me is my own doing					
Many of the unhappy things in people's lives are partly due to bad luck					
Getting a good job depends mainly on being in the right place at the right time					
Many times, I feel that I have little influence over the things that happen to me					

# Demographics

## (Gender)

What is your gender?

- Man
- Woman
- A gender other than man or woman
- I would prefer not to answer this question

(Age is already captured in screeners)

(Postcode)

What is the postcode of your main residence?

(TEXT BOX ACCEPTING US POSTCODES ONLY)

# (Background and race)

Are you of Hispanic, Latino, or Spanish origin?

- Not of Hispanic, Latino or Spanish origin
- Mexican, Mexican American, Chicano
- Puerto Rican
- Cuban
- Another Hispanic, Latino, or Spanish origin (e.g., Salvadorian, Dominican, Colombian, Guatemalan, Spaniard, Ecuadorian, etc) (Please specify) (TEXT BOX)

We asked this question this way to comply with the federal government's standards — provided by the U.S. Office of Management and Budget — for collecting data on race and Hispanic origin.

Your answer to this question should be based on how you identify. Each person can decide how to answer.

### (Race)

What is your race?

- White
- Black or African American
- American Indian or Alaska Native
- Asian
- Native Hawaiian or Pacific Islander
- Some other race (Please specify) (TEXT BOX)

We asked this question this way to comply with the federal government's standards — provided by the U.S. Office of Management and Budget — for collecting data on race and Hispanic origin.

Here are some guidelines for responding, according to the US Census:

White:
The category "White" includes all individuals who identify with one or more nationalities or

ethnic groups originating in Europe, the Middle East, or North Africa. Examples of these groups include, but are not limited to, German, Irish, English, Italian, Lebanese, Egyptian, Polish, French, Iranian, Slavic, Cajun, and Chaldean.

## - Black or African American:

The category "Black or African American" includes all individuals who identify with one or more nationalities or ethnic groups originating in any of the black racial groups of Africa. Examples of these groups include, but are not limited to, African American, Jamaican, Haitian, Nigerian, Ethiopian, and Somali. The category also includes groups such as Ghanaian, South African, Barbadian, Kenyan, Liberian, and Bahamian.

## - American Indian or Alaska Native:

The category "American Indian or Alaska Native" includes all individuals who identify with any of the original peoples of North and South America (including Central America) and who maintain tribal affiliation or community attachment. It includes people who identify as "American Indian" or "Alaska Native" and includes groups such as Navajo Nation, Blackfeet Tribe, Mayan, Aztec, Native Village of Barrow Inupiat Traditional Government, and Nome Eskimo Community.

- Asian:

The category "Asian" includes all individuals who identify with one or more nationalities or ethnic groups originating in the Far East, Southeast Asia, or the Indian subcontinent. Examples of these groups include, but are not limited to, Chinese, Filipino, Asian Indian, Vietnamese, Korean, and Japanese. The category also includes groups such as Pakistani, Cambodian, Hmong, Thai, Bengali, Mien, etc.

# - Native Hawaiian and Pacific Islander:

The category "Native Hawaiian or Other Pacific Islander" includes all individuals who identify with one or more nationalities or ethnic groups originating in Hawaii, Guam, Samoa, or other Pacific Islands. Examples of these groups include, but are not limited to, Native Hawaiian, Samoan, Chamorro, Tongan, Fijian, and Marshallese. The category also includes groups such as Palauan, Tahitian, Chuukese, Pohnpeian, Saipanese, Yapese, etc.

# - Some Other Race:

If you do not identify with any of the provided race categories, you may enter your detailed identity in the Some Other Race write-in area.

# (Marital status)

What is your marital status?

- Single / never married
- Living with partner / de facto
- Married
- Divorced or separated
- Widowed

# (Education)

What is the highest educational qualification you have received?

- Did not complete 12th grade
- Completed high school diploma or GED or alternative credential
- Completed associate degree or other qualification lower than a Bachelor's degree (e.g., trade school)
- Completed Bachelor's degree
- Completed Master's degree or professional degree beyond Bachelor's degree (e.g., MD, DDS, LLB)
- Completed Doctorate degree (e.g., PhD, EdD)

## (Work status)

Which of the following best describes your current work status?

- Working full-time
- Working part-time
- Casual employment
- Home duties
- Full-time student
- Social security recipient
- Unemployed or looking for work
- Retired
- Other (please specify) (TEXT BOX)

### (Income)

What is your current approximate annual **personal** income (before tax, including any government payments)?

#### Please remember that this survey is anonymous.

- \$10,000 or less
- \$10,001 \$30,000
- \$30,001 \$50,000
- \$50,001 \$70,000
- \$70,001 \$80,000
- \$80,001 \$90,000
- \$90,001 \$100,000
- \$100,001 \$110,000
- \$110,001 \$120,000
- \$120,001 \$130,000
- \$130,001 \$140,000
- \$140,001 \$150,000
- More than \$150,000

Please remember that this survey is anonymous.

#### (MentalHealth)

#### Last question!

In the last 12 months, have you been diagnosed with a mental health condition, and/or do believe you have had mental health problems?

#### Please remember that this survey is anonymous.

- Yes
- No

If this study raises issues for you about your gambling, you can get free confidential advice 24 hours a day from the National Council on Problem Gambling by calling or texting 1-800-522-4700 or using the online chat function at ncpgambling.org/chat.

If you or someone you know is struggling or in crisis, help is available. Call or text 988 or chat <u>988lifeline.org</u>. You can also reach Crisis Text Line by texting MHA to 741741.

Thank you for completing this survey

[END]

# **Expert Interviews**

## Interview Guide

Gambling Research Australia, a partnership between the Commonwealth, State and Territory Governments, has funded a project on Skill-based gaming, also sometimes called hybrid gaming machines. We would like to talk to you about the types of available games, regulatory concerns and player protection for these games.

Your interview will be recorded and transcribed, although your comments will not identify your name or position in the report. You are free to withdraw at any time during the interview. By agreeing to the interview, you agree that you are authorised to speak to us.

Great, I'm just going to press record.

### \*PRESS RECORD ON ZOOM AND PHONE\*

Do you give your informed consent for me to start this interview?

Firstly, can you tell me a bit about your background in the gambling area and your current position (again, this will be deidentified in the transcript)?

1) What types of games are available in your jurisdiction? What are the trends in the types of skill-based gambling games that are being developed or for which approval is being sought?

2) What games are the most popular? Why do you think this is? [Prompts: different demographics attracted to certain games].

3) What are the features of skill-based games that most occupy attention regarding regulation?

4) What features of skill-based games are most relevant to consider regarding player protection, product safety, and harm minimisation?

#### Expert submission questionnaire



## **Default Question Block**



#### Skill-based gaming in Australia

INFORMATION SHEET Thank you for your interest in this project examining skill-based gaming; also sometimes called hybrid gaming machines (HGMs).

We are interested in the experiences of a range of persons who have knowledge or concerns about the introduction of skill-based garning into Australia. Skill-based games introduce a component of skill or apparent skill into the experience of gambling on a console resembling a traditional EGM or pokie machine. In many cases, the skill component mimics the appearance and function of popular videogames. For this study, we are interested in your comments and any documents you have permission to share that address:

What are the features of skill-based games that you believe should most occupy attention regarding regulation?
What features of skill-based games are most relevant to consider regarding player protection and product safety?
What broad types of skill-based gaming machines are currently in use, or will soon be developed and seek approval?

4) Do you have any comments and/or concerns about the research process or how might it be improved?

Results for the study will be publicly available on the Gambling Research Australia website in January or February of 2023 (anticipated): <a href="https://www.gamblingresearch.org.au/current-research">https://www.gamblingresearch.org.au/current-research</a>

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If you have any questions about the study, please contact the project's Chief Investigator Prof Matthew Rockloff at m.rockloff@cqu.edu.au

Please contact CQUniversity's Office of Research (Tel: 07 4923 2603; E-mail: <u>ethics@cqu.edu.au</u>; Mailing address: Building 32, CQUniversity, Rockhampton QLD 4702) should there be concerns about the nature and/or conduct of this research project.

If this study prompts questions for you about your gambling, you can get confidential advice here: <a href="https://gamblershelp.com.au/">https://gamblershelp.com.au/</a>

INFORMED CONSENT

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

- 1. I have read and understood the Information Sheet that describes this study;
- 2. Any questions I had about the project were answered by either the Information Sheet or the researchers;
- 3. I have the right to withdraw from the project at any time prior to the publication without penalty, including withdrawal
- of my participation and/or data;
- 4. The research findings will be included in the researcher's publication(s) on the project, and this may include

conferences and research articles as well as other media described in the Information Sheet;

- 5. To protect my privacy, my identifiable information will not be used in publication(s);
- 6. I am providing informed consent to participate in this project.

Click "Yes" to indicate your agreement to the points above. Otherwise click "No" to exit.

Ο	Yes
0	No

# Block 3

Please select the area most relevant to your experience:

- O Product development/manufacturer
- O Gambling venue
- O Gambling industry peak body
- O Gambling regulation
- O Gambling help services
- O Advocate/Lived experience

Other, please specify

# Block 1

()

What are the features of skill-based games that you believe should most occupy attention regarding regulation?

What features of skill-based games are most relevant to consider regarding player protection and product safety?

What broad types of skill-based gaming machines are currently in use, or will soon be developed and seek approval?

Do you have any comments and/or concerns about the research process or how might it be improved?

Block 2

Thank you for your anonymous submission.

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