

**RESEARCH  
REPORT**

# **Gambling and problem gambling in Victoria**

**July 2018**

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# Gambling and problem gambling in Victoria

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The project was approved by the Human Research Ethics Committee of the University of Melbourne (HREC No. 1545085).

### **A tribute to A/Prof Jennifer M. Boldero**

A/Prof Jennifer Boldero died unexpectedly on September 23, 2017. Jennifer was a leader in the field of applied social psychology and had a diverse range of interests including the development of problem gambling, people's attitudes towards and preparedness for natural disasters, individuals' responses to AIDS/HIV, individuals' compliance with health screening, responses to terrorism, psychological disorders, and political decision-making. Jennifer is sorely missed by her colleagues, students, friends and family.



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## Executive summary

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### Purpose of report

This report presents the findings of a study that examined the prevalence of gambling and problem gambling in Victoria, how these vary with age and gender and how these have evolved from 2010 to 2016. The report also investigates which factors predict an individual's gambling frequency for each of 12 gambling activities and which factors predict an individual's PGSI score. Based on these findings, suggestions are made as to how gambling-related harm could be reduced.

### Methodology

In June and July 2016, a representative sample of 3361 adult Victorians, aged 18 to 88 years, were recruited by an online survey company, *The Online Research Unit*. Participants completed an online survey in which they indicated their age, their gender, their country of birth, the language spoken at home, their relationship status, where they lived, how often they participated in each of 12 different types of gambling, to what degree they perceived others to participate and approve of these 12 types of gambling, how often they saw gambling advertisements, and how often they discussed gambling, both online and offline. They additionally completed questionnaires to assess whether they were depressed, suffered from low esteem, had high positive urgency, overestimated their chances of winning, believed themselves to be lucky and had problems with gambling. The 12 different types of gambling investigated in our survey were: *Lottery tickets, Instant scratch tickets, Raffle or fund-raising tickets, Betting on animal races, Sports betting, Gaming tables at casinos, Poker machines at casinos, Poker machines at other venues, Card or board games, Games of skill, Arcade or video gaming, and Internet gambling.*

### Major findings

#### **Gambling is highly prevalent in Victoria, more so than previously acknowledged:**

- Approximately 95% of adult Victorians had gambled in the previous year
- Approximately half of adult Victorians have participated more than six times in at least one gambling activity in the previous year

#### **Self-reported gambling frequency varies as a function of age, but differently for different types of gambling activity:**

- Gambling participation rates increased with age for *Lottery tickets, Raffle or fund-raising tickets* and *Poker machines at other venues*
- For adults 25 years and older, gambling participation decreased with age for *Sports betting, Gaming tables at casinos, Poker machines at casinos, Card or board games, Games of skill, Arcade or video gaming* and *Internet gambling*
- For *Instant scratch cards*, participation rates peaked at the 25-34 year old age category, but otherwise were approximately constant
- For *Betting on animal races*, participation rates peaked at the 45-54 year old age category, but otherwise were approximately constant

**For most activities, males gambled more than females:**

- Males gambled more than females for *Lottery tickets, Betting on animal races, Sports betting, Gaming tables at casinos, Poker machines at casinos, Card or board games, Games of skill, Arcade or video games*, and *Internet gambling*
- Females gambled more than males for *Raffle or fund-raising tickets*
- Gambling rates were approximately the same for males and females for *Instant scratch tickets* and *Poker machines at other venues*

**Gambling prevalence generally increased from 2010 to 2016:**

- Gambling was more prevalent in 2016 than in 2010 for *Lottery tickets, Instant scratch tickets, Raffle or fund-raising tickets, Sports betting, Card or board games, Games of skill, Arcade or video gaming*, and *Internet gambling*
- Gambling was approximately the same in 2016 compared to 2010 for the following activities: *Betting on animal races, Gaming tables at casinos, Poker machines at casinos, Poker machines at other venues*
- For no gambling activity was the frequency of gambling less in 2016 compared to 2010

**The prevalence of high-risk problem gambling is greater than previously thought:**

- The prevalence of high-risk problem gambling varies with age and peaks for the 25-34 year old age group for which the prevalence rate is 23%
- Averaged across all age groups, the prevalence rate is 11%
- This is a little higher than what we found in 2010 (8%) and much higher than reported by Hare (2015), who reported a prevalence rate of .8%

**Predictors of gambling frequency depend on the type of gambling, but the most reliable predictors were:**

- The frequency of gambling by family and peers
- Self-reported approval of gambling
- Perceived approval of gambling by peers and people in general
- Receiving promotional materials
- Discussing gambling offline
- Age
- Gender
- Overestimating chances of winning
- PGSI

**Individuals overestimate how much others gamble and approve of gambling:**

- Individuals overestimate the extent to which others gamble, with the overestimate being the most extreme for the “people in general” category
- Similarly, they overestimate the degree to which “people in general” approve of gambling

**The top five predictors of an individual’s PGSI score were:**

- Their positive urgency score
- Their frequency of playing poker machines at pubs, hotels or sporting clubs
- Their frequency of discussing online betting on gaming tables at casinos
- Their frequency of gambling on the internet
- The degree to which they overestimate the chances of winning
- Together these five factors accounted for 91% of the explainable variance

Based on these findings, a number of suggestions were made to reduce gambling-related harm.

## Chapter 1 – Introduction

---

### Background

This study was funded by the Grants for Gambling Research Program (Round 7) of the Victorian Responsible Gambling Foundation (VRGF). This grant system was established in 2006 by the Victorian Department of Justice and Regulation with the aim of encouraging researchers from a variety of disciplines to undertake applied gambling research.

This project was designed to contribute to the theme of ‘changing gambling environments’ established by the VRGF’s 2015-18 Research Agenda. Both a small pilot study and a large-scale study were conducted, both of which focused solely on Victoria. For the large-scale study, a sample of 3361 individuals were surveyed to determine the prevalence of gambling and problem gambling in Victoria. A subset of these results was also compared to those of our 2010 survey that also focused solely on the Victorian population. As the 2010 survey considered only 18 to 24 year olds, the comparisons between the two surveys were confined to that age group. Finally, we investigated which factors predict an individual’s gambling frequency for each of 12 gambling activities and the individual’s problem gambling severity index (PGSI) score. Our work provides insight into how gambling in Victoria continues to evolve and indicates which practical interventions are most likely to reduce gambling-related harm.

### Research questions

The aim of this research project was to answer the following three research questions:

- What was the prevalence of gambling and problem gambling in Victoria in 2016 and how does this compare to 2010?
- Which factors predict an individual’s gambling frequency for each of 12 gambling activities and which factor predict an individual’s PGSI score?
- How can gambling-related harm be reduced?

In answering the first question, we considered how age and gender affect participation rates for each of 12 types of gambling. We chose to study these particular gambling activities as they were the ones that we studied in 2010, thereby allowing us to compare our 2016 data to our 2010 data.

Having obtained a clear understanding of the state of gambling in Victoria in 2016, we then asked which factors predict an individual's gambling frequency for each of these 12 gambling activities and the individual's PGSI score. We were interested in both issues because, as discussed in our literature review, gambling-related harm doesn't just stem from problem gambling. In fact, the majority of gambling-related harm originates from people at low or moderate risk of problem gambling, so it would be beneficial to reduce gambling participation rates for non-problem gamblers. Using the information we had obtain in our research, we then made practical recommendations for reducing gambling-related harm.

## **Project scope**

In this project, we confined our attention to adult gamblers aged from 18 to 88 in the state of Victoria. Further, we limit our focus to 12 specific forms of gambling. These gambling activities were:

- Lottery tickets
- Instant scratch tickets
- Raffle or fund-raising tickets
- Betting on animal races
- Sports betting
- Gaming tables at casinos
- Poker machines at casinos
- Poker machines at other venues
- Cards or board games
- Games of skill
- Arcade or video gaming
- Internet gambling

## **Procedure**

We first undertook a systematic review of the gambling research literature to first determine what is known about the prevalence of gambling and problem gambling in Victoria. We surveyed the literature to determine which factors were likely to predict an individual's gambling frequency and PGSI score. Based on this literature review, we decided to assess the following factors in our survey: age, gender, country of birth, language spoken at home, relationship status, where our participants lived, how often they participated in each of the 12 different types of gambling, to what degree they approved of each of the 12 different types of gambling, to what degree they perceived

others to participate and approve of these 12 types of gambling, how often they saw gambling advertisements, how often they received promotional material for gambling, and how often they discussed each of the 12 types of gambling, both online and offline. Additionally, we included psychological measures to assess the degree to which they were depressed, suffered from low esteem, had high positive urgency, overestimated their chances of winning, believed themselves to be lucky and had problems with gambling.

Two studies were undertaken. The first, a pilot study, was conducted using 53 first-year University students. This study was performed to determine whether the survey was an appropriate length and to uncover any difficulties or potential misunderstandings with the survey items. Accordingly, the participants discussed the questions with the research assistant after they had completed the study. The second study was conducted with a large sample of Victorians. To access this sample, who do not necessarily have access to a landline, the survey was conducted online. Participants were recruited by a survey company, The Online Research Unit (ORU), who guaranteed that the participants were representative of the general population in terms of the distributions of their ages, genders and locations. Finally, to ensure that we could reliably compare the current project's data to that obtained in our previous study, the survey was conducted in the same months as the previous survey (June and July) since some forms of gambling show seasonal variations.

## **Structure of the report**

This report has five chapters. This introductory chapter has provided the background to the project, including its aims, scope and general procedure. Chapter 2 reviews the Australian and international literature examining the prevalence of gambling and problem gambling. It also examined the factors believed to predict gambling frequency and PGSI score. Chapter 3 presents the results from the pilot study and Chapter 4 presents the results from our large-scale survey of Victorian adults. Finally, Chapter 5 discusses the results of the large-scale survey and concludes the report.

## Chapter 2 – Literature review

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### Introduction

As part of this research project, we reviewed both the Australian and the international literature on gambling. We first examined the prevalence of gambling and gambling problems in Victoria. We then reviewed the factors that predict gambling frequency and PGSI score. In particular, we focused on perceptions of how frequently others gamble and approve of gambling, the effects of advertisements, promotional materials, and gambling discussions, various demographic factors and various psychological factors. Finally, we discussed some issues that need to be considered when researching gambling.

### The prevalence of gambling and gambling problems in Victoria

A priori, one might expect that an increase in the availability of gambling opportunities would lead to greater participation in gambling. Indeed, this appears to be the case in Italy, where the liberalization of gambling has led to a significant increase in the amount of money spent on gambling activities (Bastiani et al., 2013). However, increases in the availability of gambling in Victoria have been reported not to have led to more Victorians gambling or to an increase in problem gambling (Abbott et al., 2016; VRGF, 2016). Indeed, participation in gambling by Victorians is thought to have decreased between 2008 and 2012 (Abbott et al., 2016) and it is currently estimated that 30% of the population do not gamble at all (VRGF, 2016). It has been reported, however, that there has been a change in the relative popularity of the different types of gambling activities. In particular, hotels and pubs have now become the most common location for gambling in Victoria (Hare, 2015). Given that gambling rates are apparently either decreasing or staying approximately constant, we would expect the prevalence of gambling in our 2016 survey to be either the same or less than that reported by the VRGF (2016), as that report was based on a survey conducted in 2014 (Hare, 2015).

Turning our attention to problem gambling, we note that our previous study found 8% of Victorians to be problem gamblers (Boldero & Bell, 2012a). Abbott et al. (2016) report a somewhat lower prevalence estimate of 2.2% for problem gamblers, standardised to compensate for the methodological differences in their survey. Strangely, Hare (2015) reported that only .8% of individuals in Victoria are problem gamblers.

Gambling problems lead to social, financial and/or psychological harm to the individual, their family and friends along with society (Delfabbro, 2012; Ferris & Wynne, 2001; Neal, Delfabbro & O'Neil, 2005; Scholes-Balog & Dowling, 2017). However, those classified as problem gamblers are not alone in experiencing harm from gambling; those classified as not reaching the criteria for problem gambling also experience harm. For example, Browne et al. (2016) found that low-risk, moderate-risk, and problem gambling accounted for 50%, 34%, and 15% of the total gambling-related harm experienced by Victorians. For this reason, this report will focus not just on the prevalence of problem gambling, but also on overall gambling participation rates.

### **Factors that predict gambling frequency and PGSI score**

There are a number of factors that likely predict gambling frequency and PGSI score. We will now consider these factors in turn and in this way justify the composition of our survey.

#### **Perceptions of others**

It is known that an individual's gambling frequency and the probability that they have gambling problems are correlated with not just the degree to which they personally approve of gambling (Bastiani et al., 2013) but also with the degree to which they believe others gamble and approve of gambling. Specifically, if they believe that other people gamble frequently and approve of gambling, they are more likely to gamble and are more likely to have gambling problems (Boldero & Bell, 2012b; Boldero, Bell & Moore, 2010; Delfabbro & Thrupp, 2003; Fortune et al., 2013; Larrimer & Neighbors, 2003; Moore & Ohtsuka, 1999; Neighbors, et al., 2007; Pitt et al., 2017). Despite this body of research, it is unclear to what extent the perceptions of how frequently others gamble and approve of gambling affects gambling frequency and problem gambling relative to other potential factors. In particular, these effects might be relatively minor compared to the effects caused by other factors that are also known to influence gambling habits. A second concern is that it is not clear whose opinions and actions matters. For example, it could be that individuals are only influenced by what their family and peers do and believe. Alternatively, it might be that they are also influenced by what people not associated with them do and believe. As the previous literature has not systematically investigated either of these issues, addressing these issues was one of the aims of the current study.

### **Advertising, promotional material, and discussing gambling**

Monaghan and Derevensky (2008) argued that gambling is often portrayed inaccurately in the media. In particular, the effects of problem gambling are rarely portrayed and few portrayals of responsible gambling are shown. (For a discussion of what might constitute responsible gambling, please see Hing, Russell, and Hronis (2016)). Likewise, Derevensky, Sklar, Gupta, and Messerlian (2010) reported that gambling advertisements portray gambling in an inaccurately positive manner, associating it with fun, excitement, high success, wealth, relief from financial problems, and escape from reality. Deans, Thomas, Derevensky, and Daube (2017) reported that their participants felt that the sheer volume of sports betting advertisements normalised sports betting and was effective at encouraging them to bet on sports (see also Lindsay et al., 2013). Indeed, the volume of sports gambling advertisements is such that even children can recall the names of sports betting brands (Bestman et al., 2015; Thomas et al., 2016). Additionally, there are typically very few visible or audible messages that aim to counter-frame the overwhelmingly pro-gambling message (Thomas, Lewis, Duong, McLeod, 2012). Lee, Lemanski, and Jun (2008) found exposure to gambling in the media led to positive attitudes toward gambling which, in turn, led to stronger gambling intentions. Likewise, Pitt, Thomas and Bestman (2016) report that marketing messages are effective at giving the impression that gambling is an integral part of the sporting experience.

Unsurprisingly, exposure to gambling advertisements was found to affect gambling behaviour of 16 to 19 year-olds (Fried et al., 2010) and is related to the frequency of gambling of adolescents and young adults (Clemens, Hanewinkel & Morgenstern, 2017; Felsher et al., 2004). Gambling providers also make extensive use of social media (Gainsbury et al., 2015) and social media campaigns against gambling are drowned out by pro-gambling campaigns (Thomas, Lewis & Westberg, 2015). In summary, based on this literature, one would expect that advertisements, receiving promotional material and discussing gambling should increase both gambling frequency and problem gambling. Consequently, we included these factors in our survey.

### **Demographic factors**

Gambling participation and problem gambling increase with age, reaches a relatively high level when individuals are in their 20s and 30s, and then decrease across the lifespan (Delfabbro, Lahn & Grabosky, 2005; Delfabbro, Winefield & Anderson, 2009; Welte et al., 2011). Gender is also known to influence gambling, with males being more likely than females to gamble (Abbott et al., 2016; Boldero & Bell, 2012b; Boldero et al., 2010; Delfabbro et al., 2005, 2009; Fried, Teichman & Rahav, 2010; Goldstein et al., 2009; Jackson et al., 2008; Martins et al., 2008). Additionally, males report more

gambling problems than females (Chiu & Storm, 2010; Clark & Walker, 2009; Derevensky et al., 2010; Dickson, Derevensky & Gupta, 2008; Fried et al., 2010; King, Abrams & Wilkinson, 2010; Molde et al., 2009; Parker et al., 2008; Turner et al., 2008) and are more likely to be problem gamblers (Huang & Boyer, 2007; Lee et al., 2011; Molde, et al., 2009; Scholes-Balog et al., 2014). Finally, studies that have differentiated between skill-based (e.g. poker, card games) or chance-based (e.g., bingo, lotto) activities have found that males prefer skill-based ones whereas females prefer chance-based ones (Gausset & Jansbøl, 2009), though Aasved (2003) found that males and females are equally likely to play poker machines in both casinos and other venues. Females are more likely to participate in scratch tickets, bingo, phone/SMS competitions and in raffles/sweeps (Hing et al., 2014). Individuals who were not born in Australia, individuals who speak a language other than English at home, and individuals who live in metropolitan versus rural areas are more likely to be problem gamblers (Abbott et al., 2016). Finally, given the strain that problem gambling places on relationships (Ferris & Wynne, 2001), we expected problem gamblers would be less likely to be in a relationship. Consequently, in our survey we included the demographic factors of age, gender, country of birth, language spoken at home, relationship status and location of residence.

### **Psychological factors**

More frequent gambling is related to depression (Chiu & Storm, 2010; Desai & Potenza, 2008; Griffiths, 1995) and, compared to those who are not problem gamblers, problem gamblers report higher levels of depression (Molde et al., 2009 but see Scholes-Balog et al., 2015). Similarly, self-esteem tends to be lower in individuals who are problem gamblers than those who are not problem gamblers (Potenza et al., 2011). Indeed, it is thought that low levels of esteem result in increased gambling (Rockloff & Dyer, 2006).

Sensation seeking and impulsivity are associated with more frequent gambling (McDaniel & Zuckerman, 2003) and gambling problems (Chiu & Storm, 2010; Dussault et al., 2011). Cyders and Smith (2008a) found that the tendency to act rashly when in a positive mood (i.e., positive urgency) was associated with longitudinal increases in students' gambling behaviour during the freshman year whereas the tendency to act rashly when upset (i.e., negative urgency) was not.

Young people who are problem gamblers believe that they are "luckier" than non-problem gamblers (Chiu & Storm, 2010) and students' more frequent gambling is associated with having more inaccurate or erroneous gambling cognitions (Moodie,

2008), such as believing that that one can influence gambling outcomes. Steenbergh, Meyers, May and Whelan (2002) found that overestimating one's chances of winning at gambling, a factor they labelled luck/perseverance, and having illusions of control over gambling outcomes differentiated college students and community members who gamble from those who do not, but not between pathological and problem gamblers (i.e., those who gamble compulsively and those who experience problems as a result of their gambling; Blaszczynski & Nower, 2002).

Taken together, the results of these studies suggest that people are more likely to gamble if they have higher levels of depression, lower levels of esteem, have higher levels of positive urgency, over-estimate their chances of winning and have inaccurate or erroneous gambling cognitions. Consequently, we included all these factors in our survey.

## **Research issues**

Some researchers have speculated that participating in specific gambling activities (e.g., scratch cards, Electronic Gaming Machines [EMGs], and internet gambling) are more problematic than participating in other activities (Binde, 2011; Griffiths, 2002; Griffiths, 2008; Productivity Commission, 2009). For example, Olason et al. (2011) found that the prevalence of problem gambling tended to be much higher among internet gamblers than non-internet gamblers. The gambling activities that are more likely to lead to problem gambling seem to differ between countries (Welte, Barnes, Tidwell & Hoffman, 2009). For example, in Britain and New Zealand scratch card and EGM gambling are more likely to lead to problem gambling (Clarke & Rossen, 2000; Griffiths, 1995a; Wood & Griffiths, 1998) whereas in the United States it is betting on card games, sports events, and games of skill that appear to be more likely to lead to problem gambling (Engwall, Hunter & Steinberg, 2004; Welte, Barnes, Tidwell & Hoffman, 2007; Winters, Stinchfield & Fulkerson, 1993). It is, therefore, necessary to distinguish between the different gambling activities when considering gambling frequency and problem gambling.

One difficulty we faced is that individuals participate in more than one activity and patterns of gambling participation are relatively complex. We addressed this issue by first considering each activity alone, in isolation from the others. This allowed us to determine which factors predict participation in each gambling activity. We then combined data from multiple gambling activities to predict PGSI score.

## Conclusions

Our review of the literature suggests that gambling frequency and problem gambling are both likely to be associated with the degree to which an individual's family and peers, as well as people in general, are perceived to both participate in gambling and to approve of gambling. Further, it is likely that seeing advertisements and receiving promotional materials for gambling activities, along with discussing these activities online and offline, will influence gambling frequency and PGSI score. However, alongside these social and behavioural factors, other factors are also likely to be relevant. These factors include demographic characteristics such as age, gender, country of birth, language spoken at home, relationship status and location. In addition, psychological factors, such as depression and low esteem, along with the tendency to behave rashly when in a good mood (positive urgency), along with distorted gambling cognitions such as overestimating the chances of winning and believing that one can influence one's chances, are likely to influence gambling behaviours. Our study was designed to investigate the relative contributions of all these separate factors to both gambling frequency and PGSI score. Since these factors had previously been studied in isolation, we had little idea of their relative importance. Only by studying them all together, could this be assessed.

## Chapter 3 – Pilot study

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### Introduction

Our research strategy was to first carry out a pilot study, using a small sample of university students. The purpose of this pilot study was to determine if there were any problems or misunderstandings with any of our survey items and if our survey was an appropriate length. Our survey company, the Online Research Unit (ORU), had informed us that if our survey were to take longer than 20 minutes, it would likely have an unacceptably high drop-out rate. We were therefore keen to ensure that our survey took the majority of participants less than 20 minutes to complete while simultaneously ensuring that all its items were readily comprehensible.

### Method

#### Participants

Fifty-three undergraduate students were recruited, but one dropped out before completing the survey, so is not included in our analysis. Of the remaining participants, 21 were males (40%) and all were aged between 18 and 29 years (mean age 19.52 years,  $SD = 2.53$ ). Participants we paid \$12 to compensate them for their time.

#### Procedure

The participants were presented with our survey using the Qualtrics online survey platform. The survey questions are listed in Appendix B and are discussed in more detail in the next chapter. In brief, they assessed the perceptions of how often others gamble and approve of gambling, the extent to which participants had seen advertisements or had received promotional material for each of the 12 forms of gambling, the extent to which participants discussed these gambling activities online and offline in the past year, the extent to which participants had engaged in these gambling activities in the past year, various psychological factors, various demographic characteristics, and gambling problems. Once the participants had completed the survey, they then discussed the questions with the research assistant. These discussions were designed to uncover any difficulties or potential misunderstandings with the survey items. The survey data itself was not analysed

## Results

Of the 52 students who completed our pilot study, only three (6%) indicated any difficulties with the survey questions. These students commented:

“I find that it is sometimes hard to provide an accurate response for what I perceive the general people think of gambling and it is sometimes difficult for me to recall activities that I have engaged with 6 to 12 months ago.”

“The questions about how often I thought the general public gambled etc. were a bit difficult as I found it hard to consider what was meant by the general public, and I suppose I don't know that much about gambling habits of Australia overall. The question that asked me to answer questions as a gambler: I was unsure if it meant to answer them as what I perceived of most gamblers (I answered like this), or that I should answer them as if how I would view them if I personally gambled.”

“I found the wording of the questions about responding to statements as though you were a gambler a little confusing.”

Accordingly, given that 94% of the student sample had no difficulties with questions, we did not change any of the items for the main study. Further, almost all (92%) individuals completed the survey in under 20 minutes, with a median time of 11.4 minutes.

## Conclusions

The results of this pilot study indicated that our survey questions were comprehensible and were appropriate for use in our larger field study. Further, most participants completed it in under 20 minutes, so it satisfied the requirements of our recruitment company, the ORU.

## Chapter 4 – Survey of a representative sample of Victorian adults

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### Introduction

This chapter presents the results of a survey of a representative sample of Victorian adults that was designed to address our research questions. We start by detailing our methodology. We then discuss the prevalence of gambling and gambling-related problems. Specifically, we discuss how it varies as a function of age and gender, as well as how it has evolved from 2010 to 2016. We conclude by discussing which factors predict gambling and gambling-related problems.

### Participants

Our participants were recruited by The Online Research Unit (ORU). The ORU is an Australian research company and is certified by the International Organization for Standardization (ISO 20252 and ISO 26362). The ORU maintains a panel of individuals who have agreed to participate in surveys sent to them. Participation is completely voluntary and participants can withdraw at any time without cost or penalty. A mix of incentives including vouchers and charitable donations of small value is provided to participants via the ORU.

Of the individuals contacted by the ORU in June or July 2016, 3361 agreed to participate. When recruiting participants, the ORU attempted to match our sample for age, sex and location (Melbourne vs regional) to the general Victorian population as determined by the demographic data supplied by the 2011 Australian Bureau of Statistics (ABS) survey. (The data from the 2016 ABS survey had not yet been released.) Appendix A compares the demographics of our sample to the demographics obtained in the 2011 ABS survey. One thousand six hundred and eight participants (48%) were male and 1743 (52%) were female. Participants ranged in age from 18 to 88 years (mean age = 46.7,  $SD = 16.7$ ). Two thousand three hundred and seventy-five (71%) lived in the metropolitan area of Melbourne, and 986 (29%) lived in non-metropolitan Victoria, reflecting the Victorian bias toward the metropolitan area. The majority of participants reported that they were born in Australia (77%) and were in a relationship (62%). Finally, 94% reported that the language they spoke at home was English.

## Measures

### Demographic characteristics

Participants were asked to provide information about their age, sex, country of birth, relationship status, the main language they spoke at home and the postcode of their residence.

### Gambling frequency

Participants were asked to indicate whether they had participated in 12 commonly-available gambling activities during the past year, specifically: *Lottery tickets, Instant scratch tickets, Raffle or fund-raising tickets, Betting on animal races, Sports betting, Gaming tables at casinos, Poker machines at casinos, Poker machines at other venues, Card or board games, Games of skill, Arcade or video gaming, and Internet gambling*. These 12 gambling activities were chosen as they have been assessed in our previous study (Boldero & Bell, 2012b). These activities were not specifically defined but examples of each were provided (e.g., pool and darts in the case of games of skill).

If participants indicated that they had participated in any of these activities, they were then asked to indicate whether they had participated more or less than six times. We were concerned that the responses of participants might be biased by the frequency options presented to them. Consequently, we used the same frequency options as we had used in our previous study (Boldero & Bell, 2012b), to facilitate comparisons between these two studies.

In addition, participants were asked to indicate whether they believed that their family, peers, and people in general had participated in each of the 12 activities in the past year, and if they believed they had, whether they believed this was more or less than six times. We asked them to answer this question as if they were a gambler. We phrased these questions in this manner as this was the manner in which Boldero and Bell (2012b) phrased their questions, thereby allowing us to compare our results to theirs.

### Approval of gambling

Participants were asked to indicate the extent to which they approve, on 5-point Likert scales from *strongly disapprove* (1) to *strongly approve* (5), of each of the 12 gambling activities surveyed. They also indicated the extents to which they believed that their family, their peers, and general population separately approve of gambling on these 12 gambling activities.

**Advertisements, promotional materials, and gambling-related discussions**

Participants were asked to indicate whether they had seen advertisements for each of the 12 gambling activities of interest and whether they had received any promotional material (e.g., a 'flyer' in the mail) in the past year. If they indicated that they had seen advertisements or received promotional material, they were asked whether or not this occurred more or less than six times in the past year. Participants were also asked whether they had discussed any of the 12 gambling activities either online (e.g., via Facebook, Twitter, or Instagram) or offline (e.g., in person with another individual or on the telephone) in the past year. If they had, they were asked to estimate for each gambling activity whether this occurred more or less than six times.

**Psychological factors and erroneous gambling cognitions**

In our survey we needed to assess various psychological factors and erroneous gambling cognitions. To avoid the survey becoming overly long, we used the shorter versions of these scales that we developed in our previous study (Boldero & Bell, 2012b). Accordingly, each scale contained only four items except for the PGSI scale where we used the standard 9 items (Ferris & Wynne, 2001).

***Depression***

Participants were asked to indicate the extent to which they agreed, on 5-point Likert scales from *rarely or none of the time* (1) to *always or most of the time* (5), that they felt lonely, that they felt sad, that they felt depressed and that they could not shake off the blues even with the help of family and friends. These four items were obtained from the Center for Epidemiologic Studies Depression Scale (Radloff, 1977). The scale assessed by these items had adequate internal consistency, Cronbach's  $\alpha = .92$ .

***Low esteem***

The survey used four items from Rockloff and Dyer's (2006) low esteem scale, developed using responses from a focus group of Gamblers Anonymous members. Participants indicated the extent to which they agreed, on 5-point Likert scales from *rarely or none of the time* (1) to *always or most of the time* (5), that they are often incompetent, that they feel completely worthless, that they are miserable to be around and that they rarely live up to their own values and standards. The scale assessed by these four items had adequate internal consistency, Cronbach's  $\alpha = .88$ .

**Positive urgency**

We used four items from Cyders and associates' (Cyders & Smith, 2008b; Cyders, Smith, Spillane, Fischer, Annus & Peterson, 2007) scale to assess positive urgency. Participants were asked to indicate the extent to which they agreed, on 5-point Likert scales *rarely or none of the time* (1) to *always or most of the time* (5), that when they are in a good mood they get into situations that could cause them problems, that when they are very happy they cannot seem to stop themselves from doing things that have bad consequences, that when they are overjoyed they feel like they cannot stop themselves from going overboard, and that they tend to lose control when they are in a great mood. The scale assessed by these four items had adequate internal consistency, Cronbach's  $\alpha = .91$ .

**Overestimating the chance of winning (OCW)**

We used the four items from Breen and Zuckerman's (1999) Gambling Attitudes and Beliefs Survey to assess the degree to which our participants overestimated the chance of winning at gambling. Participants were asked to indicate, regardless of whether they gambled or not, the extent to which they agreed that, on 5-point Likert scales from *strongly disagree* (1) to *strongly agree* (5) sometimes that they just 'know' they are going to have good luck, that if they have lost their bets recently their luck is bound to change, that sometimes they think they have the power to 'will' their numbers to come up in gambling games, and that if they concentrate hard enough they are able to influence whether they win when they play the pokies. The scale assessed by these four items had adequate internal consistency, Cronbach's  $\alpha = .88$ .

**Luck/perseverance**

This factor was assessed using the four items from Steenbergh et al.'s (2002) measure to assess luck/perseverance. These items asked participants to indicate the extent to which they agreed, on 5-point Likert scales from *strongly disagree* (1) to *strongly agree* (5), regardless of whether or not they gambled, that should they gamble there are certain things that they can do when gambling that would increase their chances of winning, that it does not matter where the money to gamble comes from because they will win and pay it back, that if they continue to gamble it will eventually pay off and they will make money, and that they should keep the same bet even when it has not won because it is bound to win. The scale assessed by these four items had adequate internal consistency, Cronbach's  $\alpha = .94$ .

### ***Gambling problems***

Gambling problems were assessed using the 9-item PGSI scale (Ferris & Wynne, 2001). The 9-item version of this scale has been used in a number of general population surveys in Australian jurisdictions, including Victoria to assess problem gambling (Abbot et al., 2016; Department of Justice, 2009; Hare, 2015). It was designed to assess the prevalence of gambling problems in the community rather than in clinical samples, is internally consistent, and has concurrent validity with other problem gambling measures (Jackson et al., 2010). Participants rated each item on a 4-point Likert scale: *never* (1), *sometimes* (2), *most of the time* (3) or *almost always* (4). A fifth category, *don't know*, was also included. The scale had adequate internal consistency, Cronbach's  $\alpha = .96$ .

### **Results**

Our analysis was conducted using IBM SPSS version 22 (IBM Corp, 2013). The median response time for this survey was 12.9 minutes, which was similar to the median response time for the pilot survey, which was 11.4 minutes. This indicates that the survey was not overly long and taxing for the participants, which otherwise might have affected both participation rates and the quality of the data.

### **The prevalence of gambling and problem gambling in Victoria**

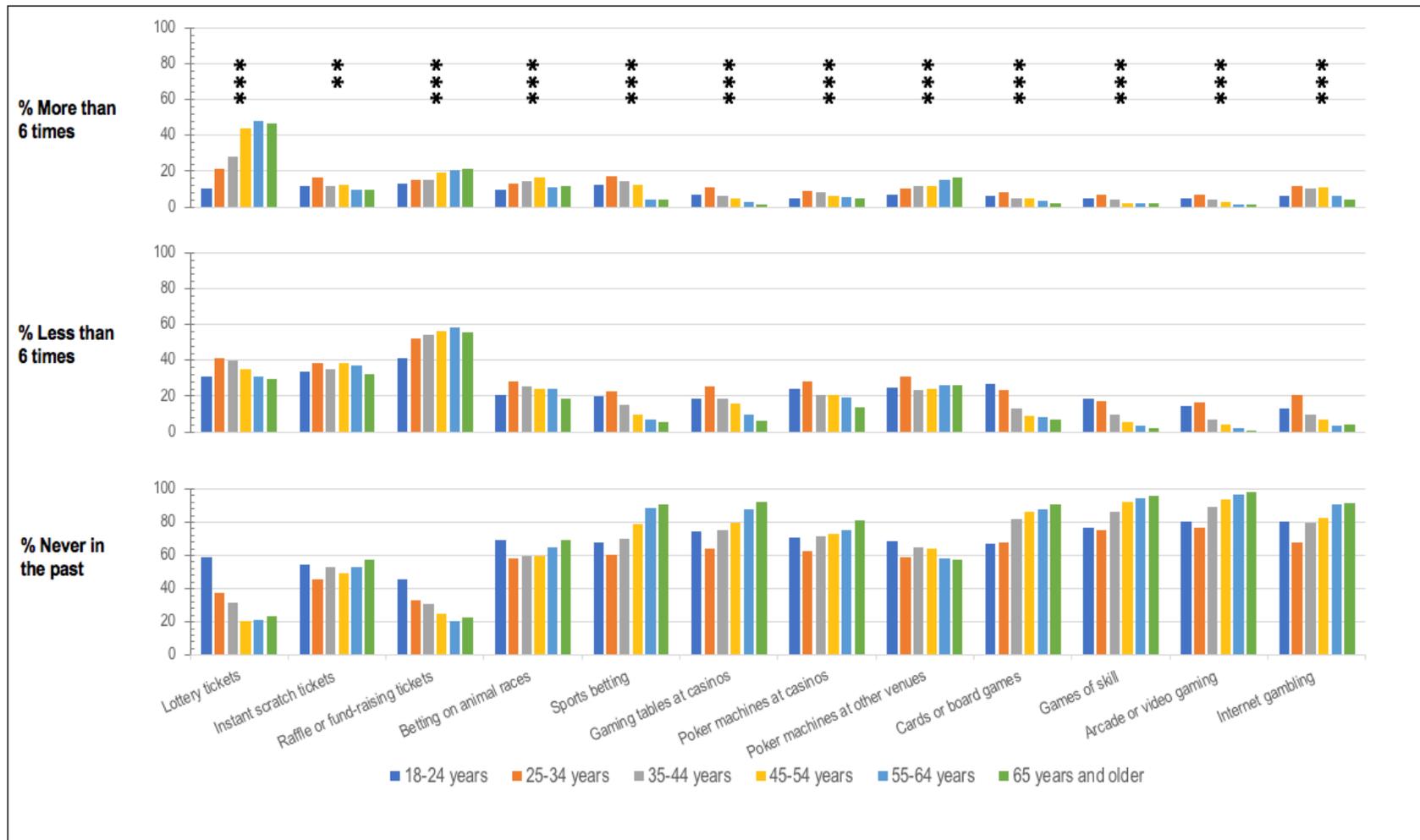
Table 1 shows the prevalence of gambling in Victoria as a function of age. We can see that the vast majority of Victorians have participated in at least one form of gambling in the preceding 12 months. Furthermore, about half could be described as regular gamblers in that they have participated in at least one gambling activity more than six times in the preceding 12 months. These results show that gambling is common in Victoria.

**Table 1: Prevalence of gambling**

Percentage of Victorians self-reporting participating in at least one gambling activity and participating in at least one gambling activity more than six times in the past year.

	Age group					
	18- 24 years	25- 34 years	35- 44 years	45- 54 years	55- 64 years	65 years or older
At least one activity	95	88	94	96	98	99
One activity more than six times	36	47	48	58	61	54

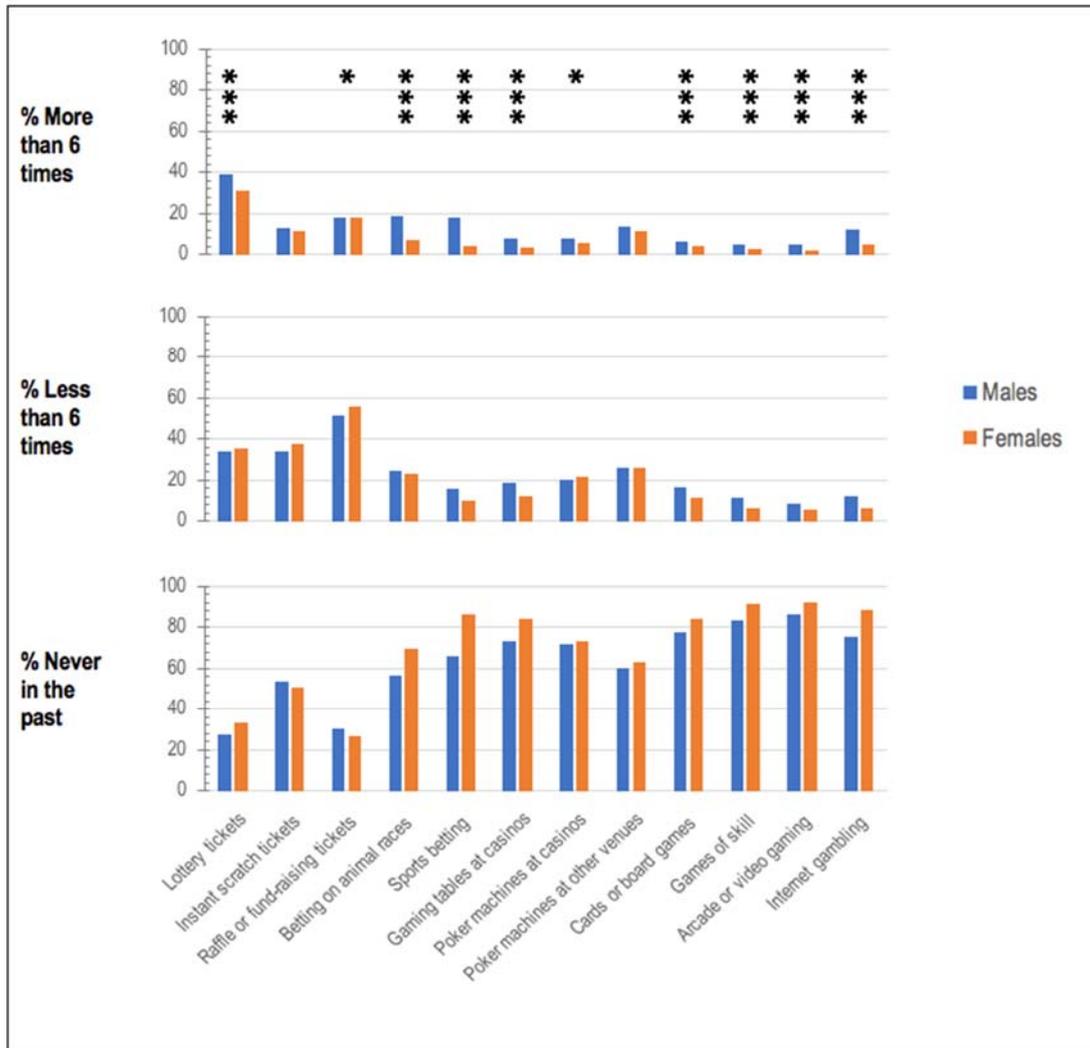
Figure 1 extends this analysis by showing how gambling participation rates varied as a function of age for each of the 12 gambling activities that we studied. Chi-square tests revealed that there were significant variations with age for all the activities. It increased with age for *Lottery tickets* and, to a lesser extent, for *Raffle or fund-raising tickets* and *Poker machines at other venues*. For all other gambling activities, it first increased then decreased with age.



**Figure 1: Gambling by age.**

Clustered bar graphs for the percentage of Victorians self-reporting participating in the 12 surveyed gambling activities in the previous year as a function of age group. Clusters marked with asterisks indicate a statistically significant chi-square association between the individual gambling activity and participants' age group.  $N_{18-24} = 388$ ,  $N_{25-34} = 593$ ,  $N_{35-44} = 565$ ,  $N_{45-54} = 567$ ,  $N_{55-64} = 643$ ,  $N_{65+} = 605$ . \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

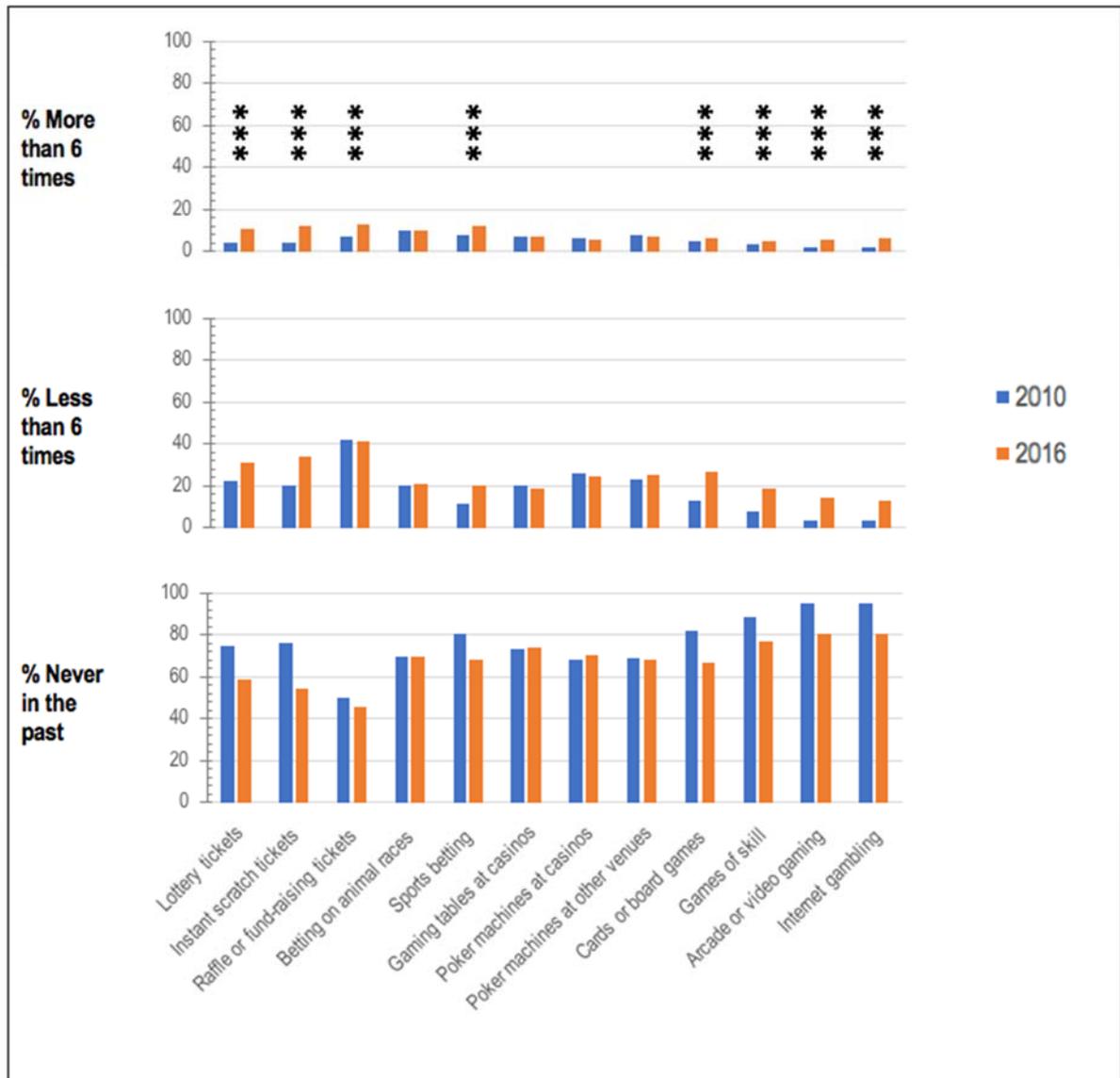
Figure 2 shows how gambling varied as a function of gender. Consistent with previous reports (Hare, 2015), for most activities males gambled more than females. Only for *Instant scratch tickets* and *Poker machines at other venues* did males and females gamble at comparable rates. Additionally, females gambled more than males for *Raffle or fund-raising tickets*.



**Figure 2: Gambling by gender**

Clustered bar graphs for the percentage of males and females self-reporting participating in the 12 surveyed gambling activities as a function of participation frequency in the last year. Clusters marked with asterisks indicate a statistically significant chi-square association between the individual gambling activity and participants' gender.  $N_{males} = 1618$ ,  $N_{females} = 1743$ . \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

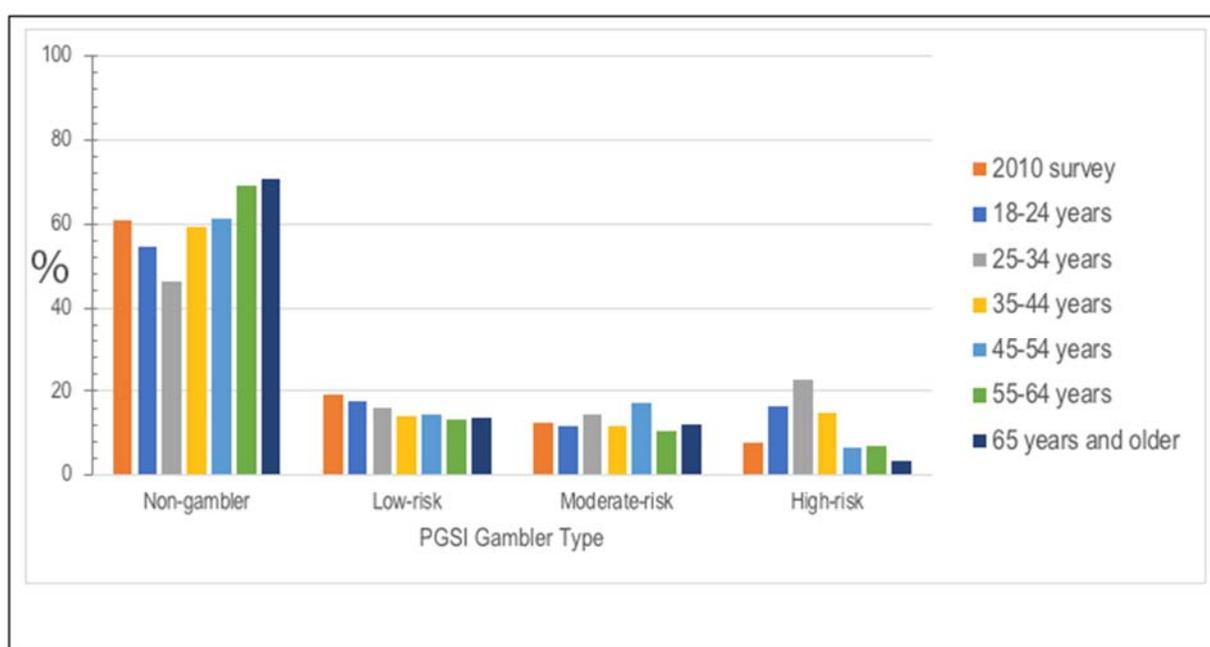
Figure 3 shows how gambling participation rates in 2016 compared to those in 2010, for each of the 12 gambling activities. For *Betting on animal races*, *Gaming tables at casinos*, *Poker machines at casinos* and *Poker machines at other venues* there was no significant difference between 2010 and 2016 participation rates. For the other eight gambling activities, chi-square tests revealed that participation rates were significantly greater in 2016 than in 2010.



**Figure 3: Gambling, 2016 vs 2010**

Clustered bar graphs for the percentage of young adults (18-24 years old) self-reporting participating in the 12 surveyed gambling activities as a function of year (2010 and 2016) and participation frequency. Clusters marked with asterisks indicate a statistically significant chi-square association between year and the individual gambling activity.  $N_{2010} = 1000$ ,  $N_{2016} = 388$ . The 2010 data was obtained from “Chance- and Skill-Based Dimensions Underlying Young Australians’ Gambling Activities and Their Relationships with Gambling Problems and Other Factors,” by J. Boldero and R. Bell, 2012, *International Gambling Studies*, 12, p. 152. \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

Finally, Figure 4 shows how problem gambling varied as a function of age. A chi-square test revealed that problem gambling did vary with age ( $\chi^2(15, n = 3348) = 196.9, p < .001$ ). Inspecting the graphs shows that it was greatest for 25-34 year olds. Figure 4 also compares the prevalence of problem gambling in 2016 to 2010. It should be noted that this 2010 study (which was different from the 2010 study discussed above, see figure caption for reference) utilised undergraduate students, whereas the current study utilised a representative sample of Victorians. Furthermore, none of the age categories utilised in the current study are directly equivalent to that utilised by this 2010 study. However, since the mean age for the 2010 study was 21 years old, the most comparable age category for the current study would be 18-24 years old. Based on this comparison, our data suggest that there is likely to have been a greater fraction of high-risk gamblers in 2016 than in 2010



**Figure 4: PGSI by age and severity**

Clustered bar graph for the percentage of Victorian's in each PGSI gambler sub-type (non-gambler, low-risk, moderate-risk, high-risk) as a function of age group and year (2010 and 2016). Asterisks indicate a statistically significant chi-square association between PGSI gambler type and participants' age group, excluding 2010 survey data. PGSI = Problem gambling severity index. Sample size, per year:  $N_{2010} = 370$ ,  $N_{2016} = 3361$ . Sample size, age group (2016 data only):  $N_{18-24} = 388$ ,  $N_{25-34} = 593$ ,  $N_{35-44} = 565$ ,  $N_{45-54} = 567$ ,  $N_{55-64} = 643$ ,  $N_{65+} = 605$ . The 2010 data from "An evaluation of the factor structure of the Problem Gambling Severity Index," by J. Boldero and R. Bell, 2012, *International Gambling Studies*, 12, p. 97.

In summary, our results show that gambling is highly prevalent in Victoria, with the overwhelming majority of people having gambled at least once in the previous year. Approximately, half of these people could be classified as regular gamblers, participating in at least one gambling activity more than six times per year. From our data it is clear that some forms of gambling (e.g. lottery tickets)

are more popular than other forms of gambling. Furthermore, a number of gambling activities, such as lottery tickets, become more popular with age. As expected, we found that, in general, men gambled more than women, except for *Instant scratch tickets* and *Poker machines at other venues* for which they gambled at comparable rates, and for *Raffle or fundraising tickets* for which women gambled more than men. For most gambling activities, participation rates have increased from 2010 to 2016. The exceptions are *Betting on animal races*, *Gambling tables at casinos*, *Poker machines at casinos* and *Poker machines at other venues*. For these gambling activities, participation rates have stayed constant. Finally, our data suggest that the rate of high-risk problem gambling may have slightly increased from 2010 to 2016, though this result must be interpreted with caution as the demographics of the samples were different in the two studies.

### **The factors that predict gambling and problem gambling**

To investigate which factors are associated with gambling participation rates we considered each of the 12 gambling activities in turn and performed a correlation analysis. The results of this analysis are shown in Table 2. We found that 13 of our variables were significantly correlated with participation rates for all gambling activities, 9 variables were significantly correlated with participation rates for most of the gambling activities and one variable was significantly correlated with participation rates for half the gambling activities. These very high rates of correlation are not surprising as these variables were specifically chosen because previous studies had shown that they were correlated with gambling participation rates, as reviewed in Chapter 2.

While this analysis demonstrated that our data is broadly consistent with the previous literature, we can go beyond this analysis by performing a linear regression. A regression analysis allows us to determine which variables are actually needed to predict gambling participation rates. Just because a variable is correlated with gambling participation rates does not necessarily mean that a linear regression will find it to be a useful predictor. It could be that there are other better predictors and when these are considered, it has no additional predictive value.

**Table 2: Correlation analysis for gambling participation rates**

Spearman rank order coefficients ( $r_s$ ) between Victorians' self-reported participation in 12 gambling activities and all variables of interest.

Variables	Self-reported participation in gambling activity											
	Lottery tickets	Instant scratch tickets	Raffle or fund-raising tickets	Betting on animal races	Sports betting	Gaming tables at casinos	Poker machines at casinos	Poker machines at other venues	Cards or board games	Games of skill	Arcade or video gaming	Internet gambling
	$r_s$	$r_s$	$r_s$	$r_s$	$r_s$	$r_s$	$r_s$	$r_s$	$r_s$	$r_s$	$r_s$	$r_s$
Participation in gambling												
Family members	.46**	.51**	.54**	.46**	.40**	.48**	.52**	.52**	.60**	.58**	.58**	.49**
Peers	.43**	.35**	.47**	.41**	.35**	.38**	.37**	.39**	.43**	.39**	.38**	.38**
People in general	.23**	.14**	.25**	.13**	.04*	.06**	.10**	.14**	.14**	.11**	.12**	.10**
Approval of gambling												
Self-reported	.49**	.34**	.35**	.49**	.48**	.33**	.38**	.49**	.29**	.24**	.26**	.46**
Family members	.36**	.29**	.30**	.33**	.31**	.22**	.27**	.32**	.25**	.21**	.20**	.29**
Peers	.26**	.20**	.28**	.25**	.24**	.18**	.18**	.23**	.23**	.17**	.17**	.26**
People in general	.15**	.06**	.21**	.03	.02	-.01	.04*	.11**	.13**	.05**	.09**	.09**
Exposure to advertisement												
Seeing ads	.24**	.19**	.35**	.25**	.08**	.21**	.20**	.16**	.30**	.35**	.42**	.18**
RPM	.18**	.25**	.31**	.33**	.38**	.37**	.33**	.28**	.37**	.47**	.50**	.31**
Participating in discussions												
Online	.10**	.29**	.19**	.33**	.41**	.42**	.34**	.27**	.47**	.54**	.57**	.42**
Offline	.36**	.42**	.38**	.48**	.43**	.44**	.41**	.42**	.55**	.58**	.60**	.41**
Demographic variables												
Age	.28**	-.06**	.15**	-.03	-.24**	-.22**	-.11**	.07**	-.22**	-.23**	-.24**	-.17**
Gender <sup>a</sup>	-.09**	.02	.03	-.16**	-.25**	-.14**	-.02	-.03	-.09**	-.12**	-.10**	-.17**
COB <sup>a</sup>	.00	.03	.07**	.10**	.04*	.01	-.01	.09**	-.05**	.00	.01	.04*
LSH <sup>a</sup>	.04*	.01	.09**	.07**	-.02	-.05**	-.03	.07**	-.07**	-.03	-.04**	-.01
Relationship status <sup>a</sup>	.14**	.07**	.15**	.06**	.03	.04*	.04*	.05**	.01	.01	.01	.00
Location <sup>a</sup>	-.01	-.02	-.08**	.02	.09**	.11**	.12**	-.02	.10**	.07**	.08**	.06**
Psychological factors												
Depression	-.06**	.09**	-.02	.07**	.15**	.16**	.13**	.12**	.18**	.23**	.24**	.21**
Low esteem	-.03	.09**	.00	.07**	.16**	.17**	.13**	.12**	.19**	.25**	.26**	.22**
Positive urgency	.02	.18**	.05**	.18**	.28**	.30**	.24**	.20**	.31**	.35**	.35**	.30**
OCW	.14**	.25**	.06**	.23**	.29**	.31**	.29**	.24**	.26**	.29**	.29**	.26**
Luck/Perseverance	.04*	.16**	.07**	.11**	.18**	.19**	.16**	.13**	.17**	.22**	.21**	.17**
PGSI score	.20**	.29**	.13**	.38**	.46**	.45**	.41**	.45**	.34**	.37**	.36**	.45**

Note. N= 3361. COB = Country of birth; LSH: Main language spoken at home; OCW = Overestimating chances of winning, PGSI = Problem gambling severity index, PRM = Receiving promotional material. COB<sup>a</sup>: 0 = Other, 1 = Australia. Gender<sup>a</sup>: 0 = male, 1 = female. Location<sup>a</sup>: 0 = Rural, 1 = Metropolitan. LSH<sup>a</sup>: 0 = Other, 1 = English. Relationship status<sup>a</sup>: 0 = Other, 1 = Married or living with a partner. \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

To be clear, if a linear regression finds a variable to be a significant predictor, this does not prove a causal relationship exists between the two variables. Ultimately, regression analyses cannot prove causation relationships, for the same reasons that correlation analyses cannot prove causal relationships (Aldrich, 1995). However, just as the lack of a significant correlation can be taken as evidence against a significant causal relationship between two variables, barring type 2 errors and assuming any causal relationship between the two variables would be monotonic, so the finding that a linear regression indicates that a particular variable is not a significant predictor of a second variable can be taken as evidence for a lack of an immediate causal relationship between the two variables. Linear regressions can suggest what the causal relationships between variables might be, but cannot be taken as proof of these relationships.

For the regression analysis, we considered each gambling activity in turn. The dependent variable was the self-reported gambling frequency for that gambling activity. The predictors were: perceived participation in gambling (family members, peers and people in general), approval of gambling (self-reported, family members, peers and people in general), frequency of seeing ads, frequency of receiving promotional material, frequency of participating in online discussions, frequency of participating in offline discussions, age, gender, country of birth, language spoken at home, relationship status, location, depression, low esteem, positive urgency, overestimating chances of winning, perceived luck/perseverance, PGSI rating. As shown in Table 3, for all gambling activities, the regression fit was highly significant with  $p < .001$  and with each regression explaining approximately 50% of the variance in the data.

**Table 3: Regression analysis to predict gambling participation rates**

Model summary statistics for a series of linear regression analyses predicting Victorians' self-reported participation rates in each of 12 gambling activities.

Gambling activity	Self-reported participation in gambling activity			
	R <sup>2</sup>	F	df <sub>Reg</sub> , df <sub>Res</sub>	P
Lottery tickets	.48	131.45	23, 3324	< .001
Instant scratch tickets	.41	99.83	23, 3324	< .001
Raffle or fund-raising tickets	.42	105.37	23, 3324	< .001
Betting on animal races	.47	129.96	23, 3324	< .001
Sports betting	.47	127.85	23, 3324	< .001
Gaming tables at casinos	.45	116.06	23, 3324	< .001
Poker machines at casinos	.42	106.54	23, 3324	< .001
Poker machines at other venues	.49	141.43	23, 3324	< .001
Cards or board games	.51	148.14	23, 3324	< .001
Games of skill	.50	145.95	23, 3324	< .001
Arcade or video gaming	.50	143.59	23, 3324	< .001
Internet gambling	.45	116.07	23, 3324	< .001

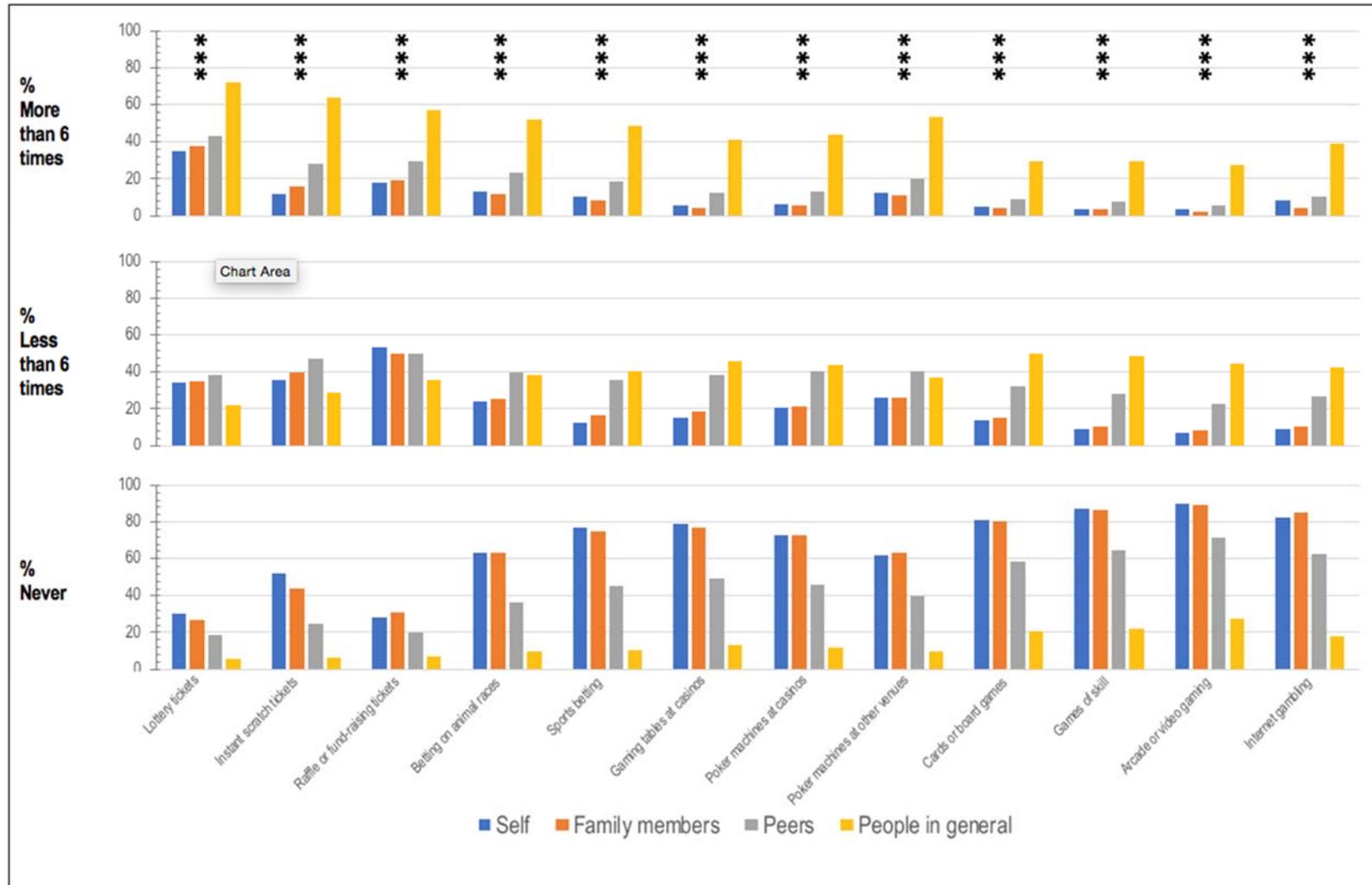
Table 4 shows the standardised predictors for the regressions described in Table 3. We see that self-reported gambling frequency is well predicted by both the perception of the degree to which both family and peers gamble (both significant predictors for all 12 gambling activities), but the first predictor has approximately double the predictive power of the second. Other significant predictors include, self-reported approval of gambling (significant for all 12 gambling activities), perceived approval of gambling by peers (significant for seven gambling activities) and people in general (significant for eight gambling activities), receiving promotional materials (significant for nine gambling activities), frequency of discussing gambling offline (significant for all 12 gambling activities), age (significant for seven gambling activities), gender (significant for eight gambling activities) and the psychological factors of overestimating chances of winning (significant for nine gambling activities) and PGSI score (significant for eleven gambling activities).

**Table 4: Standardised regression coefficients for gambling participation rates**  
 Standardised regression coefficients for the predictors of self-reported participation in 12 gambling activities.

Predictors	Self-reported participation in gambling activity											
	Lottery tickets	Instant scratch tickets	Raffle or fund-raising tickets	Betting on animal races	Sports betting	Gaming tables at casinos	Poker machines at casinos	Poker machines at other venues	Cards or board games	Games of skill	Arcade or video gaming	Internet gambling
	β	β	β	β	β	β	β	β	β	β	β	β
Participation in gambling												
Family members	.23***	.30***	.30***	.18***	.13***	.22***	.28***	.26***	.38***	.29***	.31***	.23***
Peers	.17***	.10***	.16***	.12***	.11***	.14***	.13***	.12***	.10***	.07***	.07***	.11***
People in general	.02	.03	.01	.00	-.01	.00	.02	.04**	-.01	-.01	.00	.04*
Approval of gambling												
Self-reported	.37***	.20***	.22***	.30***	.32***	.16***	.23***	.34***	.11***	.05*	.07***	.35***
Family members	-.02	.02	.00	-.02	-.03	-.03	-.03	-.07***	-.02	.01	-.03	-.07***
Peers	-.09***	-.03	-.05*	-.04*	-.08***	-.06**	-.07***	-.06***	-.02	-.03	-.02	-.02
People in general	-.10***	-.08***	-.05*	-.08***	-.05**	-.06***	-.05**	-.03	-.01	-.01	-.03	-.06***
Exposure to advertisement												
Seeing ads	.01	.00	.08***	.04**	-.02	.01	.00	-.03*	.01	.02	.06***	.03*
RPM	.03	.03	.06***	.07***	.11***	.07***	.06***	.05**	.03	.06***	.03*	.03*
Participating in discussions												
Online	-.01	.04*	.02	.03	.05**	.08***	.03	-.04*	.02	.03	.05**	.01
Offline	.16***	.19***	.12***	.23***	.18***	.14***	.13***	.17***	.23***	.25***	.24***	.13***
Demographic variables												
Age	.21***	.02	.11***	.03*	-.03*	-.04**	.01	.12***	-.02	-.01	-.03*	.02
Gender <sup>a</sup>	-.07***	-.01	.00	-.08***	-.14***	-.06***	.01	.00	-.03**	-.05***	-.03*	-.06***
COB <sup>a</sup>	.01	.00	.02	.02	.02	.02	-.01	.03*	-.02	.00	.00	.01
LSH <sup>a</sup>	-.03*	-.01	.00	.00	-.02	-.03	-.01	.00	.00	.00	.00	.00
Relationship status <sup>a</sup>	.05***	.04**	.07***	.02	.01	.03*	.01	.01	.02	.02	.02	-.01
Location <sup>a</sup>	.00	-.01	-.04**	.02	.03*	.03*	.05***	-.02	.02	.01	.02	.02
Psychological factors												
Depression	-.06*	.01	-.05**	.02	-.04	.00	.02	.01	-.01	.01	.01	.01
Low esteem	.01	-.05	.01	-.06*	-.01	-.06*	-.06*	-.05	-.04	-.02	-.01	-.02
Positive urgency	-.01	.00	.05*	-.03	-.01	.03	-.02	.02	.04*	.04*	.04*	.00
OCW	.10***	.10***	.07***	.07***	.05**	.07***	.08***	.05**	.04*	.03	.01	.01
Luck/ Perseverance	-.05***	.00	.00	-.04**	-.02	.01	-.01	-.05***	.01	.04**	.01	-.02
PGSI	.10***	.11***	.03	.13***	.17***	.18***	.19***	.24***	.10***	.15***	.08***	.19***

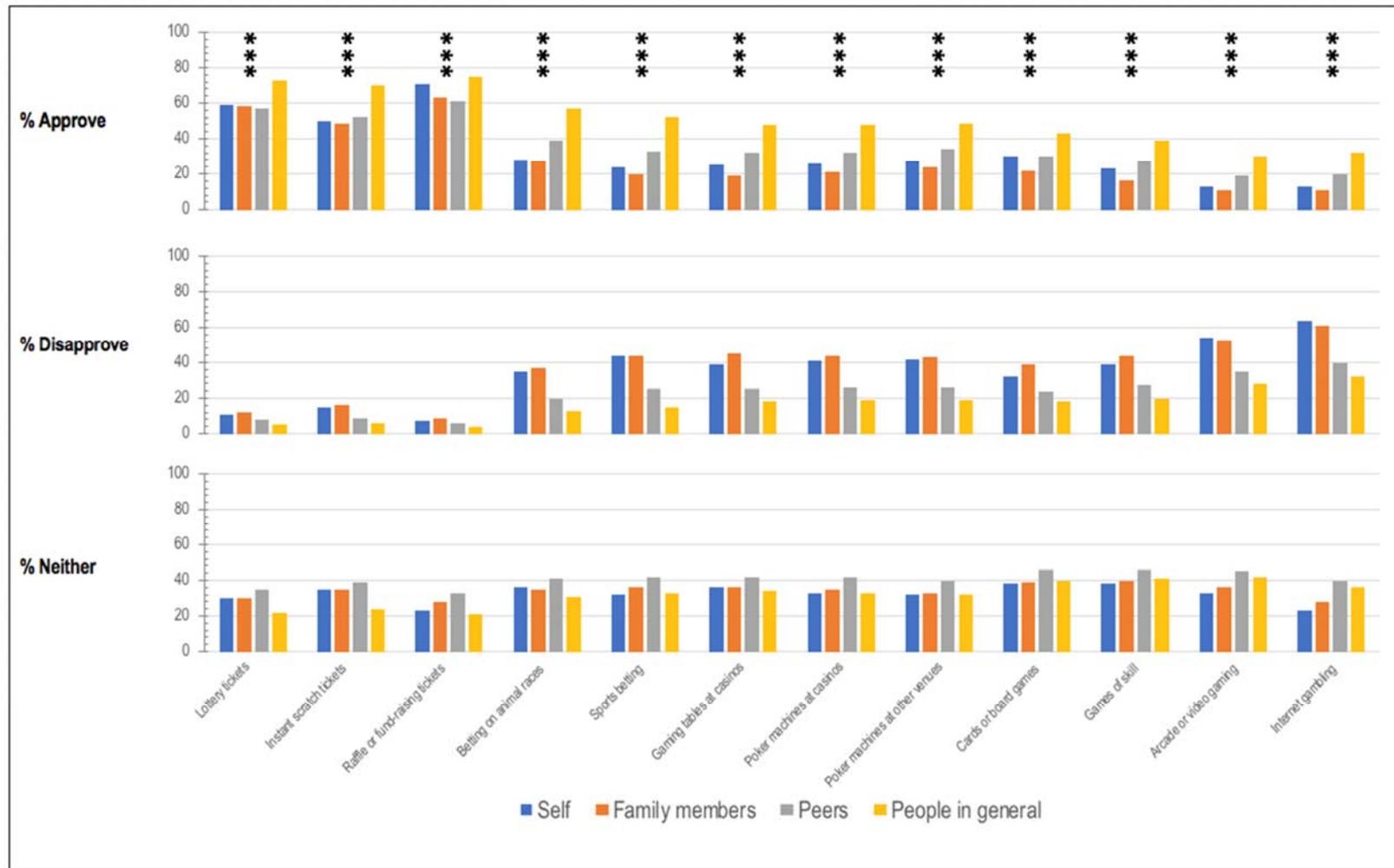
Note. N = 3361. COB = Country of birth; LSH: Main language spoken at home; OCW = Overestimating chances of winning, PGSI = Problem gambling severity index, PRM = Receiving promotional material. COB<sup>a</sup>: 0 = Other, 1 = Australia. Gender<sup>a</sup>: 0 = male, 1 = female. Location<sup>a</sup>: 0 = Rural, 1 = Metropolitan. LSH<sup>a</sup>: 0 = Other, 1 = English. Relationship status<sup>a</sup>: 0 = Other, 1 = Married or living with a partner. \*p < .05; \*\*p < .01; \*\*\*p < .001

Since beliefs about the degree to which others gamble and approval of gambling are significant predictors of gambling frequency, it is worthwhile considering how accurate these beliefs are. If they are not accurate, then correcting them could potentially reduce gambling. Figure 5 shows actual gambling frequency (i.e. average self-reported gambling frequency) versus the perceived gambling frequency of family, peers and people in general, for each of the 12 gambling activities. As can be seen, individuals systematically overestimate the degree to which others gamble. They do this least for family members, then for peers and most for people in general. Figure 6 shows the degree to which individuals perceive family members, peers and people in general to approve of gambling. There is a systematic bias for individuals to believe that people in general approve of gambling more than they do.



**Figure 5: Perceived participation in gambling**

Clustered bar graphs for the percentage of Victorians self-reporting participating in the 12 surveyed gambling activities and the perceived participation of their family members, peers, and people in general. Clusters marked with asterisks indicate a statistically significant difference on frequency ratings for gambling activity depending on the person(s) doing the gambling (self, family members, peers, and people in general) as indicated by a non-parametric Friedman test. N = 3361. \*p < .05; \*\*p < .01; \*\*\*p < .001.



**Figure 6: Approval of gambling**

Clustered bar graphs showing the percentage of Victorians who approve of each of the 12 gambling activities and what percentage of their family members, peers, and people in general, respectively, they believe approve of each of the 12 gambling activities. Clusters marked with asterisks indicate a statistically significant difference in approval ratings as a function of approval category (self, family members, peers, and people in general), as indicated by a non-parametric Friedman test.  $N = 3361$ .  $*p < .05$ ;  $**p < .01$ ;  $***p < .001$ .

Turning our attention now to PGSI score, we started by performing a correlation analysis to determine the associations between our variables and PGSI score. The results are shown in Table 5. Almost all variables were correlated with PGSI score, which was expected as previous studies had indicated that these variables were correlated either with PGSI score or, at least, with gambling frequency, which itself is known to be correlated with PGSI score. The only surprise was that the variables, *Language spoken at home* and *Relationship status* were not correlated with PGSI score.

As before, we performed a regression analysis, to determine which variables are needed to predict PGSI score. Whereas, in our previous regression analysis, we considered only one form of gambling at a time, this would not be an appropriate way of predicting PGSI score, since multiple forms of gambling could potentially contribute to an individual's PGSI score. Consequently, we needed to take into account multiple forms of gambling simultaneously. To do this, without being overwhelmed by the sheer number of potential predictors, we performed a stepwise regression. We started by identifying the single predictor of PGSI score that could explain the greatest amount of variance in PGSI score. Then, we found the second predictor which, when combined with the first predictor, explained the greatest amount of variance in PGSI score. In the next step, we added a third predictor and so on, so that each step added another predictor. We continued with this process until adding an additional predictor did not explain anymore variance. Doing this, revealed 33 predictors, as shown in Table 4, which, in total, explained 59% of the variance in PGSI score. However, almost all this variance was accounted for by the top five predictors, which combined explained 51% of the variance of the PGSI score. Consequently, we can simplify the discussion by focusing on these predictors, which is what we do in Chapter 5.

**Table 5: Correlation analysis for PGSI score**

Spearman rank order coefficients ( $r_s$ ) between PGSI score and all variables of interest

Variables	PGSI score											
	Lottery tickets	Instant scratch tickets	Raffle or fund-raising tickets	Betting on animal races	Sports betting	Gaming tables at casinos	Poker machines at casinos	Poker machines at other venues	Cards or board games	Games of skill	Arcade or video gaming	Internet gambling
	$r_s$	$r_s$	$r_s$	$r_s$	$r_s$	$r_s$	$r_s$	$r_s$	$r_s$	$r_s$	$r_s$	$r_s$
Participation in gambling												
Self-reported	.20**	.29**	.13**	.38**	.46**	.45**	.41**	.45**	.34**	.37**	.36**	.45**
Family members	.10**	.16**	.07**	.20**	.25**	.26**	.24**	.24**	.26**	.29**	.32**	.30**
Peers	.07**	.09**	.04*	.17**	.21**	.23**	.21**	.20**	.18**	.19**	.18**	.22**
People in general	-.11**	-.09**	-.08**	-.05**	-.03*	-.02	-.04*	-.05**	-.02	-.02	-.02	-.03
Approval of gambling												
Self-reported	.05**	.05**	-.05**	.24**	.26**	.27**	.27**	.27**	.15**	.20**	.20**	.31**
Family members	-.02	-.01	-.09**	.10**	.14**	.12**	.10**	.12**	.08**	.11**	.11**	.15**
Peers	-.03	-.01	-.05**	.08**	.12**	.12**	.10**	.10**	.07**	.09**	.09**	.13**
People in general	-.12**	-.13**	-.13**	-.08**	-.06**	-.05**	-.07**	-.08**	-.05**	-.06**	-.05**	-.01
Exposure to advertisement												
Seeing ads	.01	.09**	.05**	.06**	.05**	.16**	.16**	.15**	.23**	.22**	.23**	.10**
RPM	.25**	.25**	.15**	.30**	.31**	.33**	.33**	.29**	.29**	.30**	.30**	.28**
Participating in discussions												
Online	.36**	.35**	.30**	.36**	.37**	.38**	.37**	.36**	.34**	.35**	.34**	.36**
Offline	.24**	.25**	.18**	.30**	.29**	.34**	.33**	.32**	.33**	.33**	.35**	.30**
	Demographic variables						Psychological factors					
	Age	Gender <sup>a</sup>	COB <sup>a</sup>	LSH <sup>a</sup>	Relationship status <sup>a</sup>	Location <sup>a</sup>	Depression	Low esteem	Positive urgency	OCW	Luck/Perseverance	
PGSI score	-.18**	-.18**	.05**	-.01	-.03	.06**	.33**	.35**	.46**	.43**	.25**	

Note. N= 3361. COB = Country of birth; LSH: Main language spoken at home; OCW = Overestimating chances of winning, PGSI = Problem gambling severity index, PRM = Receiving promotional material. COB<sup>a</sup>: 0 = Other, 1 = Australia. Gender<sup>a</sup>: 0 = male, 1 = female. Location<sup>a</sup>: 0 = Rural, 1 = Metropolitan. LSH<sup>a</sup>: 0 = Other, 1 = English. Relationship status<sup>a</sup>: 0 = Other, 1 = Married or living with a partner. \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

**Table 6: Stepwise regression to predict PGSI score**

Summary statistics for a stepwise linear regression designed to predict PGSI score

	Gambling activity	PGSI score			
		R <sup>2</sup>	F	df <sub>Reg</sub> , df <sub>Res</sub>	<i>p</i>
1.	Psychological factor: Positive urgency	.343	1743.58	1, 3346	< .001
2.	Self-reported participation: Playing poker machines at pubs, hotels, or sporting clubs	.421	1214.19	1, 3345	< .001
3.	Participation in online discussion about: Betting on gaming tables at casinos	.464	965.43	1, 3344	< .001
4.	Self-reported participation: Gambling on the Internet	.492	809.82	1, 3343	< .001
5.	Psychological factor: Overestimating chances of winning	.512	702.56	1, 3342	< .001
6.	Psychological factor: Low esteem	.519	601.97	1, 3341	< .001
7.	Perceived participation of family members: Betting on arcade or video games	.525	528.26	1, 3340	< .001
8.	Perceived participation of people in general: Buying lottery tickets such as Tattslotto, Powerball, or Keno	.529	467.87	1, 3339	< .001
9.	Participation in online discussion about: Playing poker machines at casinos	.532	421.27	1, 3338	< .001
10.	Perceived participation of family members: Playing poker machines at pubs, hotels, or sporting clubs	.535	383.81	1, 3337	< .001
11.	Self-reported participation: Betting on sports like football, tennis, rugby, or cricket	.538	353.05	1, 3336	< .001
12.	Perceived participation of peers: Betting on cards or board games with family or friends	.540	325.98	1, 3335	< .001
13.	Perceived approval of family members: Playing poker machines at casinos	.541	302.56	1, 3334	< .001
14.	Self-reported approval: Gambling on the Internet	.544	283.96	1, 3333	< .001
15.	Psychological factor: Perceived luck / perseverance	.546	266.67	1, 3332	< .001
16.	Self-reported participation: Betting on games of skill such a pool, bowling, or darts	.547	251.33	1, 3331	< .001
17.	Receiving promotional materials about: Playing poker machines at casinos	.548	237.70	1, 3330	< .001
18.	Demographics: Main language spoken at home	.549	225.51	1, 3329	< .001
19.	Perceived participation of family members: Betting on games of skill such a pool, bowling, or darts	.550	214.36	1, 3328	< .001
20.	Self-reported approval: Buying lottery tickets such as Tattslotto, Powerball, or Keno	.551	204.26	1, 3327	< .001
21.	Self-reported approval: Betting on gaming tables at casinos	.552	195.36	1, 3326	< .001
22.	Self-reported participation: Buying lottery tickets such as Tattslotto, Powerball, or Keno	.553	187.27	1, 3325	< .001

23.	Self-reported participation: Betting on arcade or video games	.554	179.73	1, 3324	< .001
24.	Participation in offline discussion about: Betting on arcade or video games	.555	172.91	1, 3323	< .001
25.	Participation in online discussion about: Betting on cards or board games with family or friends	.556	166.56	1, 3322	< .001
26.	Self-reported approval: Buying instant scratch tickets ('scratchies')	.557	160.64	1, 3321	< .001
27.	Self-reported approval: Betting on games of skill such as pool, bowling, or darts	.558	155.27	1, 3320	< .001
28.	Psychological factor: Depression	.559	150.19	1, 3319	< .001
29.	Self-reported participation: Buying raffle or fundraising tickets	.560	145.42	1, 3318	< .001
30.	Participation in online discussion about: Betting on games of skill such a pool, bowling, or darts	.560	140.86	1, 3317	< .001
31.	Perceived approval of people in general: Betting on cards or boards games with family or friends	.561	136.58	1, 3316	< .001
32.	Perceived approval of people in general: Playing poker machines at pubs, hotels, or sporting clubs	.561	132.60	1, 3315	< .001
33.	Self-reported participation: Playing poker machines at casinos	.562	128.81	1, 3314	< .001

## Chapter 5 – Discussion and conclusions

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### Introduction

The previous chapter of this report summarised our main research findings. In doing so, it addressed the first two of our three research questions:

- What was the prevalence of gambling and problem gambling in Victoria in 2016 and how does this compare to 2010?
- Which factors predict an individual's gambling frequency for each of 12 gambling activities and which factor predict an individual's problem gambling severity index (PGSI) score?
- How can gambling-related harm be reduced?

### The prevalence of gambling and problem gambling in Victoria

Approximately, ninety-five percent of our sample indicated that they had participated in at least one of the surveyed 12 gambling activities in the previous 12 months. This is considerably higher than the 70% prevalence rate reported by Hare (2015). One might think that this discrepancy occurred because we surveyed activities that some individuals might not consider to be gambling (e.g., buying lottery, instant scratch, and raffle/fund-raising tickets). However, this reason does not seem likely as these activities were also surveyed by Hare (2015). In our view, the difference is more likely due to the way our participants were sampled compared to how participants were sampled in Hare (2015). In particular, participants in Hare (2015) were sampled using telephone interviews whereas our participants responded to an online survey. Given the stigma associated with gambling, it might be that the survey participants were more likely to admit in an anonymous online survey that they gambled than in a telephone interview where they would have needed to make the admission to a human operator. Additionally, our participants were incentivised to complete the survey, whereas the participants in Hare (2015) were not and could shorten the interview by claiming not to gamble. This might have tempted people to falsely claim that they do not gamble. A third reason is that the demographics of the participants in Hare (2015) did not match those of the population in general. In particular, females were overrepresented in Hare (2015) because females are more likely to answer phone calls to residential phone lines. Since females are generally less likely to gamble than males, Hare (2015) is likely to have underestimated the prevalence of gambling. Finally, there appeared to be no attempt to control for age in Hare (2015). As this factor strongly influences rates of gambling, this could also lead to Hare (2015) underestimating the true prevalence rate. Conversely, the ORU ensured that our sample matched the general Victorian population for the demographics of age, gender and location, so we were more likely to obtain an accurate estimate of the true prevalence rate. Whatever the reason for the discrepancy in the findings of our study compared to those of Hare (2015), our data show that approximately 95% of the

population had gambled at least once in the preceding 12 months. Additionally, we showed that about half the population had gambled on a single activity more than six times in the preceding 12 months. This shows that gambling is common in Victoria – more common than previously thought.

We also examined how gambling frequency varied as a function of age. We expected gambling frequency to peak in the 20s and 30s and then to generally decrease with age in line with previous reports (Welt et al., 2011). Indeed, a previous study of Victorians found that gambling participation rates generally decreased or remain constant with age for all gambling activities except for Lotto, Powerball or the Pools for which participation rates were found to increase with age (Hare, 2015). While we found that gambling did increase with age for *Lottery tickets* we also found that it increased with age, albeit to a lesser extent, for *Raffle or fund-raising tickets* and *Poker machines at other venues*. For all other gambling activities, it first increased then decreased with age. Our results are thus broadly consistent with those reported by Hare (2015), though differ for *Raffle or fund-raising tickets* and *Poker machines at other venues*. This difference may be due to the fact that Hare (2015) did not have exactly equivalent categories. The closest equivalent categories she used were *Buying tickets in raffles sweeps and other competitions* and *Gaming machines*.

We also investigated how gambling varied as a function of gender. We expected that, in general, males would gamble more frequently than females, but that this difference would be reduced, or possibly eliminated, for chance-based gambling activities such as lottery tickets, raffle tickets and scratch tickets (Hare, 2015). Consistent with our expectations, we found that males did generally gamble more than females, though this difference was not significant for *Instant scratch tickets* or *Poker machines at other venues*, and females gambled more than males for *Raffle or fund-raising tickets*. Taken together with our previous findings, these results underline the need to control for both age and gender when estimating the gambling prevalence rate in the general population.

We investigated how gambling frequency varied from 2010 to 2016. Previously, it had been reported that gambling participation rates had decreased from 2008 to 2014 (VRGF, 2016). Based on this trend we expected gambling rates to continue to decrease or, at least, not to increase. Contrary to this expectation, we found that gambling rates increased for eight of the 12 gambling activities we considered. For the remaining four categories, there was no evidence of a decrease. We note that these results must be interpreted with caution since these two studies used different sampling methodologies. Whereas the current study used an anonymous internet survey, the 2010 data was obtained using a telephone survey, whose participants' demographics may not have matched those of the population in general in terms of age and gender, both of which know to influence gambling frequency. It is, therefore, possible that Boldero and Bell (2012b) may have underestimated the prevalence of gambling in 2010.

Finally, we considered how the rate of problem gambling varied as a function of age. We expected high-risk problem gambling to vary in the same way as gambling frequency, so peak for the age range of 35-44 years old (Hare, 2015) or at least for participants in their 20's and 30's (Welte et al., 2011) and then decrease with age. More consistent with Welte et al. (2011) than with Hare (2015), we found that high-risk problem gambling peaked for the 25-34 year old age range, and then decreased from that point. We also found some evidence that problem gambling may have increased since 2010 but, as discussed above, the sampling technique was not equivalent in the two studies, so the data is not directly comparable. Particularly caution should be taken when extrapolating from laboratory or student-based studies to real world populations as the gambling characteristics of these two groups can be quite different (Gainsbury & Blaszczynski, 2011; Gainsbury, Russell & Blaszczynski, 2014).

Why does problem gambling not increase with age if gambling frequency generally increases with age? We think the answer to this question is that as people get older, they tend to shift to gambling activities that are less likely to result in gambling problems. For example, the gambling activity whose participation rates increases most with age is *Lottery tickets*. As will be discussed later, this activity is not strongly associated with problem gambling, which could explain why partaking more in it does not tend to lead to gambling problems.

### **The factors that predict gambling frequency**

We initially addressed this question by performing a correlation analysis, whose results are shown in Table 2. We found that most of the factors we considered were associated with most forms of gambling. This wasn't surprising as these factors had been selected for inclusion specifically because previous studies have found them to be associated with gambling frequency. As such, our results were consistent with the literature reviewed in Chapter 2.

We then performed a regression analysis to determine which of these factors were needed to predict participation rates for each of the 12 gambling activities, considered individually. We found that gambling participation rates could be well predicted by a linear regression. The corresponding standardised regression coefficients were reported in Table 4. Comparing Table 4 to Table 2, we see that a number of factors that were significantly correlated with gambling rates were not found by this regression analysis to be significant predictors of gambling rates. For example, *Participation in gambling: People in General* was significantly correlated with gambling participation rates for all 12 gambling activities, but was a significant predictor only for internet gambling. Thus, when attempting to predict gambling participation rates, one does not need to take into account this factor, at least when using a linear model. Similar reasoning applies to the psychological factors of *Depression*, *Low esteem*, *Positive Urgency* and

*Luck/Perseverance*. Each was significantly correlated with gambling frequency for all or almost all of the 12 gambling activities that we investigated. However, they turned out to be significant predictors for only a few of these activities.

Consistent with Larrimer & Neighbors (2003), we found that individuals overestimated how much others gambled and overestimated how much they approved of gambling. Based on previous research, we expected that the frequency with which others are perceived to gamble would predict an individual's gambling frequency (Boldero & Bell, 2010b; Boldero, Bell & Moore, 2010). We also expected this effect to be strongest for others that are most similar to the individual in question. Thus, we expected an individual's gambling frequency to be most strongly predicted by the gambling frequency of family members, followed by the perceived gambling frequency of peers and least predicted by the perceived gambling frequency of others. Our findings were in line with these expectations except that the perceived frequency of people in general (i.e. non-family members and non-peers) significantly predicted an individual's gambling frequency only in the case of *Internet gambling*. This finding is new as previous work on the influence of descriptive norms on gambling did not distinguish between different social groups (e.g. family, peers and people in general).

We also expected the perceived approval of family members to predict an individual's gambling frequency (Boldero & Bell, 2010b; Boldero, Bell & Moore, 2010). To our surprise, this was often not the case. While an individual's self-reported approval of gambling strongly predicted their own gambling frequency for all 12 gambling activities, the approval of family members predicted self-reported gambling frequency only in the case of *Poker machines at other venues* and *Internet gambling*. The approval of peers was more important, significantly predicting self-reported gambling frequency for seven gambling activities, and the approval of people in general was more important still, significantly predicting self-reported gambling frequency for eight gambling activities.

Before conducting this survey, we expected exposure to advertisements to strongly influence self-reported gambling frequency, especially in the case of sports betting, where advertisements are particularly prevalent (Deans et al., 2017; Lindsay et al., 2013). To our surprise, the frequency of gambling advertisements predicted self-reported gambling frequency only in the case of five gambling activities: *Raffle or fund-raising tickets*, *Betting on animal races*, *Poker machines at other venues*, *Arcade or video games* and *Internet gambling*. We suspect that this occurred because participants generally saw a very large number of advertisements, so these advertisements may have lacked novelty and, consequently, fail to attract attention. For example, in the case of sports betting, the majority (53%) of participants reported seeing more than six sports advertisements in the previous year. Receiving promotional material was a better predictor of self-reported gambling frequency, being a significant predictor for nine gambling

activities. Presumably, this was because it was a much rarer occurrence, so may have had a greater novelty value. For example, only a minority (10%) of participants reported receiving promotional material related to sports betting more than 6 times in the previous year.

Given that gambling providers make extensive use of social media (Gainsbury et al., 2015), we had expected the frequencies of both online and offline discussions to predict self-reported gambling frequency. While the frequency of offline conversations was a significant predictor for self-reported gambling frequency for all 12 gambling activities, the frequency of online conversations was a significant predictor for only five gambling activities: *Instant scratch cards*, *Sports betting*, *Gaming tables at casinos*, *Poker machines at other venues* and *Arcade and video gaming*.

We also expected both age and gender to strongly predict self-reported gambling frequency (Hare, 2015). Age was a significant predictor for seven gambling activities and gender was a significant predictor for eight gambling activities.

Finally, we looked at six psychological factors. We found that depression, low esteem, positive urgency and luck/perseverance, in general were not reliable predictors of gambling frequency, being significant predictors for two, three, four and four gambling activities respectively. Overestimating chances of winning was a more reliable predictor, being significant for nine gambling activities. The strongest and most reliable predictor was the PGSI score, which was a significant predictor for eleven gambling activities.

### **The factors that predict PGSI score**

As before, we started by performing a correlation analysis. We found that almost every factor was correlated with PGSI score. The main surprises were that *Language spoken at home* and *Relationship status* were not significantly correlated with PGSI score. Abbott et al. (2016) reported that there was some evidence that *Language spoken at home* could predict gambling problems, but this evidence did not quite reach statistical significance. Our results would indicate that this is not, in fact, an important predictor. We were surprised to find that *Relationship status* does not predict PGSI score given the fact that problem gambling is known to damage relationships (Ferris & Wynne, 2001). We have no good explanation for this.

As before, we then performed a linear regression to determine which of these factors are significant predictors. Whereas previously we had considered each gambling activity in turn, we now needed to consider them all simultaneously, since problem gambling could arise from participation in more than one

activity. To avoid being overwhelmed by the large number of predictors, we performed a stepwise linear regression, which simultaneously considered all possible variables. At each step, we added the variable that would maximally increase the amount of variance our linear regression could explain. This process was terminated when adding an additional variable would not increase the explained variance by a statistically significant amount. While we found that 33 variables were significant predictors and, in total, could explain 56% of the variance in PGSI score, we also found that the majority (91%) of the explainable variance could be explained by just the first five predictors: *Positive urgency, Playing poker machines at pubs, hotels, or sports clubs, Betting on gaming tables at casinos, Gambling on the internet, and Overestimating chances of winning.*

## **Implications for policy and interventions**

Our work has a number of practical implications. We will consider these in turn.

### **Problem gambling is more prevalent than previously reported**

Perhaps the most striking finding from our study is that for the 25-34 year age group, the prevalence of problem gambling is 23%. This is far higher than has previously been reported. For example, a study conducted for The Victorian Responsible Gambling Foundation estimated that only .8% of individuals in Victoria are problem gamblers (VRGF, 2016) and an older study reported that the prevalence of problem gambling in Victoria was 0.97% (McMillen & Wenzel, 2006). Part of the reason for this discrepancy is that we were able to measure problem gambling as a function of age, so could focus on the age group that exhibits the most problem gambling (25-34 year olds). Had we presented data averaged over the entire population, the prevalence of problem gambling would have dropped to 11%. While that prevalence is still higher than that reported by the VRGF (2016) and McMillen & Wenzel (2006), it is much more in keeping with the 8% prevalence rate that we found previously, also using a Victorian sample (Boldero & Bell, 2012). Similarly, Scholes-Balog et al. (2016) reported a prevalence rate of 4.7% for one survey (age range 17 to 24 years old) and a problem gambling prevalence rate of 5.7% for a second survey (age range 19 to 26 years old), with both surveys also focusing solely on Victorians. Abbott et al. (2016) report a somewhat lower prevalence estimate of 2.2% for problem gambling in Victoria. Thomas et al. (2010) reported a much higher prevalence rate of problem gambling, reporting that 20.9% of their sample were problem gamblers. While their sample was also Victorian-based, they made a concerted effort to sample minorities, and this may have increased the fraction of problem gamblers. While our prevalence rate is higher than that reported by most of the previous studies, though lower than that reported by Thomas et al. (2010), some of the remaining difference may be due to our survey method. Our survey was conducted as an online questionnaire, whereas almost all the previous studies were conducted via telephone

interviews. The sole exception to this was Thomas et al. (2010) where participants also completed an anonymous questionnaire. Given the stigma associated with problem gambling and the personal nature of telephone interviews, individuals may have been more reluctant to acknowledge their gambling problems in a telephone interview as opposed to in an anonymous questionnaire. This could explain why both we and Thomas et al. (2010) found a higher rate of problem gambling than previous studies. Additionally, the demographics of our survey were chosen to be representative of the general Victorian population, whereas those in the previous surveys were not, though Abbott et al. (2016) attempted to compensate for this by reweighting their sample. A final factor may be the timing of our survey. If the rate of problem gambling is increasing (VGRF, 2016), then one would expect our study to find a higher rate of problem gambling than previous studies. Regardless of the exact reason for the difference between our findings and previous findings, it is clear that high-risk problem gambling is far more prevalent in Victoria than generally acknowledged.

### **Problem gambling is mainly predicted by just five factors**

As discussed above, 91% of the explainable variance in the PGSI score was accounted for by just five variables: *Positive urgency*, *Playing poker machines at pubs, hotels, or sports clubs*, *Online discussions of gaming tables at casinos*, *Gambling on the internet*, and *Overestimating chances of winning*. This suggests that interventions designed to reduce problem gambling would do well to concentrate on these factors. We predict that problem gambling would likely be reduced if interventions were introduced to reduce gambling at poker machines at pubs, hotels or sports clubs, gambling at gaming tables at casinos and gambling on the internet. Furthermore, interventions that reduce the degree to which people overestimate the chances of winning would also help. For example, educating people to avoid common gamblers fallacies might reduce problem gambling. Finally, when treating problem gamblers, counsellors should concentrate on reducing and better controlling positive urgency.

### **Gambling frequency**

Although interventions tend to be designed to address problem gambling, most gambling-related harm originates from low and moderate risk gambling (Browne et al., 2016). For this reason, it would be highly beneficial to reduce overall gambling frequency. Our data suggest that the degree to which individuals gamble is influenced by their perceptions of the degree to which family members and peers gamble and the degree to which peers and people in general approve of gambling. Furthermore, our data shows that individuals systematically overestimate the degree to which their peers gamble and the degree to which people in general approve of gambling. Correcting these misperceptions should help reduce gambling frequency. Additionally, a major predictor of self-reported gambling frequency is self-reported approval of gambling. This suggests that interventions that reduce the degree to which an individual approves of gambling are likely to be effective at reducing gambling frequency.

## Limitations

Our study is not without limitations. Our participants were recruited from those enrolled in the ORU's survey panel. Although we requested that the ORU provide us with a representative sample of Victorians and the demographic characteristics of age, gender, and place of residence (i.e., metropolitan vs. non-metropolitan) matched those of Victorian residents, we have no information about the number of participants contacted who did not agree to participate. In addition, because we wanted to increase the chance that contacted individuals would agree to participate, we used a relatively short survey and did not include some factors that could have been associated with gambling frequencies and gambling problems. Further, our frequency data included only two time periods (i.e., more than six times and less than six times in the past year) in addition to never. It is possible that using more categories for the frequencies of behaviour, for seeing advertisements and for receiving promotional materials could have allowed a more nuanced description of the extent to which other people are perceived to gamble and the impact of advertisements and promotional materials on gambling behaviour and gambling problems. Finally, our sample was restricted to those individuals who have access to the internet. As such, we did not survey those who did not have this access. It is possible that the gambling behaviours of individuals with internet access differ from those who lack this access.

In some parts of our analysis, we performed correlations. While correlations can show which factors are statistically associated, they can never prove that one factor is causing the variation in another factor (Aldrich, 1995). Consequently, while a correlation analysis can be suggestive of the causal relationships, it cannot prove these relationships. We additionally performed linear regressions. For the same reasons that correlations cannot prove causality, finding that one variable predicts another in a linear regression is suggestive but is not proof that the first variable is a cause of the fluctuations in the second variable. Similarly, finding that one variable does not predict another variable is suggestive, but not proof, of a lack of a causal relationship. The apparent lack of predictive power could be the result of a type 2 error or be caused by a non-monotonic relationship between the two variables. Additionally, it should be acknowledged that the values of the standardised betas in the regression will vary depending on which variables are included in the set of predictors in the regression. So, while we can claim that the linear regressions have constructed plausible models to explain the fluctuations in the dependent variables, it is possible that other linear models could also be constructed that could explain a similar amount of variance. Our regression analysis is, therefore, best described as suggestive, but not proof, as to what the underlying causal relationships are, so these results must be interpreted with caution.

## Conclusions and recommendations for future research

About 95% of Victorians have gambled at least once in the preceding 12 months, with about 50% gambling more than six times in a single gambling activity, during this time period. We found that gambling frequency generally increased with age, was generally greater for males than for females and was generally greater in 2016 than in 2010. Conversely, we found that problem gambling was most prevalent for people aged 25-34 years old and decreased thereafter. There is some evidence that problem gambling was more frequent in 2016 than in 2010, but this is not conclusive. Perhaps our most surprising finding was the rate of high-risk problem gambling. Averaged over our entire sample, it was 11%. While this is only slightly greater than what we found in 2010, where we found that approximately 8% of individuals were high-risk problem gamblers, this is much greater than that reported by Hare (2015), who reported only 0.8% of individuals were high-risk problem gamblers. While we discussed various potential reasons for the discrepancy between the rate of high-risk problem gambling reported by us and by Hare (2015), these reasons were necessarily speculative in nature. Since it is important to know the true prevalence rate of high-risk problem gambling in Victoria, future work is needed to account for the reported discrepancies.

Turning our attention now to the factors that predict self-reported gambling frequency, we found that for the most part these factors were as expected based on the review of the literature reported in Chapter 2. In general, we found that gambling frequency was well predicted by the perceived gambling frequency of family members and peers, the self-reported approval of gambling, the approval of peers and people in general, the frequency of receiving promotional material, the frequency of discussing gambling offline, age, gender, overestimating chances of winning and PGSI score. However, there were a number of factors that we expected to reliably predict self-reported gambling frequency but either did not do so at all or did so only for a minority of gambling activities. These predictors included: the perceived participation in gambling of people in general, the approval of gambling by family members, the frequency of seeing gambling advertisements, the frequency of discussing gambling online, country of birth, language spoken at a home, relationship status, location, and the psychological factors of depression, low esteem, positive urgency, luck/perseverance. This was surprising since previous studies had found these factors to be associated with self-reported gambling frequency. We expect that this discrepancy occurred because most previous studies performed what amounted to a correlation analysis. Conversely, we utilized a linear regression which allowed us to determine the proportion of the explainable variance each factor could *uniquely* explain, given our other predictors. This naturally resulted in lower estimates for the strengths of the various relationships. For example, analysing our data we find that depression is significantly correlated with the self-reported frequency of sports betting (N=3661, Spearman's rho = .15,  $p < .01$ , Table 2). However, almost none of this is uniquely attributable to depression, which is why when we perform a linear regression we find that the comparable standardised beta is -.04 (Table 4), which is not

statistically significant. It was for this reason that we chose to report both standardised betas and regression coefficients, since the latter can be misleading when viewed on their own.

To investigate which factors predict problem gambling, we performed a stepwise linear regression. This revealed 33 variables as being significant predictors. However, the majority (91%) of the explainable variance could be explained by just the first five predictors which were: *Positive urgency*, *Playing poker machines at pubs, hotels, or sports clubs*, *Betting on gaming tables at casinos*, *Gambling on the internet*, and *Overestimating chances of winning*. Based on this, we were able to suggest potential interventions to reduce problem gambling.

In conclusion, our study has achieved the following outcomes:

- A comprehensive review of the international and Australian literature on the predictors of gambling frequency and gambling problems.
- An analysis of the prevalence of gambling in Victoria as a function of both age and gender.
- A comparison of the prevalence of gambling in 2016 versus in 2010.
- An analysis of the prevalence of problem gambling as a function of both age and severity.
- An analysis of the predictors of both gambling frequency and problem gambling.
- An analysis of how often others are perceived to gamble and the degree to which others are perceived to approve of gambling.
- A discussion of the implications of this research for policy and interventions.

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## Appendix A

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In recruiting participants, the ORU attempted to match our sample to the Victorian population in general for age, sex and location, according to the demographic data obtained from the 2011 Australian Bureau of Statistics (ABS) survey. The data from the 2016 ABS survey was not used as it had not been released when we started to run our study. It was not possible to perfectly match on any single dimension, given the time constraints, the finite size of the subject panel and the fact that the ORU was trying to match simultaneously on three different dimensions (gender, age and location).

### Gender

	<b>ABS 2011</b>	<b>Our survey</b>
<b>Male</b>	49.4%	48.1%
<b>Female</b>	50.6%	51.8%

### Location

	<b>ABS 2011</b>	<b>Our survey</b>
<b>Melbourne</b>	75.4%	70.7%
<b>Regional</b>	24.6%	29.3%

### Age

	<b>ABS 2011</b>	<b>Our survey</b>
<b>18-24</b>	12.43%	11.54%
<b>25-29</b>	8.46%	8.63%
<b>30-34</b>	9.28%	9.02%
<b>35-39</b>	9.71%	8.39%
<b>40-44</b>	9.75%	8.42%
<b>45-49</b>	9.59%	8.75%
<b>50-54</b>	8.72%	8.12%
<b>55-59</b>	8.18%	8.75%
<b>60-64</b>	6.35%	10.38%
<b>65+</b>	17.53%	18.00%

## Appendix B

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The questionnaire used in both the pilot study and in the large-scale survey of Victorian adults.

### **Gambling Survey**

There are location requirements that must be met in order to participate in our study. Please type your postcode on the box below, then click "next".

If you do not meet the criteria the survey will terminate and you will be redirected to the screen out page.

PostCode: [Free response]

### Section 1- **Demographics**

In this section we would like to find out about you and your household. We are interested in collecting this information so we can make comparisons between different groups of individuals, different households, and different geographical areas.

What is the street name, suburb, and postcode of your property? (Please DO NOT include your street number or lot number)

Street: [Free response]

Suburb: [Free response]

Postcode: [Free response]

What gender do you identify with? [Choice of "Male", "Female", "Other (please specify)"]

Please specify your age in years: [Free response]

Where were you born? [Choice of "Australia", "Other (please specify)"]

What is the main language you speak at home? [Choice of "English", "Other (please specify)"]

What is your marital status? [Choice of "Married", "Living with a partner (e.g. a de facto, or boyfriend/girlfriend)", "Single, that is, never married", "Separated (still legally married)", "Divorced", "Widowed"]

## Section 2 - **Gambling Behaviour (PGSI)**

We would now like to ask you some questions **about YOUR gambling behaviour. Thinking about the last 12 months**, please answer the following questions.

[For the following questions the choices were “Never”, “Sometimes”, “Most of the time”, “Almost always”, “Don’t know”]

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?

This is a catch question to check that you are reading the survey. Please click “Most of the time” to show that you have read this question.

Have people criticized your 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?

Have you lied to family members or others to hide your gambling?

Have you bet or spent more money that you wanted to on gambling?

Have you wanted to stop betting money or gambling, but did not think you could?

### Section 3 - **Approval of Gambling**

Please indicate **the extent YOU approve** of the following gambling activities.

[For the following questions the choices were “Strongly disapprove”, “Moderately disapprove”, “Neither approve nor disapprove”, “Moderately approve”, “Strongly approve”]

Buying lottery tickets such as Tattslotto, Powerball, or Keno?

Buying instant scratch tickets (a 'scratchie')?

Buying raffle or fundraising tickets?

Betting on horse races, trots or dog races?

Betting on sports like football, tennis, rugby or cricket?

Betting on gaming tables at casinos?

Playing poker machines at casinos?

Playing poker machines at pubs, hotels or sporting clubs?

Betting on cards or boards games with family or friends?

Betting on games of skill such as pool, bowling or darts?

Betting on arcade or video games?

Gambling on the Internet?

### Section 3 - **Approval of Gambling**

Please indicate **the extent you think that YOUR FAMILY approves** of the following gambling activities.  
Same list of questions and same scale as above.

### Section 3 - **Approval of Gambling**

Please indicate **the extent you think that YOUR PEERS approve** of the following gambling activities.

Same list of questions and same scale as above.

### Section 3 - **Approval of Gambling**

Please indicate **the extent you think that PEOPLE IN GENERAL approve** of the following gambling activities.

Same list of questions and same scale as above.

### Section 4 - **Participation in Gambling**

Please indicate **the extent to which YOU have done** the following **within the last 12 months**.

[For the following questions the choices were “More than 6 times”, “Less than 6 times”, “Never”]

Bought a lottery ticket such as Tattslotto, Powerball, or Keno?

Bought an instant scratch ticket (a 'scratchie')?

Bought raffle or fundraising tickets?

Bet on horse races, trots or dog races?

Bet on sports like football, tennis, rugby or cricket?

Bet on gaming tables at a casino?

Played poker machines at a casino?

Played poker machines at a pub, hotel or sporting club?

Bet on cards or board games with family or friends?

Bet on games of skill such a pool, bowling or darts?

Bet on arcade or video games?

Gambled on the Internet?

#### Section 4 - **Participation in Gambling**

Please indicate **the extent you think YOUR FAMILY has done** the following **within the last 12 months**.  
Same list of questions and same scale as above.

#### Section 4 - **Participation in Gambling**

Please indicate **the extent you think YOUR PEERS have done** the following **within the last 12 months**.  
Same list of questions and same scale as above.

#### Section 4 - **Participation in Gambling**

Please indicate **the extent you think PEOPLE IN GENERAL have done** the following **within the last 12 months**.  
Same list of questions and same scale as above.

#### Section 5 - **Views About Gambling**

Whether they gamble or not, people have views about gambling. Please rate **the extent to which YOU agree with** the following statements.

[For the following questions the choices were “Strongly disapprove”, “Moderately disapprove”, “Neither approve nor disapprove”, “Moderately approve”, “Strongly approve”]

Sometimes I just know I'm going to have good luck.

If I had lost my bets recently, my luck would be bound to change.

Sometimes I think I have the power to "will" my numbers to come up in gambling games.

If I concentrate hard enough I would be able to influence whether I win if I play poker machines.

This is a catch question to check that you are diligently reading the survey. Please tick “Neither agree nor disagree” to show you have read this question.

#### Section 5 - **Views About Gambling**

Regardless of whether you personally gamble, please **rate the extent to which YOU agree or disagree with** the following statements **as if you were a gambler**.

[For the following questions the choices were “Strongly disapprove”, “Moderately disapprove”, “Neither approve nor disapprove”, “Moderately approve”, “Strongly approve”]

Where I get money to gamble doesn't matter because I will win and pay it back.

If I continue to gamble, it will eventually pay off and I will make money.

I should keep the same bet even when it has not come up lately because it is bound to win.

There are certain things that I can do when I am betting - for example, tapping a certain number of times, holding a lucky coin in my hand, crossing my fingers, etc. - which increase the chances that I win.

### Section 6 - **Perceptions of One's Self**

People see their lives in different ways. Please rate **the extent to which YOU agree that** each of the following statements **describe you**.

[For the following questions the choices were “Rarely or none of the time”, “A little”, “Sometimes”, “Often”, “Always or most of the time”]

I feel lonely.

When I am in a great mood I tend to get into situations that could cause me problems.

I am miserable to be around.

When I am very happy, I can't seem to stop myself from doing things that can have bad consequences.

I feel depressed.

When overjoyed, I feel as like I can't stop myself from going overboard.

I am often incompetent.

I tend to lose control when I am in a great mood.

I feel completely worthless.

I rarely live up to my own values or standards.

I feel sad.

I feel that I could not shake off the blues even with the help of family and friends.

Section 7 - **Advertisements and Social Media** Please indicate **how often in the last year YOU have seen advertisements** for the following types of gambling.

[For the following questions the choices were “More than 6 times”, “Less than 6 times”, “Never”]

Lottery tickets such as Tattslotto, Powerball, or Keno?

Instant scratch tickets ('scratchies')?

Raffle or fund-raising tickets?

Betting on horse races, trots or dog races?

Betting on sports like football, tennis, rugby or cricket?

Betting on gaming tables at casinos?

Poker machines at casinos?

Poker machines at pubs, hotels or sporting clubs?

Betting on cards or board games with family or friends?

Betting on games of skill such a pool, bowling or darts?

Betting on arcade or video games?

Gambling on the Internet?

Section 7 - **Advertisements and Social Media**

Please indicate **how often in the last year YOU have received promotions** (e.g. a flyer in the mail) for the following types of gambling.

Same list of questions and same scale as above

#### Section 7 - **Advertisements and Social Media**

Please indicate **how often in the last year YOU have discussed online** (e.g. via email, Facebook, Twitter, Instagram etc.) the following types of gambling.

Same list of questions and same scale as above.

#### Section 7 - **Advertisements and Social Media**

Please indicate **how often in the last year YOU have discussed offline** (e.g., in person, on the telephone etc.) the following types of gambling.

Same list of questions and same scale as above.

In responding to this survey, did you experience any difficulties or find any of the questions confusing? If so, please explain below. [Free response]

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