

THE VICTORIAN GAMBLING STUDY

**A LONGITUDINAL STUDY OF GAMBLING AND HEALTH
IN VICTORIA 2008–2012**

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FOREWORD

It is my great pleasure to release the fifth in a series of research reports from the Victorian Gambling Study 2008–2012.

This is Australia's first large prospective study of gambling, and one of only a few large general population longitudinal studies in the world that investigates gambling and health. Where previous Australian and international gambling research has been cross-sectional or retrospective in nature, this study takes gambling research in Australia to the next level. By following the same people for four years, the Victorian Gambling Study 2008–2012 provides valuable insights into gambling behaviour over time.

The Victorian Gambling Study 2008–2012 contributes a public health perspective to gambling research. By focusing on determinants, this study deepens our understanding of the context in which gambling problems occur. The Victorian Gambling Study 2008–2012 makes an important contribution to the identification of risk and protective factors for the onset of gambling problems, and transitions between levels of problems and recovery. At the same time, the study provides further insights to improve our understanding of the interplay between gambling and other health conditions.

The Victorian Gambling Study 2008–2012 is important research for Victoria, Australia and internationally. This study begins to answer many of the yet unaddressed questions around gambling and its impacts. I believe the findings from this study will be useful to a broad array of those working in the field of gambling, from policy makers to practitioners, to enable them to better reduce the harm resulting from gambling in our community.



Professor Bruce Singh
Chair, Victorian Responsible Gambling
Foundation Board

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The project was initially managed by the Victorian Department of Justice until June 2012, at which point it was transferred to the Victorian Responsible Gambling Foundation (the foundation). The project board would like to thank the executive team at the Department of Justice, including Micheil Brodie and Cate Carr, for their belief in the longitudinal project, as well as the chief executive officer of the foundation, Serge Sardo, for his continuing support.

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SUMMARY

The Victorian Gambling Study: A longitudinal study of gambling and health in Victoria 2008–2012 is a large longitudinal study of gambling and health in Victoria, Australia. With a starting sample size of 15,000 Victorian adults (aged 18 years and over) in the first wave, it represents the largest study of its kind in Australia.

This report outlines the final findings and analyses of the Victorian Gambling Study. Four previous reports have been published:

- *A study of gambling in Victoria: Problem gambling from a public health perspective* (2009)
- *The Victorian Gambling Study: A longitudinal study of gambling and public health – Wave 2 findings* (2011)
- *The Victorian Gambling Study: A longitudinal study of gambling and public health – Wave 3 findings* (2012)
- *The Victorian Gambling Study qualitative component* (2012).

The Victorian Government, initially through the Department of Justice and then the Victorian Responsible Gambling Foundation, funded this research.

STUDY COMPONENTS

The study comprised three discrete components with different study designs:

- Wave 1, the prevalence study, was cross-sectional in design. It used computer-assisted telephone interviewing (CATI) via random digit dialling of 15,000 adults, representing a cross-section of the Victorian population. Areas that have high gambling spending using electronic gaming machines (EGMs) were oversampled.
- Waves 2–4, the longitudinal study or prospective cohort study, followed participants from the prevalence study who consented to further research. The study consisted of annual CATI surveys, which asked questions about gambling, health and wellbeing.
- The qualitative study, which consisted of face-to-face interviews with participants who consented to interviews, was conducted between Wave 3 and Wave 4.

STUDY OBJECTIVES

The study's main objectives were to:

- estimate prevalence and incidence of problem gambling
- investigate the pathways in and out of gambling risk states

- understand the risks and vulnerabilities related to gambling behaviour, health and problem gambling risk states
- understand the relationship between gambling risk and health.

MAIN FINDINGS

This section summarises the main findings from all waves of the study, including from previous reports and additional analyses not previously published. Previous reports can be found on the foundation's website.¹

GAMBLING PREVALENCE, PARTICIPATION AND INCIDENCE

Most of the Victorian adult population gambles at least occasionally. In 2008, 73% of adult Victorians participated in gambling activities, whereas 27% did not. Gambling frequency was weekly or more for 23% of the population, several times per month for 18% and less than monthly for 32%.

The study calculated the participant's gambling risk state (non-gambler, non-problem gambler, low-risk gambler, moderate-risk gambler and problem gambler) using the Problem Gambling Severity Index (PGSI). In Victoria in 2008, the estimated problem gambling prevalence was 0.7% (95% confidence interval [CI] 0.6–0.9). An additional 2.4% were moderate-risk gamblers and 5.7% were low-risk gamblers. Non-gamblers and non-problem gamblers were grouped together as 'zero-risk gamblers' for some analyses.

Problem gamblers are more likely to:

- be young men (25–34 years old)
- be employed as a sales worker, machinery operator/driver or labourer
- have an annual income of \$31,200–51,999 or annual household income of \$62,400–103,999.

Problem gamblers are less likely to:

- be female
- be employed as professionals, technicians and trade workers, or clerical or administrative staff
- have an annual income of less than \$31,200 or annual household income of less than \$33,799.

¹ www.responsiblegambling.vic.gov.au/data/assets/pdf_file/0011/4025/Victorian-Gambling-Study-Qualitative-Component-Report.pdf

Additional analyses from the prevalence survey found that males were more strongly associated with the following four key activities (chosen because they can more easily lead to harm through regular, prolonged participation) than females:

- EGMs (23% versus 20%)
- table games (7.4% versus 1.9%)
- race betting (21% versus 12%)
- sports betting (6.5% versus 1.5%).

Young age groups were also more often associated with these activities.

The study also found that problem gamblers and low- and moderate-risk gamblers have higher gambling participation rates in the four key activities:

- 91% of problem gamblers gamble on EGMs, 34% bet on races, 25% gamble on table games and 16% bet on sports
- 21% of the general population gamble on EGMs, 16% bet on races, 5% gamble on table games and 4% bet on sports
- 96% of problem gamblers compared with 33% of adult Victorians participated in at least one of the four key activities associated with high-risk gambling
- 4% of problem gamblers compared with 67% of the population did not participate in these four key activities.

There was a strong correlation between past-year gambling risk behaviour (PGSI) and the lifetime risk (as measured using NODS CLiP2). More than 88% of problem gamblers also reported a history of lifetime problem or pathological gambling behaviour. Similarly, 44% of the lifetime pathological gamblers and 24% of lifetime problem gamblers reported being past-year problem gamblers.

The estimated incidence of problem gambling (i.e. new cases) in 2009 was 0.36% (95% CI 0.21–0.57). Approximately two-thirds (0.24%) of the incidence rate comprised problem gamblers with a previous history of lifetime problem gambling or pathological gambling.

GAMBLING, HEALTH AND SOCIAL CONTEXT

Problem gamblers reported poor health more often than zero-risk gamblers (i.e. non gamblers and non-problem gamblers) in Wave 1, and this was still evident in Wave 4:

- self-reported poor health: 23% problem gamblers compared with 4.2% zero-risk gamblers

- severe psychological distress: 41% problem gamblers compared with 1.6% zero-risk gamblers
- past-year smoking: 49% problem gamblers compared with 18% zero-risk gamblers
- clinical alcohol abuse: 49% problem gamblers compared with 14% zero-risk gamblers.

Problem gamblers were also more likely to report poor social capital. On all measures of social capital, problem gamblers were about half as likely to answer 'yes' than zero-risk gamblers in Wave 4 on questions such as:

- 'Do you feel valued by society?' ('yes': 69% zero-risk gamblers, 31% problem gamblers)
- 'Are you involved in any community activities?' ('yes': 65% zero-risk gamblers, 36% problem gamblers)
- 'Do you volunteer to help out the community?' ('yes': 58% zero-risk gamblers, 28% problem gamblers).
- 'Would you be able to raise \$2000 within two days in an emergency?' ('yes': 87% zero-risk gamblers, 49% problem gamblers).

Moderate-risk and problem gamblers were more likely to cite life events—such as death, divorce, retirement, injury and illness—as triggers for gambling than zero-risk gamblers: in Wave 1, 12% and 43% compared with less than 1%, respectively; in Wave 4, 14% and 54% compared with less than 1%, respectively.

In Wave 4, the sample reported various reasons for gambling. The most common reasons were for social reasons (54%), to win money (48%) and for general entertainment (33%). However, problem gamblers' main reasons were boredom (62%), to win money (62%), entertainment (33%), social (28%), stress relief (26%), loneliness (23%) and to take their mind off things (21%).

Problem gamblers more often reported having experienced a lot of major trauma and hardship in their lives, compared with zero-risk gamblers: in Wave 1, 54% compared with 22%, respectively; in Wave 4, 72% compared with 26%, respectively.

In Wave 3, the proportion of people gambling in major events increased with increasing PGSI risk category:

- Melbourne Spring Racing Carnival: 36% of zero-risk gamblers (non-gamblers and non-problem gamblers) compared with 70% of problem gamblers
- large lottery jackpots: 2.8% of zero-risk gamblers compared with 10% of problem gamblers

- large sporting events, such as the Australian Football League (AFL) Grand Final or the FIFA World Cup: 30% of zero-risk gamblers compared with 52% of problem gamblers.

Similarly, the proportion who reported ‘always or often playing machines with linked jackpots’ or ‘recall of a first big win in gambling’ increased with increasing PGSI risk category, from 2.6% of zero-risk gamblers to 39.6% of problem gamblers, and from 13% of zero-risk gamblers to 66% of problem gamblers, respectively.

GAMBLING PATHWAYS AND PREDICTORS

TRANSITIONS

For the five possible PGSI gambling risk states (non-gamblers, non-problem gamblers, low-risk gamblers, moderate-risk gamblers and problem gamblers) over four waves, there are 625 possible pathways.

The study followed different gambling risk segments and traced any changes from their Wave 1 status to Wave 4 status:

- 93% of zero-risk gamblers remained zero-risk gamblers
- 27% of low-risk gamblers remained low-risk gamblers
- 35% of moderate-risk gamblers remained moderate-risk gamblers
- 55% of problem gamblers remained problem gamblers.

As gambling risk increased, so too did the likelihood of becoming a problem gambler by Wave 4—3% of low-risk gamblers became problem gamblers, whereas 14% of moderate-risk gamblers did so.

The study also traced different gambling risk segments from their Wave 4 status back to their starting status in Wave 1:

- 96% of zero-risk gamblers started as zero-risk gamblers
- 19% of low-risk gamblers started as low-risk gamblers
- 24% of moderate-risk gamblers started as moderate-risk gamblers
- 59% of problem gamblers started as problem gamblers.

The relative frequency of PGSI risk segments was analysed using person-years. During the four study years, participants who completed surveys for all four waves of the study contributed a total of 11,225 person-years as non-problem gamblers (or 76.1% of the total person-time in the study). The time spent as low-risk, moderate-risk and problem gamblers was 896 person-years (6.1%), 345 person-years (2.3%) and 130 person-years (0.9%),

respectively. Non-gamblers contributed 2148 person-years (or 14.6% of the total person-time) as non-gamblers.

Participants who had ever been categorised as a non-problem gambler spent 83% of their time as non-problem gamblers, making this the most stable PGSI risk state. People who had ever been classified as a problem gambler spent 59% of their time in that PGSI risk state, making it the second most stable risk state.

The study used Markov transition probabilities to calculate the probability of transitioning risk groups. Moderate-risk gamblers have the greatest probability (9%) of transitioning to problem gambling than all other risk states. Most problem gamblers (71%) are likely to remain problem gamblers, regardless of gender. Finally, approximately 22% of problem gamblers (in person-years time) are likely to decrease to moderate-risk states, and the probability that problem gamblers are likely to cease gambling is close to zero.

PREDICTORS

The lifetime gambling risk (NODS CLiP2) is the strongest predictor of both problem gambling and high-risk gambling (i.e. the PGSI moderate and problem gambling risk states combined). It is also the strongest predictor of persistent high-risk gambling (i.e. remaining in the combined PGSI moderate and problem gambling risk state).

Progression from non-problem gambling to at-risk gambling (i.e. low-risk, moderate-risk or problem gambling) is associated with being male, speaking a language other than English, having a year 10 education or less, showing signs of alcohol dependence, having a lifetime problem or pathological gambling risk, and having anxiety and/or obesity.

Lagged effects (an increase in risk in Wave 3 that was predicted by factors in Wave 1) were also considered. Two variables were associated with progression from non-high risk to high risk (combined moderate risk and problem gambling)—being in a one-parent or ‘other’ family, and being in an at-risk or a pathological NODS CLiP2 category.

Progression from non-problem gambling to at-risk gambling (i.e. combined low-risk, moderate-risk and problem gambling) is associated with being in a higher lifetime gambling risk category. Progression from low-risk gambling to high-risk gambling (i.e. combined moderate-risk and problem gambling) decreases as age increases.

HEALTH CONDITIONS

The presence of any health condition in Wave 1 was associated with progression to high-risk gambling (i.e. combined moderate-risk and problem gambling) in the following year. Being a current smoker and having an at-risk lifetime gambling risk was also associated with progressing to a high-risk gambling category. Anxiety was the only health condition to independently predict this progression.

The presence of problem gambling in Wave 1 was associated with development in the following year of new onset health conditions, as was being male, ageing and having a disability.

GAMBLING FREQUENCY

Participants with a moderate-risk or problem gambling status are significantly more likely to participate in EGMs, table games, informal betting and race betting. This was true after taking occupation, lifetime gambling risk, and having psychological distress or depression into account.

Increasing frequency of gambling on EGMs over time is associated with a monotonic (or dose–response) increase in PGSI score. This increase is larger for those who reported a lifetime risk of problem or pathological gambling. In contrast, increasing frequency of race betting over time is associated with a threshold or stepped increase in PGSI score. However, the increase is still larger for those who reported a lifetime risk of problem or pathological gambling.

CONCLUSIONS

The Victorian Gambling Study: A longitudinal study of gambling and health in Victoria 2008–2012 is the first study to follow a population of Victorian adults for four years investigating their gambling, health, recreation, lifestyle and wellbeing factors.

It adds to the global body of knowledge regarding gambling behaviour, frequency, participation, aetiology and determinants of problem gambling.

The findings from this study are many and varied. Although these findings are extremely useful and interesting, they are yet to be explored or replicated in other longitudinal research. Given this, all findings should be interpreted with caution.

Overall, the Victorian Gambling Study has presented a wealth of new information about gambling and health in Victoria. The findings from this study will be of great value in the development of gambling policies, programs and activities in Victoria, Australia and overseas.

CHAPTER 1

INTRODUCTION

The Victorian Gambling Study 2008–2012 is a longitudinal study of gambling and health in Victoria, Australia. The study commenced in 2008 with a telephone survey of 15,000 Victorian adults about gambling behaviour, recreation and health. This was followed by three further waves of data collection from participants who agreed to take part in future research. A qualitative study, using face-to-face interviews, was also conducted between research waves 3 and 4.

Each wave of this research, as well as the overall study, was guided by a series of hypotheses and objectives which are detailed in Chapter 2.

This study has added to the body of knowledge regarding the:

- aetiology, distribution and determinants of problem gambling
- associations between problem gambling and health
- predictors of problem gambling over time
- transitions in and out of gambling risk states.

This knowledge is invaluable not only to inform policy and service delivery in Victoria, but also in Australia and at the international level.

The Victorian Government, initially through the Department of Justice and then the Victorian Responsible Gambling Foundation (the foundation), funded this research. The longitudinal study received ethics approval from the Department of Justice Human Research Ethics Committee.

A panel of international gambling researchers, epidemiologists, biostatisticians and public health practitioners provided expert advice to the study. A project board comprised of three representatives—one each from the foundation, the Victorian Department of Justice and the Victorian Department of Health—oversaw this advice.

1.1 STUDY OVERVIEW

There are three discrete designs to the Victorian Gambling Study:

- cross-sectional study
- longitudinal study
- qualitative study.

The first two study designs are detailed in Chapter 3 of this report. The qualitative component of this study will not be further explored in this report; however, key quotes from the interviews have been

included to provide additional context or to highlight some of the quantitative findings. A detailed qualitative report from the study can be accessed on the foundation's website.²

1.2 EXISTING PUBLICATIONS

To date, the following four reports have been published from the Victorian Gambling Study:

- *A study of gambling in Victoria: Problem gambling from a public health perspective* (2009)
- *The Victorian Gambling Study: A longitudinal study of gambling and public health – Wave 2 findings* (2011)
- *The Victorian Gambling Study: A longitudinal study of gambling and public health – Wave 3 findings* (2012)
- *The Victorian Gambling Study qualitative component* (2012).

These reports are all available on the foundation's website³ and further information about the study can be found on the study's website.⁴

1.3 STRUCTURE OF THIS REPORT

This report is divided into the following six parts:

- **1: Introduction**

This chapter provides the background to the Victorian Gambling Study, and describes the study objectives, components and existing publications. It also places the study in context by describing the geographical and social characteristics of the study location and the public health framework that guided this research.

- **2: Study design and methodology**

This chapter describes the study methodology, including detailed information about the study objectives, designs, sampling approaches, survey instruments and analysis techniques.

2 www.responsiblegambling.vic.gov.au/__data/assets/pdf_file/0011/4025/Victorian-Gambling-Study-Qualitative-Component-Report.pdf

3 www.responsiblegambling.vic.gov.au

4 www.gamblingstudy.com.au

- **3: Gambling prevalence, participation and incidence**

Chapter 3 details findings about gambling prevalence, participation and incidence in Victoria. These results are largely drawn from the 2008 prevalence study (Wave 1), expanding on the results that have already been published from this component of the study. Findings in this part are also supplemented by results from the longitudinal component (incidence estimate) of the study.

- **4: Gambling, health and social context**

Chapter 4 describes the health and social context findings based on all four waves of the longitudinal study, including findings on the health conditions that co-occur with gambling, as well as findings on the interplay between gambling and social factors.

- **5: Gambling pathways and predictors**

This chapter comprises the results on analyses of gambling pathways, transitions between levels of gambling risk and factors that predict changes in gambling behaviour over time.

- **6: Conclusion and next steps**

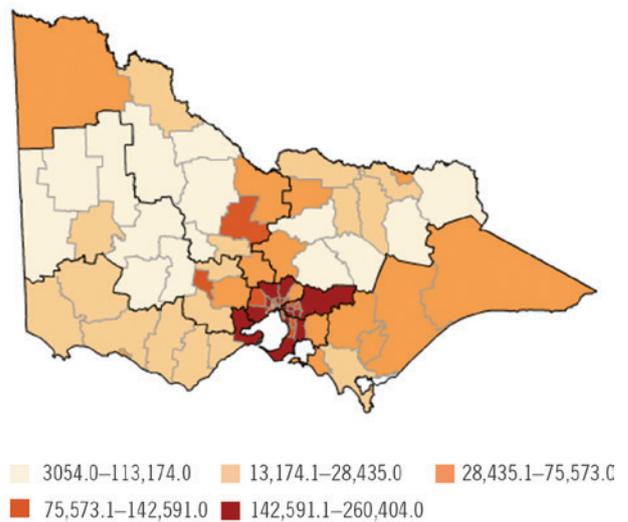
This final chapter provides an overview of findings contained throughout the report and discusses future directions for gambling and health in Victoria.

1.4 CONTEXT

1.4.1 THE VICTORIAN POPULATION

Victoria is the most densely populated state or territory in Australia. According to the 2011 Census, it has a population of 5.4 million, with the majority (90%) living in cities or towns. It makes up approximately one-quarter of the 22 million people living in Australia. There are 3.9 million people (74% of the Victorian population) living in the Greater Metropolitan Melbourne area.

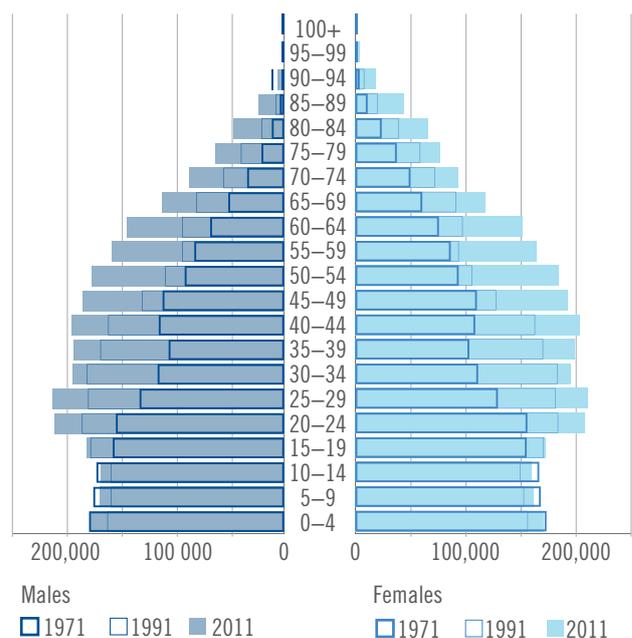
Victoria is divided into local government areas (LGAs) in eight state government regions. Figure 1 shows the estimated resident population for each LGA. The dark red colour represents the highest population numbers within a local government area. It shows how most of the population is centred on the capital city, Melbourne.



Source: Estimated resident population as at 30 June 2011 (revised figures), as reported in Population by Age and Sex, Victoria, electronic delivery (released August 2012), ABS (www.health.vic.gov.au/modelling/instantatlas.htm, accessed 28 October 2013)

Figure 1 Victorian population 2011 in local government areas in the eight state government regions

Although the population of Victoria is ageing, the impact of this has been ameliorated by migration and high fertility rates. Figure 2, from the Victorian Department of Planning and Community Development, compares the population age distributions for Victoria in 1971, 1991 and 2011.



Source: ABS, Australian Demographic Statistics (3101.0)

Figure 2 Age distribution of the Victorian population in 1971, 1991 and 2011

Victoria was originally populated by Aboriginal peoples, but only 0.7% of the Victorian population were of Aboriginal or Torres Strait Islander descent in 2011. In comparison, 2.5% of the total Australian population is of Aboriginal or Torres Strait Islander descent.

Victoria is a multicultural state, with residents coming from more than 200 countries, speaking 260 languages or dialects, and following 135 religious faiths. In 2011, 26.2% of Victorians were born overseas, and 46.8% of Victorians were either born overseas or have a parent who was born overseas. Greater Metropolitan Melbourne has a higher proportion of overseas-born residents (32.0%) compared with the rest of Victoria (10.3%). Just over 72% of the population speaks English only at home and 23% of the Victorian population speak a language other than English at home. The top 10 languages other than English spoken at home in Victoria in 2011 are shown in Table 1.

Table 1 Top 10 languages other than English spoken at home, Victoria, 2011

Rank	Language	Persons	Language other than English (%)
1	Italian	124,856	10.1
2	Greek	116,802	9.5
3	Mandarin	103,742	8.4
4	Vietnamese	86,592	7.0
5	Cantonese	72,902	5.9
6	Arabic	68,437	5.5
7	Turkish	32,899	2.7
8	Hindi	32,704	2.6
9	Punjabi	31,068	2.5
10	Macedonian	30,945	2.5

Note: 3,874,862 people speak English at home

Source: www.multicultural.vic.gov.au/population-and-migration/victorias-diversity/2011-census-a-snapshot-of-our-diversity, accessed 9 September 2013.

1.4.2 GAMBLING IN VICTORIA

Australians are prolific gamblers. The Productivity Commission, in its national 1999 prevalence report, found that 82% of Australians had gambled in the previous year, with the most popular forms being lotteries (60%) and scratch tickets (46%) (Productivity Commission 1999).

In Victoria, as in other states of Australia, gambling is a popular recreational activity. From the early days of settlement when games of chance were popular, Victorians have gambled on diverse activities, including horse and greyhound racing, sports betting, and later in commercial casinos or on electronic gaming machines (EGMs). The 1990s and early 21st century saw a liberalisation of gambling, a proliferation of gambling and a growth in EGM gambling.

All gambling in Victoria is regulated by the *Gambling Regulation Act 2003*, the *Casino Control Act 1991* and *Casino (Management Agreement) Act 1993*. The 2003 Act consolidated the *Gaming Machine Control Act 1991*, the *Lotteries Gaming and Betting Act 1966*, the *Public Lotteries Act 2000*, the *Club Keno Act 1993*, the *Interactive Gaming (Player Protection) Act 1999*, the *TT Line Gaming Act 1993* and the *Gaming No. 2 Act 1997*, which have all been repealed.

1.5 GAMBLING AND PUBLIC HEALTH

The Victorian Gambling Study is underpinned by a public health philosophy and approach. Previous international, Australian and Victorian general population studies of gambling have focused almost exclusively on the distribution rather than the determinants of problem gambling (Abbott et al 2004, Shaffer et al 2004, Williams et al 2012). In addition, earlier studies have been cross-sectional in nature and unable to explore changes in gambling over time, or the relationship between gambling, health and other factors over time.

This study goes further than the earlier research by adding a prospective cohort study, also known as a longitudinal study. Epidemiology is concerned with both the distribution and determinants of disease (Hennekens and Buring 1987), and this study, with its longitudinal design, enables an exploration of aetiology and an elucidation of the determinants of problem gambling. Further, the study has a qualitative component, which enriches the information gathered via the annual quantitative collection waves.

A public health approach aims to provide conditions in which people can be healthy. It involves a collaborative effort by all parts of the health sector, and governments, industries, communities and individuals, working together to ensure the wellbeing of society through comprehensive prevention, early intervention, treatment and support. In the Australian context, the National Public Health Partnership (1999) defined public health as ‘the organised

response by society to protect and promote health and to prevent illness, injury and disability’.

In Australia, the definition of problem gambling is harm based. All Australian governments use the following definition (Neal et al 2005):

Problem gambling is characterised by difficulties in limiting money and/or time spent on gambling which leads to adverse consequences for the gambler, others or for the community.

Using this definition means that harms (or adverse consequences) associated with gambling are central to attempts to identify and combat problem gambling in Australia. Non-problem or recreational gamblers may also experience harms as a result of gambling. These harms may occur less frequently and may be qualitatively different to harms experienced by problem gamblers. However, they are still relevant to understanding and responding to gambling as a public health issue. In addition, gambling may result in harms to third parties (including the family and friends of gamblers) and to the community.

This is an important study for Victoria. It is a large and complex study that investigates not only individuals, but families, communities and societies as well. The study recognises gambling harms, and provides critical information to support programs and policies aimed at addressing these. By shifting the focus from a clinical perspective to one that considers the circumstances in which people work, live, grow and age (Marmot 2005), this study provides a solid foundation for the prevention, intervention and treatment of gambling problems.

STUDY DESIGN AND METHODOLOGY

The Victorian Gambling Study 2008–2012 is a large and complex study of gambling behaviour, recreation, wellbeing and health. This chapter describes the methodology for the study, including its objectives, study designs, the study samples, the survey instruments employed and the analytical methods used. This chapter also discusses the strengths and limitations of this study.

2.1 OBJECTIVES

The objectives for this study were designed and developed in consultation with an expert panel that consisted of international experts in the field of gambling research. Design of the study also involved national researchers who are highly experienced in conducting research to inform government decision making.

There were several objectives for this study:

- to estimate the prevalence and incidence of problem gambling
- to investigate the pathways in and out of gambling risk states
- to understand the risks and vulnerabilities relating to gambling behaviour, health and problem gambling risk states
- to understand the relationship between gambling risk and health.

A series of hypotheses guided the study's overall analysis. These were that:

- gamblers move in and out of Problem Gambling Severity Index (PGSI) gambling risk states
- gamblers with moderately high PGSI scores are at greater risk of becoming problem gamblers
- problem gambling is transitory in nature
- comorbidities (including problem gambling) are clustered together
- certain biopsychosocial profiles predispose gamblers to problem gambling
- chasing of wins to cover losses is the greatest predictor of problem gambling
- electronic gaming machines (EGMs) and other continuous forms of play are more likely to result in problem gambling development than non-continuous forms of play
- contextual factors contribute to problem gambling
- problem gambling is a complex phenomenon and there are many pathways to it

- some populations are more likely to develop problem gambling
- most problem gamblers are young and male.

2.2 STUDY DESIGNS

The Victorian Gambling Study 2008–2012 used a number of study designs to optimise the value of findings from the project. The first design was cross-sectional, the second was a prospective cohort (also called a longitudinal or follow-up design) and the third was a qualitative design. Each of the components of the study is described below.

2.2.1 CROSS-SECTIONAL DESIGN, 2008

The first design was a cross-sectional study of a representative sample of the Victorian adult population (18 years and older) using computer-assisted telephone interviewing (CATI). Areas with high EGM expenditure were oversampled to enrich the sample for subjects with higher risk gambling behaviour. The aim was to estimate participation in gambling activities, and the prevalence of problem gambling risk in the adult Victorian population. It was also designed to investigate the association between different gambling risk levels (determined through the PGSI), and gambling participation and frequency within a wide range of demographic, social, health and wellbeing factors.

A description of the methodology and the results from the Wave 1 study are available on the Victorian Responsible Gambling Foundation's (the foundation's) website.⁵

2.2.2 PROSPECTIVE COHORT DESIGN, 2008–12

The second design was a prospective cohort study of participants from the Wave 1 study who gave consent to participate in further research. Participants were contacted using CATI for three subsequent years (waves) at approximately the same time of year:

- Wave 1: 2008
- Wave 2: 2009
- Wave 3: 2010–11
- Wave 4: 2011–12.

The purpose of the longitudinal study was to explore temporal changes in gambling risk behaviours (transitions), and the factors

⁵ www.responsiblegambling.vic.gov.au/__data/assets/pdf_file/0013/4027/Gambling-in-victoria-problem-gambling-from-a-public-health-perspective.pdf

that contribute to increases or decreases in gambling risk. Given that studies such as this are expensive, following up and retaining the smaller numbers of higher risk gamblers was prioritised. Despite this, the Wave 2 survey was considered sufficiently representative to provide robust population estimates of the incidence of problem gambling in the adult population between 2008 and 2009.

Findings from the Wave 2 and Wave 3 surveys are available from the foundation's website.⁶

2.2.3 QUALITATIVE DESIGN, 2012

The third study design was qualitative in nature and was undertaken between waves 3 and 4. In depth, face-to-face interviews with a range of participants were conducted to provide rich and detailed information on gambling and health.

Further information about the qualitative study, including the full findings, have been published in a separate report available on the foundation's website.⁷ Given this, the current report does not provide further analysis of the qualitative component of the study.

2.3 PARTICIPANT SAMPLES

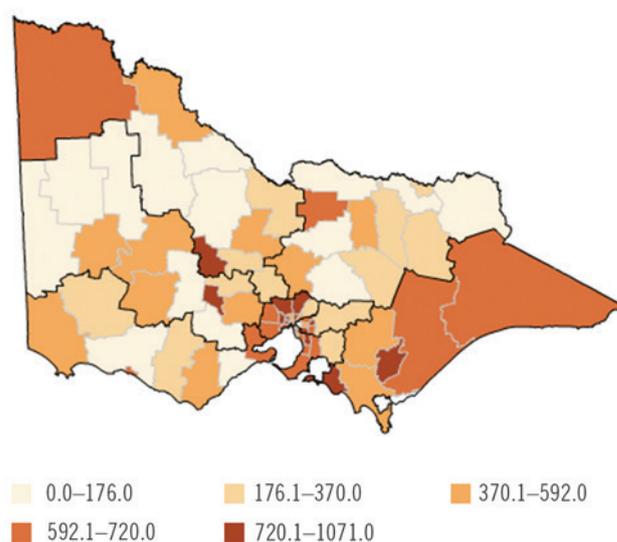
Given the various components of the study, and their different designs and purposes, the sample composition changed. For example, the priority of the prevalence study was to survey a representative sample of the adult Victorian population to determine the prevalence of problem gambling. On the other hand, the longitudinal study prioritised the retention of higher risk gamblers. The samples used in the separate components of the study are described below.

2.3.1 PREVALENCE STUDY

The study commenced in 2008 with a population-based cross-sectional survey of 15,000 adults (18 years and over) in the Victorian population using CATI. Sampling was stratified to reflect the relative proportions of the populations within the eight Victorian local government areas (LGAs) (see Section 1.4.1).

6 www.responsiblegambling.vic.gov.au/__data/assets/pdf_file/0010/4024/Victorian-Gambling-Study-Wave-Three-Findings-Report.pdf; www.responsiblegambling.vic.gov.au/__data/assets/pdf_file/0012/4026/Victorian-gambling-study-wave-two-findings.pdf
7 www.responsiblegambling.vic.gov.au/__data/assets/pdf_file/0011/4025/Victorian-Gambling-Study-Qualitative-Component-Report.pdf

Sampling was increased in LGAs within the government regions based on higher EGM expenditure bands to improve capture rates of participants likely to be at increased risk for problem gambling. Figure 3 shows how the EGM expenditure per adult by LGA varies within regions and across the state. Weighting methodologies were developed and the sample was adjusted to be representative of the Victorian population in Wave 1. These weightings are detailed in the first report from the study.⁸ This was the only component of the overall study that was representative of the Victorian adult population, and thus the results from this first wave were able to provide general population estimates, such as the population prevalence of the risk of problem gambling.



Note: This figure shows the total amount of money lost on electronic gaming machines (EGMs) that are located in a local government area (LGA), per head of adult population. The expenditure is a calculation of all monies spent on EGMs within the LGA, which is then divided by the number of adult (age 18+) residents within that LGA. It does not take into account how much of the expenditure comes from residents of other LGAs.

Source: Victorian Commission for Gambling Regulation. *Population: People 18 years of age or older. Currency: 2011–12.* (www.health.vic.gov.au/modelling/instantatlas.htm, accessed 28 October 2013).

Figure 3 Net electronic gaming machine expenditure (\$ per adult, age 18+) by local government area

In the prevalence survey, all respondents were administered the gambling participation questions. All gamblers were then administered the Problem Gambling Severity Index (PGSI) screen. One in three non-problem gamblers were subsampled. Non-gamblers were asked if they had 'ever' gambled and, if they had,

8 www.responsiblegambling.vic.gov.au/__data/assets/pdf_file/0013/4027/Gambling-in-victoria-problem-gambling-from-a-public-health-perspective.pdf

they completed the lifetime problem gambling screening tool (NODS CLiP 2) followed by the demographics questions.

2.3.2 LONGITUDINAL STUDY

Participants from the prevalence study in 2008 who consented to take part in further research formed the baseline, or Wave 1, for the longitudinal study. The priority was to retain the higher risk gamblers, while retaining as much of the full sample as possible.

Approximately half (7148) of the 15,000 participants from the prevalence study agreed to be recontacted to participate in further waves. The remainder of participants' responses were a mixture of 'hard' and 'soft' refusals—4513 (30%) and 3339 (22%), respectively.

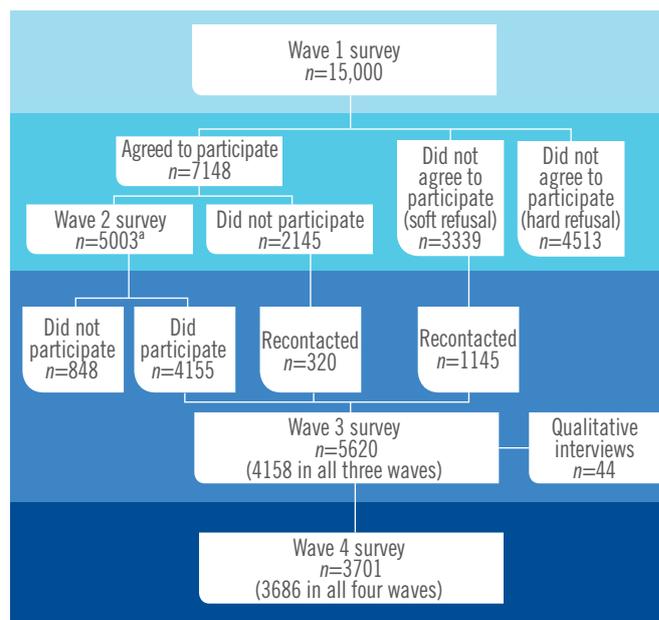
In Wave 2, responses were collected from 5003 participants. In Wave 3, responses were collected from 5620 participants. Wave 3 responses included 1145 of the soft refusals from Wave 1 (thus explaining why the number is larger than Wave 2). In Wave 4, responses were collected from 3701 participants out of the 5003 respondents from Wave 3, with 3686 having completed all four waves. The Wave 4 recontact was capped at 3700, with priority given to those who had completed all three previous waves. This decision was based on financial constraints.

A key challenge in undertaking longitudinal studies is loss to follow-up of participants (attrition) over time. Attrition is a major source of bias in cohort studies. If the loss is large, say 30–40%, this would raise doubts about the validity of the study results (Hennekens and Buring 1987). It is therefore important to identify how the composition of a study sample changes over time. Appendix A provides details about how the longitudinal study sample changed in terms of demographic characteristics, gambling risk, gambling activities, and health and wellbeing measures.

This study used a number of strategies to minimise attrition and maximise retention. These included making regular contact with participants, maintaining a dedicated study website, and ensuring the use of skilled and trained interviewers. Because problem gambling has a low prevalence worldwide, it was critical to retain those participants who were at risk according to the PGSI (the low, moderate and problem gamblers). To do this, the at-risk group was contacted by the interviewers (using CATI) before the other study participants. There were up to 15 call-backs to ensure the at-risk group was contacted.

In Wave 4, all participants who had completed waves 1–3 were prioritised for recontact. This would ensure that the study had sufficient sample size for robust analyses for the whole study period.

Figure 4 and Table 2 demonstrate participant attrition throughout the study.



a Includes only valid responses

Figure 4 Source of the Wave 4 participants ($n = 3701$)

Table 2 Study wave sample size and data collection periods

Wave	Sample size	Fieldwork dates
1	15,000	July 2008 – October 2008
1	7,148	Agreed to participate in longitudinal study
2	5,003	September 2009 – January 2010
3	5,620 ^a	September 2010 – January 2011
Qualitative study	44	May 2011 – September 2011
4	3,701 ^b	October 2011 – January 2012

a 4158 completed all three waves, and 1465 completed waves 1 and 3 only

b 3686 completed all four waves

2.4 SURVEY INSTRUMENTS

A number of survey instruments were investigated for use in this study. Where possible, validated and internationally recognised instruments were used. Choices were made based on the most effective and efficient instruments that could be used to answer the research questions that were originally proposed. The following section provides an overview of survey questions by wave and highlights some of the key instruments used.

2.4.1 OVERVIEW OF SURVEY QUESTIONS

The Victorian Gambling Survey contained a core set of questions administered in each wave. These included questions about gambling participation, gambling screens, health and social capital. In addition, contextual questions were asked in the longitudinal waves. For example, in Wave 2, participants were

asked questions about the global financial crisis, the economic stimulus package and the impact of the Victorian bushfires. Wave 3 included questions on the Melbourne Spring Racing Carnival and linked jackpots. Wave 4 included additional questions on social capital and trauma.

In waves 2–4, all participants were asked every question, whereas in Wave 1, non-gamblers and two-thirds of non-problem gamblers were not asked the health and social capital questions.

Multiple factors were investigated to improve the understanding of gambling behaviours and associations with other health attributes. These factors included demographic factors, health and wellbeing, health risk factors, readiness to change, life events, reasons for and for not gambling, and many more. Some measures were collected in all four waves, while others were asked in only one or more waves. Table 3 provides an overview of survey questions by wave.

Table 3 Summary table of survey instruments by wave

Measures	W1	W2	W3	W4
Presurvey screen				
Age	✓	×	×	×
Speak a language other than English at home	✓	×	×	×
Aboriginal or Torres Strait Islander background	✓	×	×	×
Number of telephone phone lines	✓	×	×	×
Number of adults (18+) live in household	✓	×	×	×
Local government area	✓	×	×	×
Postcode	✓	×	×	×
Gambling activities: Money spent on gambling activities in the past 12 months (informal betting for money, pokies, table games, racing, sports betting, Keno, lotteries, scratch tickets, Bingo, competitions for money, raffle, sweeps, other)	✓	✓	✓	✓
Access channels for gambling activities participated	✓	✓	✓	✓
Gambling frequency for gambling activities participated	✓	✓	✓	✓
PGSI (Problem Gambling Severity Index from the Canadian Problem Gambling Index)	✓	✓	✓	✓
NODS-CLiP2 (developed by Volberg and Shaw Taylor, not published)	✓	×	×	×
Additional gambling questions				
Bet on Melbourne Spring Racing Carnival in past 12 months	×	×	✓	×
Ever bet on Melbourne Spring Racing Carnival	×	×	✓	×
Bet on major sporting events in past 12 months	×	×	✓	×
Ever bet on major sporting events	×	×	✓	×
Bet on large lottery jackpots in past 12 months	×	×	✓	×
Ever bet on large lottery jackpots	×	×	✓	×
Frequency of playing EGMs with large linked jackpots	×	×	✓	×

Table 3 continued

Measures	W1	W2	W3	W4
Self-reported change in gambling activity				
Self-reported—change in gambling activity in the past 12 months	×	✓	✓	✓
Self-reported—reason for change in gambling activity in past 12 months	×	✓	✓	✓
Preferred activity/channel and venue location for highest spend activity (main gambling activity)				
Highest spend activity	✓	✓	✓	✓
Money spent on highest spend activity	✓	×	×	×
Access channel to highest spend activity	✓	×	×	×
Venue name where spent most on highest spend activity	✓	×	×	×
Distance to venue	✓	×	×	×
Top 3 features liked about venue	✓	×	×	×
Played the highest spend activity alone or with others	✓	✓	✓	✓
Top 3 reasons to gamble on the highest spend activity	✓	✓	✓	✓
Binge gambling				
Number of days binge gambling	✓	✓	✓	×
Single binge gambling activity type	✓	×	✓	×
Location of binge gambling activity	×	×	✓	×
Financial difficulties as a result of binge gambling	✓	×	×	×
Binge gambling triggers	✓	×	×	×
Venues and other details about gambling				
Number of venues attended for gambling activities (EGMs, table games, racing, sports betting, Keno, lotteries, scratch tickets, Bingo, competitions for money)	✓	×	×	×
Gambling activities specific questions. No questions for table games or Keno				
Pokies (influence of jackpots, frequency of bet more than 1 credit per line, kind of poker machine mostly played, name of favourite EGM)	✓	×	×	×
Racing betting (main ways bets placed, whether used batch settings, whether mainly bet in syndicate or alone)	✓	×	×	×
Sports betting (type, main ways bets placed)	✓	×	×	×
Lotteries (whether play in syndicate or alone, whether use Quickpicks or own numbers, number of picks per game, number of games or squares per week)	✓	×	×	×
Scratch tickets (denomination of scratch tickets mostly bought)	✓	×	×	×
Bingo (number of books, number books played at once)	✓	×	×	×
Competitions where money paid to enter (top 3 channels through which the competitions mainly promoted)	✓	×	×	×
Money management for gambling				
Money taken to gamble on highest spend activity	✓	✓	×	×
Card brought to gambling even if not used	✓	✓	×	×
Frequency of accessing money using cards	✓	✓	×	×
Frequency of seeing gambling advertisements, marketing and promotions	×	✓	×	×

Table 3 continued

Measures	W1	W2	W3	W4
Life events experienced in the past 12 months				
Life events experienced (death of someone close, divorce, legal difficulties, major injury or illness to either yourself or someone close, marriage or de facto, troubles with your work, boss, or superiors, retirement, pregnancy or family additions, major change to your financial situation, taking on a mortgage, loan or making a big purchase, Increase in the number of arguments with someone you are close, major change in living or work conditions (e.g. renovations, new job))	✓	✓	✓	✓
Life event trigger gambling/increase gambling (single biggest trigger)	✓	✓	✓	✓
Level of impact —2009 Victorian bushfires	×	✓	×	×
Level of impact —current recession (2008-2009)	×	✓	×	×
Received Kevin Rudd stimulus package payment	×	✓	×	×
Increase gambling spend after the receipt of the money	×	✓	×	×
Smoking				
Smoked in the past 12 months	✓	✓	✓	✓
Age of smoking commencement	×	×	✓	×
Currently smoke	✓	✓	✓	✓
Number of cigarettes currently smoked per day	✓	✓	✓	✓
Effects of the smoking ban on gambling (since July 2007)	✓	×	×	×
Alcohol				
Consumed alcohol in the past 12 months	✓	✓	✓	✓
Age at which first alcoholic drink consumed	×	×	✓	×
Number of standard drinks per week	✓	✓	✓	✓
CAGE score	✓	×	✓	✓
Health conditions				
Self-reported health status	✓	✓	✓	✓
Trauma, hardship and problems in life	✓	×	×	✓
Current health conditions (heart conditions, high blood pressure or high cholesterol, diabetes, cancer, lung conditions including asthma, depression, anxiety disorders, obesity, other physical or mental)	✓	✓	×	×
Disability affecting day-to-day life	✓	×	×	×
Psychological distress (Kessler 10 Psychological Distress Scale)	✓	✓	✓	✓
Serves of vegetables on a daily basis	×	✓	×	×
Serves of fruit on a daily basis	×	✓	×	×
Continuous walking	×	✓	×	×
Vigorous physical activity	×	✓	×	×
Blood pressure checked by yourself or doctor in past 12 months	×	✓	×	×

Table 3 continued

Measures	W1	W2	W3	W4
Social capital items				
Ability to get help	✓	✓	✓	✓
Member of community group	✓	✓	✓	✓
Like living in your community	✓	✓	✓	✓
Rate of overall quality of services, facilities and 'things to do' in your community	✓	×	×	×
Volunteered to help in the community in any way in the past 12 months	×	×	×	✓
Ability to raise \$2000 within 2 days in an emergency	×	×	×	✓
Feeling valued by society	×	✓	✓	✓
Involvement in community activities	×	✓	✓	✓
Gambling difficulties				
Gambling difficulties - ever	✓	×	×	×
Gambling difficulties - past 12 months	✓	✓	✓	×
Seriousness of gambling difficulties in past 12 months	✓	✓	✓	×
Self-awareness of gambling problem or at risk	✓	×	×	×
When self-awareness of gambling problem gambling risk occurred	✓	×	×	×
Description of what happened (e.g. difficulties related to gambling)	×	✓	✓	×
Gambling in households, families and relationships				
Family members currently considered to be at-risk or a problem gambler	✓	×	×	×
Close friends currently considered to be at-risk or a problem gambler	✓	×	×	×
How people started gambling				
Age first started gambling (apart from Melbourne Cup sweeps)	✓	×	×	×
First gambled for money (by yourself, with a friend, with a housemate, male relative, female relative, other)	✓	×	×	×
Gambling activity first started with	✓	×	×	×
First gambling trigger	✓	×	×	×
Experienced a big win when first started gambling	×	×	✓	×
Gambling help and awareness of gambling help				
Sought help for a gambling problem in the past 12 months	✓	✓	✓	✓
Who provided the help	✓	×	×	×
Type of help (friendship support, relationship counselling, personal counselling, help with sorting out finances, help with food, money, clothing, accommodation or other items, other)	✓	×	✓	✓
Usefulness of help received for gambling problem	×	×	✓	✓
Source of referral to the help	✓	×	×	×
Wanted help for gambling problem in past 12 months	✓	×	×	×
Reasons for not seeking help	✓	×	×	×

Table 3 continued

Measures	W1	W2	W3	W4
Overcoming problem gambling				
Readiness to change	✓	✓	✓	✓
Help to reduce gambling—social network	✓	×	×	×
Help to reduce gambling—counselling	✓	×	×	×
Help to reduce gambling—more money	✓	×	×	×
Help to reduce gambling—information on the odds of winning	✓	×	×	×
Help to reduce gambling—outside leisure activities and interests	✓	×	×	×
Help to reduce gambling—relationship partner	✓	×	×	×
Role of significant others				
Encouragement from others—employer	✓	×	×	×
Encouragement from others—friends	✓	✓	✓	✓
Encouragement from others—relationship partner	✓	✓	✓	✓
Encouragement from others—relatives	✓	✓	✓	✓
Encouragement from others—doctor or health professionals	✓	×	✓	✓
Suicide, substance use and crime				
Considered taking own life in the past 12 months	✓	×	×	×
Drug use—marijuana/hashish	✓	×	✓	✓
Drug use—prescription pain killers	✓	×	✓	✓
Drug use—amphetamines (e.g. speed)	✓	×	✓	✓
Drug use—ecstasy/designer drugs	✓	×	✓	✓
Drug use—cocaine/crack	✓	×	×	×
Drug use—tranquillisers	✓	×	×	×
Drug use—hallucinogens	✓	×	×	×
Drug use—inhalants	✓	×	×	×
Drug use—heroin	✓	×	×	×
Drug use—gamma-hydroxybutyric acid (GHB)	✓	×	×	×
Drug use—barbiturates	✓	×	×	×
Drug use—growth- or muscle-promoting steroids	✓	×	×	×
Drug use—methadone	✓	×	×	×
Drug use—other types of illicit or illegal drugs	×	×	✓	✓
Gambling led to crime in the past 12 months	✓	×	×	×
Key attitudes about gambling in Victoria				
Attitudes about gambling—Victorian Government taking action to encourage responsible gambling in Victoria	✓	×	×	×
Attitudes about gambling—gambling is a serious social problem in Victoria	✓	×	×	×
Attitudes about gambling—provides a lot of fun for the community	✓	×	×	×
Attitudes about gambling—gambling is too widely accessible in my local council or shire	✓	×	×	×
Attitudes about gambling—governments need to do more to address problem gambling in my local council or shire	✓	×	×	×

Table 3 continued

Measures	W1	W2	W3	W4
Demographics				
Level of education	✓	×	✓	✓
Household structure	✓	×	✓	✓
Year of birth	×	×	×	✓
Number of dependent children live with you under the age of 25	✓	×	×	×
Employment status	✓	×	✓	✓
Occupation	✓	×	✓	✓
Migrated to Australia in the past 5 years	✓	×	×	×
Speed of internet connection	✓	×	×	×
Household income	✓	×	✓	✓
Personal income	✓	×	✓	✓
Migrated to Australia on a visa (education visa, business migration visa, skilled migration or special work visa, family or spouse visa, humanitarian visa, other type)	×	×	✓	×
Leisure interests				
Leisure activities apart from gambling	×	✓	×	×
Future studies				
Agree to participate in future studies	✓	×	✓	×
Confirm first name	✓	×	✓	✓
Confirm phone number	✓	✓	✓	✓
Other telephone numbers for future contact	✓	✓	×	×
Email address	✓	✓	✓	✓
Whether happy to be considered for qualitative research	×	×	✓	×
Interested in free confidential support from Gambler's Help	✓	✓	✓	✓

2.4.2 PRESURVEY SCREEN

In the prevalence survey, all participants were given a presurvey screen that collected basic information that would be used to:

- weight the sample to the Victorian population
- identify the participants' gambling participation and gambling risk level.

2.4.3 GAMBLING PARTICIPATION

A new approach was taken to defining gambling. This included differentiating the measurement of gambling activities from the channels through which gambling activities are delivered (e.g. pokies can be played through clubs, pubs or online). New activities measured included participation in event wagering (e.g. wagering on the outcomes of TV shows), participation in SMS or phone-in competitions, and participation in speculative

stock investments (e.g. day-trading in stocks and shares). The frequency of participation was also collected to determine the number of times during the past year that participants gambled on each activity.

Specific gambling activities measured in the study were:

- informal private betting for money (e.g. playing cards at home)
- playing the pokies or EGM
- betting on table games like blackjack, roulette and poker
- betting on horse, harness or greyhound races (excluding sweeps)
- betting on sports and event results (e.g. football or TV show results)
- Lotto, Powerball or the pools
- Keno

- scratch tickets
- bingo
- competitions where you pay money to enter by phone or leave an SMS
- raffles, sweeps and other competitions
- speculative stock investments like day-trading (without a long-term strategy).

2.4.4 PROBLEM GAMBLING

PROBLEM GAMBLING SEVERITY INDEX

In the first and all subsequent waves, all respondents who had indicated they had participated in at least one gambling activity in the previous 12-month period completed the nine-item PGSI component of the Canadian Problem Gambling Index (Ferris and Wynne 2001). Participants who reported gambling in any one activity, including Lotto and day-trading, were classified as a gambler for that 12-month period.

The PGSI is a population screening tool developed to measure two dimensions of problem gambling: problem gambling behaviour, and the consequences of that behaviour for the individual or others.

The Queensland modification of the item response scale to five points (never, rarely, sometimes, often and always) rather than the original four-point scale was used. Responses of 'rarely' and 'sometimes' were combined and given a score of 1, so that the range of scores remained from 0 to 27 as in the original. Cut-points for the total PGSI score were chosen to be consistent with previous Australian studies and classified people into the following risk categories:

- non-gambler—no gambling reported in the past year
- non-problem gambler—score of 0
- low-risk gambler—score of 1–2
- moderate-risk gambler—score of 3–7
- problem gambler—score of 8 or higher.

NODS CLIP2

All respondents who reported having **ever** gambled completed the NODS CLIP2 (Volberg and Taylor, unpublished), derived from the NORC DSM-IV Screen for Gambling Problems—Control, Lying and Preoccupation NODS CLIP scale (Toce-Gerstein and Volberg 2003), to measure an individual's lifetime risk of problem gambling.

The NODS CLIP2 is a brief screen that measures lifetime prevalence of pathological gambling and problem gambling using a variant definition. Pathological gambling is a persistent and recurrent

maladaptive gambling behaviour as indicated by five or more behaviours listed in the *Diagnostic and statistical manual of mental disorders*. This scale presents an efficient and high-validity method for measuring an individual's lifetime risk for problem gambling through a small number of questions. The NODS CLIP2 scores are divided into the following groups:

- lifetime non-problem gambler—score of 0
- lifetime at-risk gambler—score of 1–2
- lifetime problem gambler—score of 3–4
- lifetime pathological gambler—score of 5 or higher.

2.4.5 GAMBLING ACCESS AND UTILISATION PATTERNS

Multiple factors were investigated to improve the understanding of how, where and when participants gambled. Questions were asked about binge gambling, venues, expenditure and money management.

2.4.6 HEALTH, WELLBEING AND SOCIAL CONTEXT

In Wave 1, the research study examined not only the distribution of gambling behaviour in the Victorian adult population, but also health and wellbeing issues. This included an exploration of health and wellbeing for all gamblers, not only those who developed a problem, in an effort to understand the possible determinants of problem gambling. Gambling behaviours and health and wellbeing questions were asked in all subsequent waves, with the aim of exploring the aetiology of problem gambling, and identifying risk and protective factors. Health and wellbeing was measured using the following questions and screening tools.

SELF-REPORTED HEALTH STATUS

Self-rated health assessments have been found to be a powerful predictor of future health care use and mortality, independent of other medical, behavioural or psychosocial risk factors (Idler and Benyamini 1997, Miilunpalo et al 1997). Self-reported health conditions included questions on diabetes, lung conditions, disability, depression and anxiety.

MENTAL HEALTH

A mental health population measure, the Kessler Psychological Distress Scale (K10) was used in all four waves (Kessler et al 2002). This screen was selected because it is widely used in Australia at national and jurisdictional levels, and data from this study could be used for comparative purposes. The K10 score is based on 10 questions about negative emotional states experienced in the four-week period leading up to the survey. Respondents are categorised according to their scoring.

SUBSTANCE USE (SMOKING, ALCOHOL AND DRUGS)

Key questions were asked on substance use, including alcohol, cigarettes and drugs. These were asked in all waves.

The four-item CAGE screen was used to investigate alcohol problems in all waves (Ewing 1984). This screen was used because it is non-confrontational and quick to administer. Additional questions on alcohol use were also asked.

Questions on smoking were based on other Victorian health and gambling studies. Smoking questions were about past and current smoking, as well as the number of cigarettes smoked.

Questions on drugs were only asked in Wave 1. These were based on those used in the earlier Victorian population surveys on alcohol and drug use.

SOCIAL CONTEXT

To understand the social context in which people gambled, a number of questions were asked exploring life events (such as divorce, death, birth, marriage, separation, unemployment) and past trauma. Social capital and community connectedness questions were asked in each wave. These were taken from the Victorian Population Health Survey for comparative purposes.

HELP-SEEKING BEHAVIOUR

A wide range of questions on help-seeking behaviour, including both formal and informal, were included in all four waves. The Readiness-to-Change scale, based on the Prochaska and DiClemente model (Rollnick et al 1992), measures whether a gambler is at precontemplation, contemplation or action stage of seeking help. This was asked in all waves.

2.5 ANALYSIS FRAMEWORK

A comprehensive analytical plan was designed and revised annually to ensure the study would achieve the objectives and explore the hypotheses described earlier in Chapter 2. The plan was developed by the expert research panel guiding the study. A full copy of the analysis plan can be requested from the Victorian Responsible Gambling Foundation.

Data were analysed using SPSS 18 and STATA 11/SE statistical packages.

2.6 STRENGTHS AND LIMITATIONS

The Victorian Gambling Survey is the first dedicated large longitudinal study that investigates gambling and health in Australia, and only one of a few in the world, making it a groundbreaking study. It is underpinned by a public health perspective that sees problem gambling as part of a continuum, so while the prevalence of problem gambling was one focus of the cross-sectional design, the pathways, transitions and harms were central themes in the subsequent waves. There are both strengths and limitations to this study.

The main strength of the study is that it is a large, well-conducted jurisdiction-wide survey that has oversampled areas with populations at higher risk of problems with gambling. Problem gambling has a low prevalence (0.5–1.0%) worldwide (Devlin and Walton 2012). This means that a large cohort must be followed to enable sufficient numbers for a rigorous analysis of the whole study. This makes it a costly study. The large numbers in the prevalence study ($n = 15,000$) and the oversampling ensured there were sufficient numbers for analysis in the cross-sectional design.

Longitudinal studies are increasingly prone to loss of participants (loss to follow-up) the longer the study progresses. Retention of low, moderate-risk and problem gamblers was a priority in waves 2–4 in this study. As the study progressed and numbers decreased, moderate-risk and problem gamblers were combined into one group for some analyses, and by the fourth wave the subsamples in the remaining 3701 participants were often too small for some of the complex multiple timepoint analyses. Many studies struggle to capture sufficient problem gamblers and often combine moderate-risk and problem gamblers into one group (Afifi et al 2010, Crockford et al 2008). Although other studies have combined the two categories, the effects of this have not been examined. Currie et al (2013) recommend against this, as these two groups are heterogenous with respect to a wide range of risks in nearly all dimensions, particularly gambling expenditure and preference for EGMs (Currie et al 2013).

The results from the prevalence study can be generalised to the Victorian population; however, the longitudinal design results cannot. In some countries, such as Sweden, official national registries enable weighting to the general population. Victoria has no such registries, so results from waves 2–4 were not weighted to the Victorian population. The results from these waves are not population estimates; they represent results from a sample of the Victorian population. Information on how the sample has changed provides some insights into how the sample in waves 2–4 differs

from the prevalence study. However, the level and direction of bias introduced by loss to follow-up is unknown.

The study collected detailed information on gambling activities and screened all gamblers. Many previous Australian studies excluded some gambling activities, and only screened regular or frequent gamblers. Such studies would underestimate the prevalence of gambling risk segments and, if the excluded risk groups have varying risk factors, may miss some important risk factors.

Both the prevalence and incidence estimates, like many other problem gambling estimates, should be interpreted with caution. The prevalence figure is likely to be an underestimate of the true prevalence. Using random-digit dialling means that some populations, including those who are homeless or in institutions (such as prisons or hospitals), and those who only use mobile phones, are likely to be missed. Studies have shown that the prevalence in these populations is likely to be higher than the general population (Abbott et al 2005, Pennay and Bishop 2010). The incidence estimate was calculated using a screen that relied on participant memory of past gambling behaviour and used a classification that differed from the PGSI; however, it was determined to be the best screen for this study.

The PGSI is well validated as a population screening tool for problem gambling; however, the scoring cut-points are increasingly under debate. Currie et al (2010) propose a change in the low-risk score range from between 1 and 2 to 1 and 4, and the moderate-risk groups from between 3 and 7 to 5 and 7. Others are suggesting that the PGSI cut-point of 8 is too stringent and recommend 5 and above to define problem gamblers (Williams et al 2012, Williams and Volberg 2014).

The Victorian Gambling Study recruited very low numbers of people who are culturally and linguistically diverse, and people of Aboriginal or Torres Strait Islander descent, so analyses were not possible for these populations.

Cost was an important limitation. Longitudinal studies are expensive to conduct. Design choices are therefore made to balance costs and study outcomes—for example, previous studies have been limited because of the small numbers of problem gamblers in the sample. In Wave 1, a choice was made to collect a larger sample to optimise the number of problem and at-risk gamblers. This was at the expense of delivering the full survey to everyone in the sample. A reduced survey was given to all non-gamblers and a subset of non-problem gamblers, thus limiting some analyses on these groups.

CHAPTER 3

GAMBLING PREVALENCE, PARTICIPATION AND INCIDENCE

This chapter details findings about gambling prevalence, participation and incidence in Victoria. The results in this chapter are drawn largely from the 2008 prevalence study and are weighted to the Victorian population in 2008. In addition to some key findings already published,⁹ Chapter 3 presents a range of results based on additional analysis that has been undertaken since the publication of the first report.

Section 3.1 provides findings relating to the prevalence of gambling in Victoria in 2008. It includes prevalence results by problem gambling risk categories based on the Problem Gambling Severity Index (PGSI), as well as by a range of demographic characteristics. These include gender, age, occupation, education and cultural background.

Section 3.2 describes gambling participation in Victoria, including frequency of participation, participation across activities, and participation by gender and age demographics. This section also explores differences in gambling participation by PGSI problem gambling risk categories.

Section 3.3 explores lifetime versus past-year risk for problem gambling. Findings in this section are based on analysis of participant responses to past-year (PGSI) and lifetime risk (NODS CLiP2) gambling screens.

Section 3.4 provides the number of new cases of problem gambling in Victoria in the past 12 months (the incidence rate). This was determined using results from Wave 1 and Wave 2 of the study.

3.1 GAMBLING PREVALENCE 2008

Based on data from the prevalence study in 2008, this section provides a broad description of gambling behaviour at the population level in Victoria. It provides information about population level prevalence according to problem gambling risk categories, as well as prevalence according to a number of demographic characteristics.

3.1.1 PREVALENCE BY GAMBLING RISK CATEGORIES

In 2008, the prevalence of problem gambling in the Victorian adult population was measured using the nine-item PGSI. Every adult gambler in the study was screened to determine their risk for problem gambling. Gambling was defined as participation in any activity listed, including Lotto and day-trading, for that 12-month period.

Table 4 shows that, in 2008, the prevalence of problem gambling was 0.7%, moderate-risk gambling was 2.4% and low-risk gambling was 5.7%. Although this may appear to be a small proportion of the population, it represents more than 28,000 adult Victorians reporting problem gambling behaviours and almost 95,000 reporting moderate-risk gambling behaviour during the past 12 months.

Table 4 Prevalence of gambling risk behaviours in Victorian population, 2008 (weighted, all respondents $n = 15,000$)

Risk for problem gambling	PGSI score	Victorian adults (%)	Lower limit (%)	Upper limit (%)	Estimated population size
Non-gamblers	0	26.9	26.0	27.9	1,080,746
Non-problem gamblers	0	64.3	63.3	65.3	2,581,154
Low-risk gamblers	1–2	5.7	5.2	6.2	228,740
Moderate-risk gamblers	3–7	2.4	2.1	2.7	94,739
Problem gamblers	8–27	0.7	0.5	0.9	28,272
Total					4,013,651

PGSI = Problem Gambling Severity Index

⁹ www.responsiblegambling.vic.gov.au/about-us/what-we-do/foundation-research-program/published-research-library

3.1.2 PREVALENCE BY GENDER AND AGE

Problem gambling is twice as prevalent in males (0.95% of the Victorian male adult population) than in females (0.47%). Analysis at the age-group level is difficult because of the small numbers of problem gamblers.

In male gamblers, the 65 and older age group has a significantly lower prevalence (1.74%) of moderate-risk gambling compared to the 18–24 age group (5.97%). In female gamblers, the rate of moderate-risk gambling was significantly lower in females 25–34 years old (1.09%), compared to females 18–24 years old (2.71%).

Figure 5 shows the prevalence of the various gambling groups in the Victorian population by age and gender in 2008. Because around 30% of the population do not gamble and an additional 65% are non-problem gamblers, this figure shows the less than 15% who have problems with gambling. This enables expansion of the y-axis to better demonstrate the patterns of gambling risk across age and gender.

3.1.3 PREVALENCE BY OCCUPATION, EMPLOYMENT AND INCOME

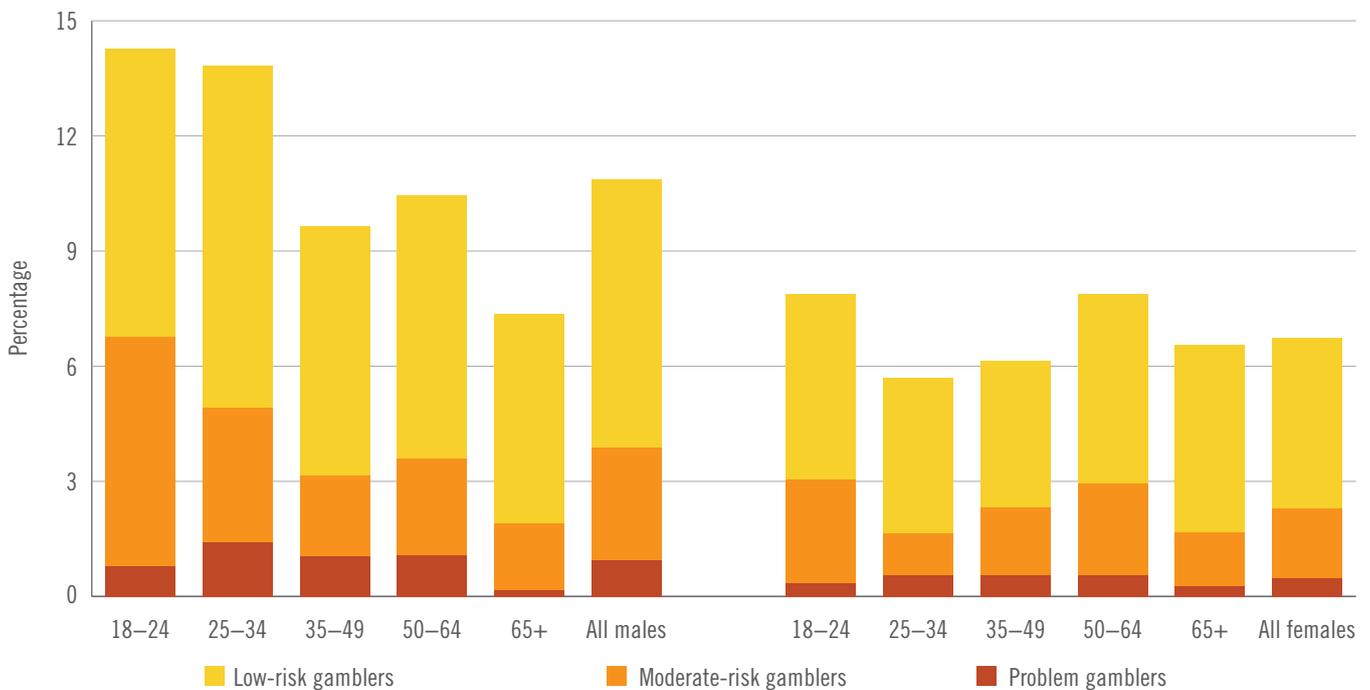
A number of occupations had significantly higher representation among problem gamblers compared with the Victorian adult population. These included:

- sales workers—30.9% compared with 6.1% in the Victorian population
- machinery operators/drivers—14.9% compared with 4.0%
- labourers—18.3% compared with 5.4%.

In comparison, some occupations had a significantly lower representation among problem gamblers compared with the Victorian adult population. These included:

- professionals—12.4% compared with 32.3% in the Victorian population
- technicians/trades workers—2.8% compared with 17.0%
- clerical/administrative staff—1.0% compared with 12.3%.

Employment status in problem gamblers was not significantly different to the Victorian adult population.



Note: Question asked: 'May I confirm your age?' (Base: all respondents.)

Figure 5 Prevalence of gambling risk in the Victorian population 2008, by age and gender (weighted, $n = 15,000$)

In terms of income differences between problem gamblers and the adult Victorian population, the study found:

- a lower proportion with a personal income of less than \$31,199—44.5% compared with 60.7% in the Victorian population
- a significantly higher proportion with an income of \$31,200–51,999—33.7% compared with 20.6%
- a lower proportion of households with an income of under \$33,799—11.7% compared with 33.4%
- a significantly higher proportion of households with an income of \$62,400–103,999—5.2% compared with 21.4%.

3.1.4 PREVALENCE BY EDUCATION AND HOUSEHOLD COMPOSITION

The education levels and the household composition reported by problem gamblers were not significantly different to the Victorian adult population.

3.1.5 PREVALENCE IN THE INDIGENOUS POPULATION

The proportion of problem gamblers from Indigenous backgrounds at 3.8% (1.2–11.1%) was significantly higher than the Victorian population proportion of 0.7% (0.6–0.9%).

3.1.6 PREVALENCE IN MIGRANT AND LANGUAGE OTHER THAN ENGLISH POPULATIONS

The proportion of problem gamblers in the study who have migrated to Australia in the past five years at 0.0% was significantly lower than the Victorian population proportion of 5.0%.

There was no difference between the proportion of problem gamblers and the Victorian adult population in terms of speaking a language other than English at home.

3.2 GAMBLING PARTICIPATION

This section provides gambling participation findings for Victoria in 2008. It looks at the relationships between gambling activities, gender, age, gambling frequency, number of activities played and gambling risk category. All results presented in this section are weighted to the 2008 Victorian population.

This section largely presents findings from analyses in relation to four key gambling activities: electronic gaming machines (EGMs),

table games, race betting and sports betting. These four key activities were chosen because they can more easily lead to harm, particularly through regular, prolonged participation.

Results from the same analysis in relation to additional gambling activities are presented in Appendix B.

3.2.1 PARTICIPATION BY GENDER

Participation in gambling activities by gender showed that males were significantly more likely to play the following key gambling activities, compared to females:

- EGMs (23.0% versus 20.0%; odds ratio [OR] = 1.17, $P < 0.01$)
- table games (7.4% versus 1.9%; OR = 4.22, $P < 0.001$)
- race betting (21.0% versus 12.0%; OR = 1.94, $P < 0.001$)
- sports betting (6.5% versus 1.5%; OR = 4.60, $P < 0.001$).

3.2.2 PARTICIPATION BY AGE, FREQUENCY AND ACTIVITY

Table 5 shows that participants aged 18–24 had significantly higher rates of participation in EGMs, table games and sports betting. Those aged 25–34 had significantly higher rates of participation in table games, race betting and sports betting. In comparison, participants aged 35–49 and aged 50–64 had significantly higher rates of participation in only one of these key activities. Participants aged 65 and over tended to have lower rates of participating in all these key activities.

In 2008, an estimated 73.1% of the 4 million Victorian adults (>18 years old) reported participating in some form of gambling activity in the previous 12 months. Participation frequency varied, with 32% of adult Victorians participating in gambling less than once a month, 18% less than weekly and more than monthly, and 23% once a week or more.

As is demonstrated in Table 6, for the general population, Lotto, Powerball or the pools (47.5%), and raffles and sweeps (42.9%) were the most common activities, followed by EGMs (21.5%), horse and greyhound race betting (16.4%) and scratch tickets (15.3%). These five activities were the most prevalent activities participated in weekly, one to three times a month, and less than once a month.

Table 5 Participation in gambling activities in Victoria in past year; age comparisons with all Victorian adults (weighted, all respondents $n = 15,000$)

Gambling activity	Age group (years) ^a				
	18–24 (%)	25–34 (%)	35–49 (%)	50–64 (%)	≥65 (%)
EGMs	Higher (27.0)	Lower (18.0)	Lower (17.0)	Higher (25.0)	NS (24.0)
Table games	Higher (13.0)	Higher (7.3)	NS (3.9)	Lower (1.6)	Lower (0.6)
Race betting	NS (16.0)	Higher (21.0)	Higher (19.0)	NS (15.0)	Lower (10.0)
Sports betting	Higher (6.8)	Higher (6.7)	NS (4.9)	Lower (1.5)	Lower (0.6)

EGM = electronic gaming machine; NS = difference not significant

^a Participation compared to the other age groups. Higher means higher rates of participation; lower means lower rates of participation; NS means no significant difference.

Note: Questions asked: 'Which of the following activities have you spent any money on in the past 12 months?' and 'May I confirm your age?'

Table 6 Participation in gambling activities (weighted, all respondents $n = 15,000$)

Activity	Not at all (%)	Population rate (%)	Frequency		
			Once a week or more (%)	1–3 times per month (%)	Less than once per month (%)
Lotto, Powerball or the pools	52.5	47.5	18.3	9.4	19.8
Raffles and sweeps	57.1	42.9	1.2	5.1	36.6
EGMs	78.5	21.5	1.6	4.2	15.6
Race betting	83.6	16.4	2.1	2.0	12.4
Scratch tickets	84.7	15.3	1.1	2.8	11.4
Phone competitions	92.7	7.4	0.2	1.1	6.1
Table games	95.4	4.6	0.2	0.3	4.2
Sport and event betting	96.0	4.0	0.6	1.0	2.3
Informal private betting	96.5	3.5	0.4	0.6	2.5
Speculative investments	96.8	3.2	–	–	–
Keno	97.7	2.3	0.4	0.2	1.7
Bingo	97.9	2.1	0.7	0.4	1.0

– = analysis not done; EGM = electronic gaming machine

Notes:

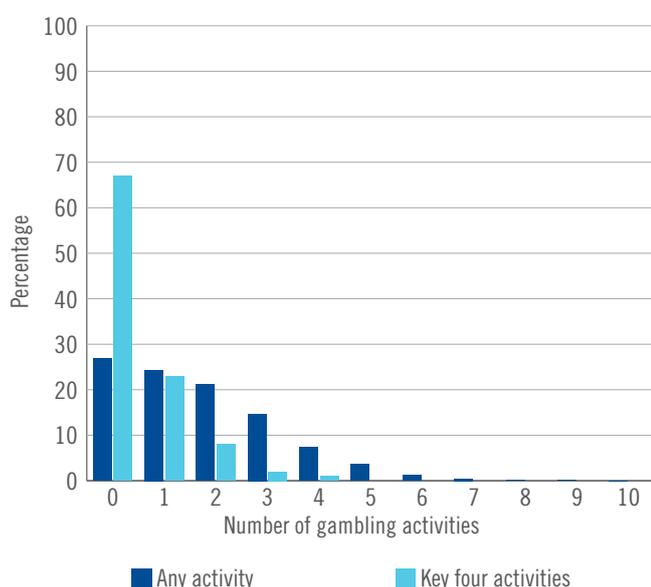
1. Rows with bold text represent the four key gambling activities.

2. Questions asked: 'Which of the following activities have you spent any money on in the past 12 months?' and 'How often did you take part in [insert activity] in the past 12 months?'

3.2.3 PARTICIPATION BY NUMBER OF ACTIVITIES AND PROBLEM GAMBLING RISK CATEGORY

Participants varied in the number of gambling activities in which they engaged. Approximately 27% of the population report not gambling at all. Another 46% engage in one or two gambling activities and 27% engage in three or more.

When only EGMs, table games, horse racing and sports betting are considered, 67% of the population does not engage in these activities. About 23% engage in one activity of the four key activities, 8% in two, 2% in three and 1% in all four (Figure 6).



Note: Question asked: 'Which of the following activities have you spent any money on in the past 12 months?' (Base: all respondents.)

Figure 6 Number of gambling activities engaged in the past 12 months (weighted, n = 15,000)

Table 7 provides rates of gambling participation across the four key gambling activities by PGSI problem gambling risk categories. The pattern of participation is quite different across the gambling risk groups. These results show that participation rates for some, but not all, gambling activities are higher for higher risk gamblers (i.e. moderate-risk and problem gamblers) than it is for non-problem gamblers.

Problem gamblers had the highest participation in any single activity, with 91.0% engaging in EGMs. Betting on horse or harness racing (33.6%) was almost twice the population averages of 16.4%. Betting on table games (25.0%) and betting on sports (15.7%) were around four to five times the population level. Overall, moderate-risk gamblers participated in similar activities, but at reduced percentages compared with problem gamblers.

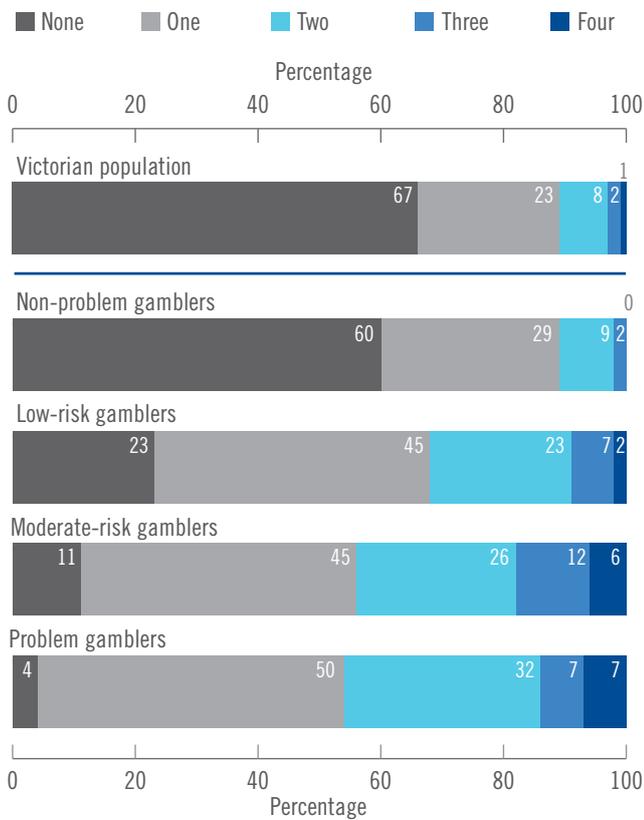
Figure 7 shows that the higher the gambling risk, the more likely gamblers were to engage in multiple gambling activities. For example, less than 1% of non-problem gamblers compared with 7% of problem gamblers participated in all four key gambling activities. Few problem gamblers (4%) engaged in none of these key activities compared with non-problem gamblers (60%).

Table 7 Participation in key gambling activities by gambling segment in Victoria 2008 (weighted, all respondents n = 15,000)

Activity	Victorian population	PGSI category			
		Non-problem gambler	Low-risk gambler	Moderate-risk gambler	Problem gambler
EGMs	21.5	24.7	54.6	77.2	91.0
Horse and greyhound race betting	16.4	20.6	34.6	40.1	33.6
Table games	4.6	4.5	17.2	24.2	25.0
Sport and event betting	4.0	4.1	14.2	17.2	15.7

EGM = electronic gaming machine; PGSI = Problem Gambling Severity Index

Note: Question asked: 'Which of the following activities have you spent any money on in the past 12 months?'



Notes:
 1. Question asked: 'Which of the following activities have you spent any money on in the past 12 months?' (Base: all respondents.)
 2. Totals may not equal 100% due to rounding.

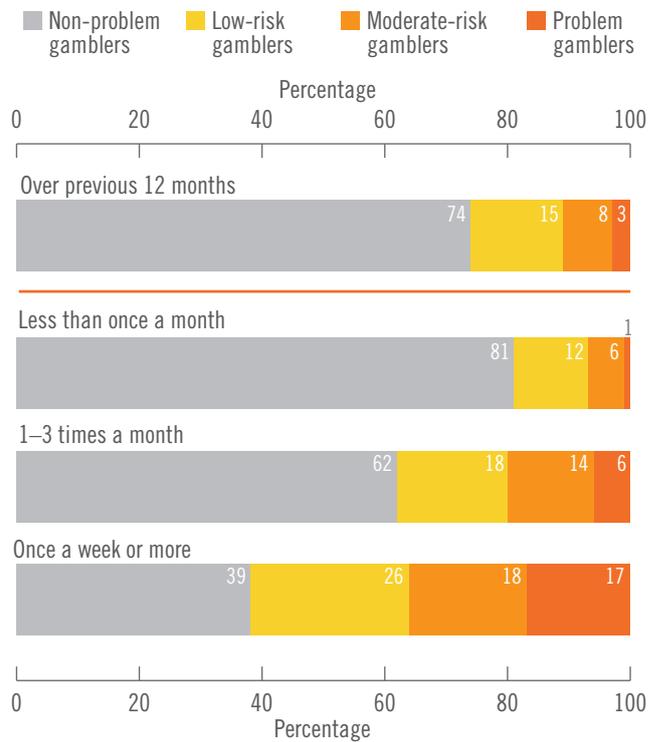
Figure 7 Gambling risk levels and number of key gambling activities (weighted, $n = 15,000$)

3.2.4 PARTICIPATION BY GAMBLING ACTIVITY AND PROBLEM GAMBLING RISK CATEGORY

The following sections highlight the relationship between gambling activity, frequency of gambling on the activity and gambling risk category. Again, the results presented relate only to the four key gambling activities (EGMs, table games, race betting and sports betting). Results relating to frequency of gambling and gambling risk category for other activities (i.e. informal betting and Lotto) are presented in Appendix B.

ELECTRONIC GAMING MACHINES

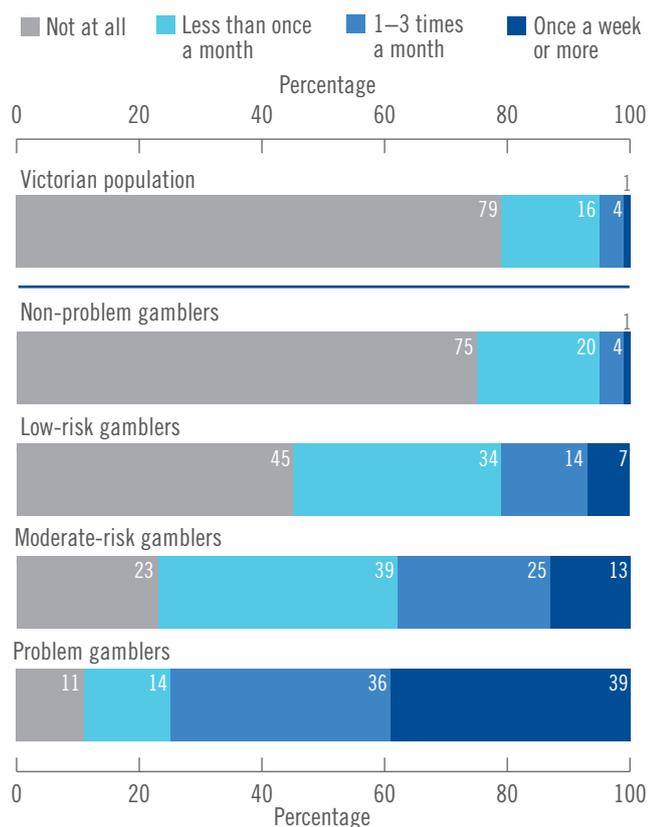
Approximately 21% (860,000) of the adult Victorian population in 2008 had gambled on EGMs in the previous year. Of these, 3% were problem gamblers. When EGM gamblers were separated into groups based on the frequency of their EGM gambling, the group that gambled on EGMs more frequently contained a higher proportion of problem gamblers. Figure 8 shows that, as gambling frequency increased from 1–3 times per month to once a week or more, the proportion of problem gamblers increased from 6% to 17%.



Notes:
 1. Questions asked: 'Which of the following activities have you spent any money on in the past 12 months?' and 'How often did you take part in EGMs in the past 12 months?' (Base: all respondents.)
 2. Totals may not equal 100% due to rounding.

Figure 8 Gambling risk group by frequency of playing electronic gaming machines (weighted, $n = 3251$)

Participants with higher PGSI gambling risk were more likely to play EGMs at a higher frequency, whereas those with lower PGSI gambling risk play EGMs at a lower frequency or not at all. Figure 9 shows that, in 2008, 39% of problem gamblers played EGMs weekly or more during the previous 12 months, compared with 13% of moderate-risk gamblers, 7% of low-risk gamblers and 1% of non-problem gamblers.



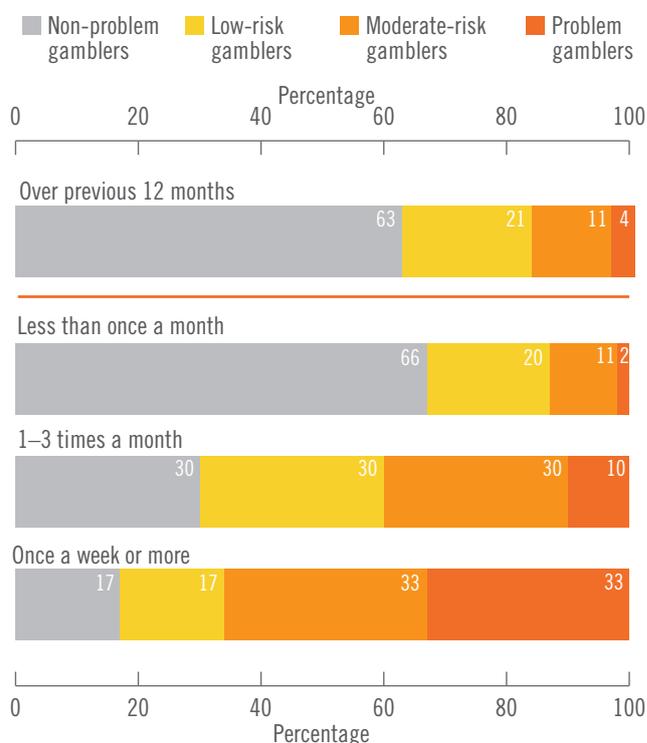
Notes:

1. Questions asked: 'Which of the following activities have you spent any money on in the past 12 months?' and 'How often did you take part in EGMs in the past 12 months?' (Base: all respondents.)
2. Totals may not equal 100% due to rounding.

Figure 9 Frequency of playing electronic gaming machines by risk group (weighted, $n = 3251$)

TABLE GAMES

Of the estimated 181,500 Victorians (4.9% of the adult Victorian population in 2008) who played table games, 4% were problem gamblers. When these table games players were separated into groups based on the frequency of playing, the group that played table games more frequently contained a higher proportion of problem gamblers. Figure 10 shows that as reported gambling frequency increased from 1-3 times per month to once a week or more, the proportion of problem gamblers increased from 10% to 33%.

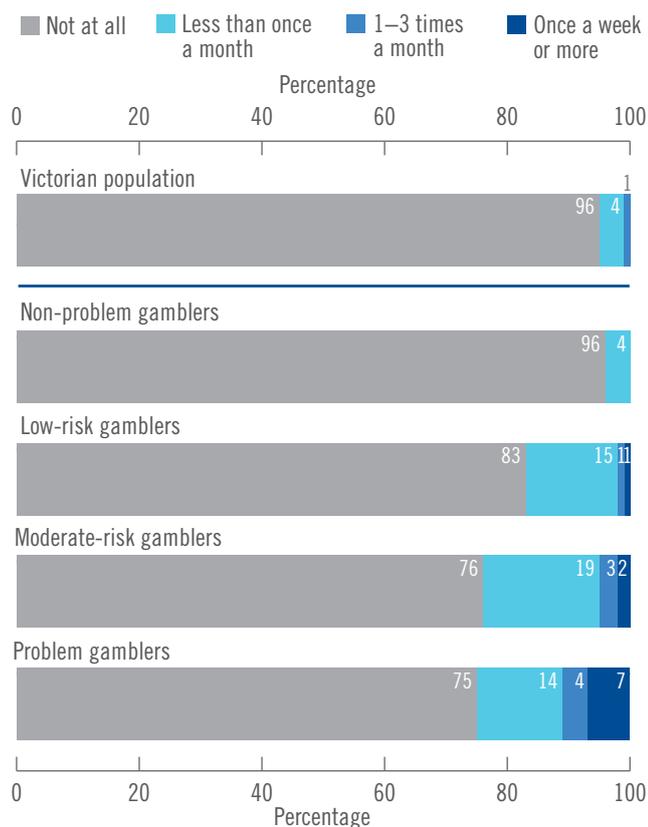


Notes:

1. Questions asked: 'Which of the following activities have you spent any money on in the past 12 months?' and 'How often did you take part in table games in the past 12 months?' (Base: all respondents.)
2. Totals may not equal 100% due to rounding.

Figure 10 Gambling risk group by frequency of playing table games (weighted, $n = 486$)

Similarly, participants with higher PGSI gambling risk were more likely to play table games at a higher frequency, whereas those with lower PGSI gambling risk play table games at a lower frequency or not at all. The majority of non-problem gamblers (96%) did not participate in table games. Figure 11 shows that, in 2008, 7.0% of problem gamblers played table games weekly or more during the past 12 months, compared with 2.0% of moderate-risk gamblers and 0.4% of low-risk gamblers.



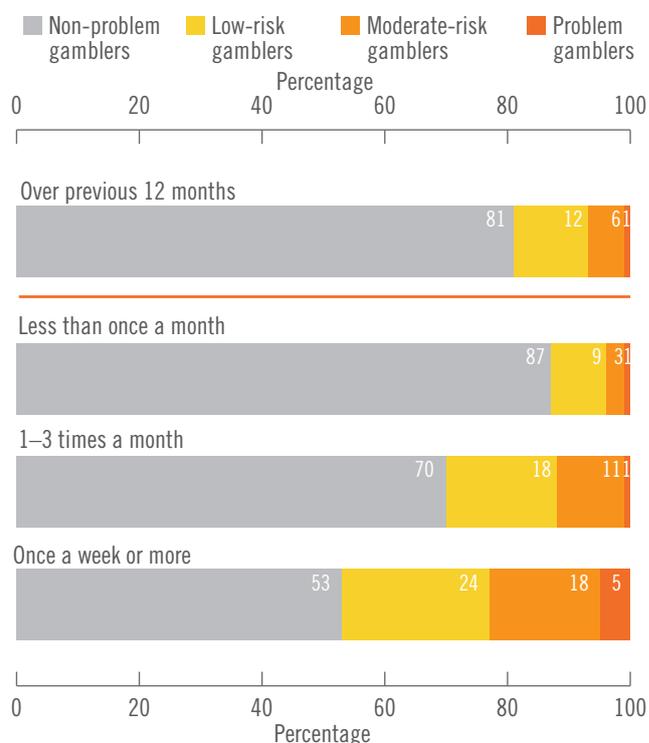
Notes:

1. Questions asked: 'Which of the following activities have you spent any money on in the past 12 months?' and 'How often did you take part in table games in the past 12 months?' (Base: all respondents.)
2. Totals may not equal 100% due to rounding.

Figure 11 Frequency of playing table games by risk group (weighted, $n = 486$)

RACE BETTING

Of the estimated 660,000 Victorians (16% of the adult Victorian population in 2008) who bet on horse and greyhound races, 1% were problem gamblers. When these horse and greyhound races gamblers were separated into groups based on the frequency of betting, the group that betted the most frequently contained a higher proportion of problem gamblers. Figure 12 shows that, as reported gambling frequency increased from 1-3 times per month to once a week or more, the proportion of problem gamblers increased from 1% to 5%.

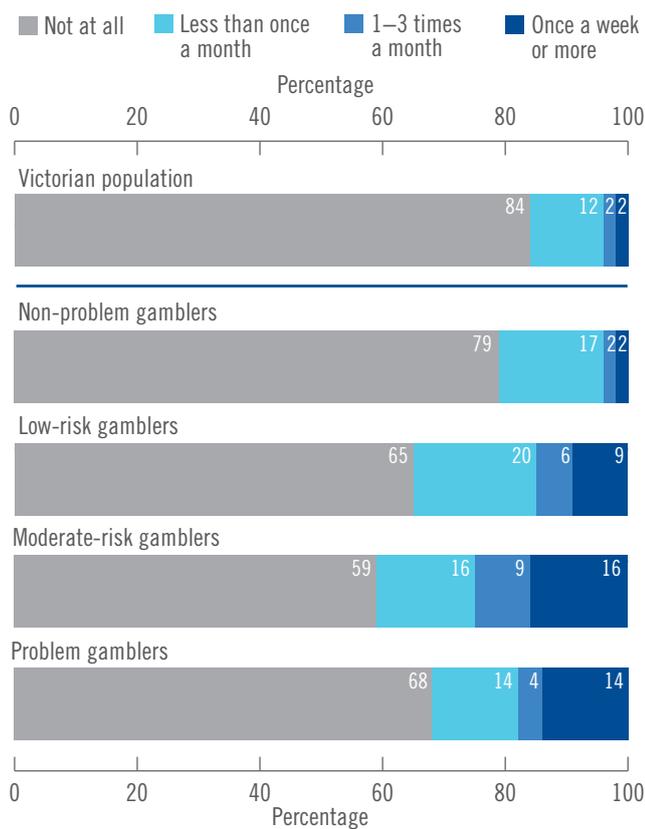


Notes:

1. Questions asked: 'Which of the following activities have you spent any money on in the past 12 months?' and 'How often did you take part in racing in the past 12 months?' (Base: all respondents.)
2. Totals may not equal 100% due to rounding.

Figure 12 Gambling risk group by frequency of betting on horses and greyhounds (weighted, $n = 2250$)

Similarly, participants with higher PGSI gambling risk were more likely to bet on races at a higher frequency, whereas those with lower PGSI gambling risk bet on races at a lower frequency or not at all. The majority of non-problem gamblers (79%) did not bet on horse or greyhound racing. Figure 13 shows that, in 2008, 14% of problem gamblers bet on races weekly or more during the past 12 months, compared with 16% of moderate-risk gamblers and 9% of low-risk gamblers.

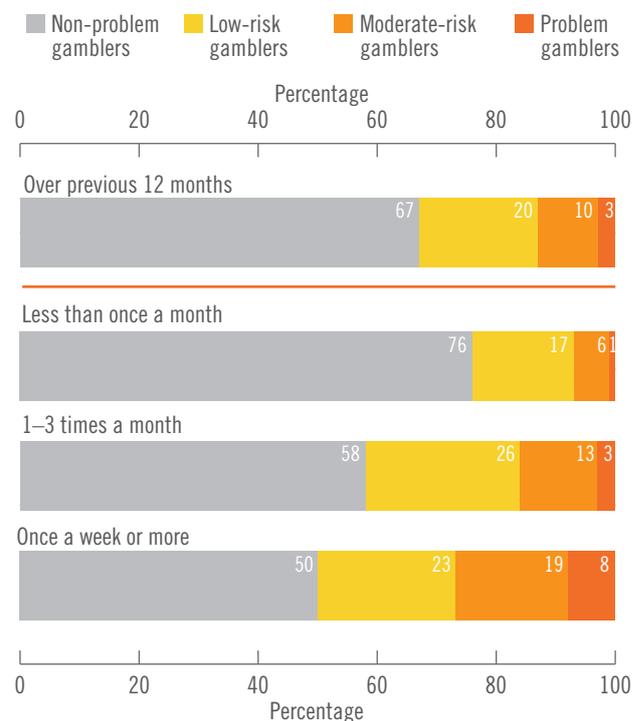


Note:
 1. Questions asked: 'Which of the following activities have you spent any money on in the past 12 months?' and 'How often did you take part in racing in the past 12 months?' (Base: all respondents.)
 2. Totals may not equal 100% due to rounding.

Figure 13 Frequency of betting on horse and greyhound racing by risk group (weighted, $n = 2250$)

SPORTS BETTING

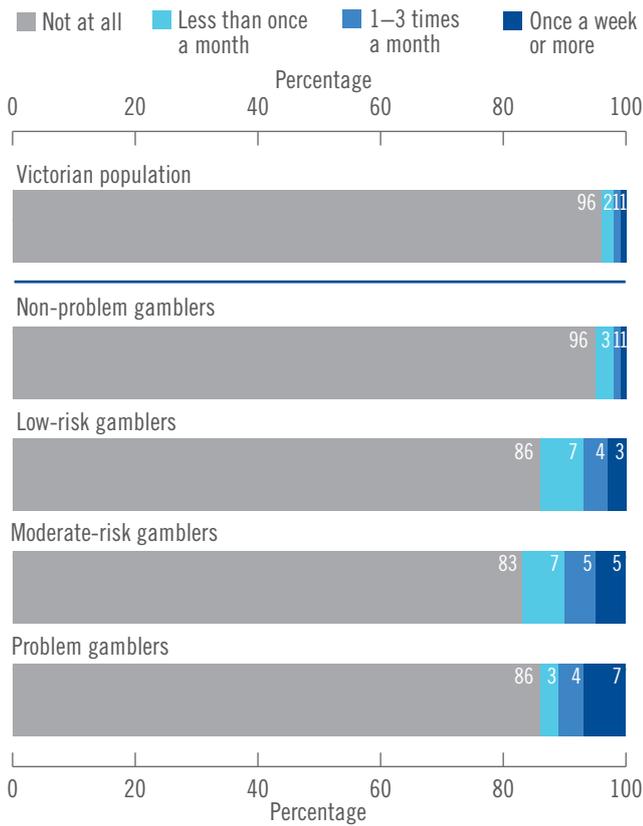
Of the estimated 158,000 Victorians (4% of adult Victorian population in 2008) who bet on sports in the past year, 3% were problem gamblers. When sports betters were separated into groups based on the frequency of betting, the group that bet more frequently contained a higher proportion of problem gamblers. Figure 14 shows that, as reported gambling frequency increased from 1-3 times per month to once a week or more, the proportion of problem gamblers increased from 3% to 8%.



Notes:
 1. Questions asked: 'Which of the following activities have you spent any money on in the past 12 months?' and 'How often did you take part in sports betting in the past 12 months?' (Base: all respondents.)
 2. Totals may not equal 100% due to rounding.

Figure 14 Gambling risk group by frequency of sports betting (weighted, $n = 436$)

Similarly, participants with higher PGSI gambling risk were more likely to bet on sports at a higher frequency, whereas those with lower PGSI gambling risk bet on sports at a lower frequency or not at all. The majority of non-problem gamblers (96%) did not bet on sports. Figure 15 shows that, in 2008, 7% of problem gamblers bet on sports weekly or more during the past 12 months, compared with 5% of moderate-risk gamblers and 3% of low-risk gamblers.



Notes:

1. Questions asked: 'Which of the following activities have you spent any money on in the past 12 months?' and 'How often did you take part in sports betting in the past 12 months?' (Base: all respondents.)
2. Totals may not equal 100% due to rounding.

Figure 15 Frequency of sports betting by risk group (weighted, *n* = 436)

3.3 PROBLEM GAMBLING AND LIFETIME GAMBLING RISK

This section presents results relating to lifetime gambling problems. In addition to quantifying lifetime gambling problems in the 2008 Victorian population, it compares lifetime to past-year gambling problems. The information in this section is based on analysis of another screening tool for gambling problems, NODS CLiP2.

3.3.1 LIFETIME RISK

Table 8 shows that the estimated Victorian prevalence of lifetime problem gambling and lifetime pathological gambling is 1.2% and 1.1%, respectively. While this may appear to be a small proportion of the population, it represents an estimated 38,984 adult Victorians reporting lifetime pathological gambling and 35,735 reporting lifetime problem gambling in 2008.

Table 8 Prevalence of lifetime gambling risk behaviours in Victorian population, 2008 (weighted, respondents who have ever gambled in life *n* = 12,292)

Lifetime risk for problem gambling	Victorian adults (%)	Lower limit (%)	Upper limit (%)
Lifetime non-problem gamblers	93.1	92.5	93.7
Lifetime at-risk gamblers	4.6	4.1	5.1
Lifetime problem gamblers	1.2	1.0	1.5
Lifetime pathological gamblers	1.1	1.0	1.4

Note: Lifetime risk based on NODS CLiP2 score.

3.3.2 LIFETIME RISK COMPARED WITH PAST-YEAR RISK

Past-year prevalence of gambling problems according to the PGSI screen was compared with lifetime gambling problems according to the NODS CLiP2 screen. The PGSI and the NODS CLiP2 are different screens for gambling problems and are asked over different time frames.

There are differences between the NODS CLiP 2 and the PGSI. The former is derived from the NODS CLiP, which is based on the NORC Diagnostic Screen for Gambling Disorders (NODS), a 17 item diagnostic screen. This screen is derived from the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM IV). The NODS CLiP2 includes questions on multiple dimensions, including illegal acts.

The PGSI is a 9 item population, rather than diagnostic, screening tool that focuses on past year gambling risk only and measures adverse consequences and problem gambling behaviour. The PGSI has a stronger emphasis on social and environmental factors related to problem gambling (Ferris and Wynne 2001).

Most past-year problem gamblers reported lifetime problem or pathological gambling. Table 9 shows that most (more than 88%) participants that reported problem gambling in the past 12 months also reported lifetime problem or lifetime pathological gambling behaviour. More than 22% of moderate-risk gamblers also reported lifetime problem or lifetime pathological gambling behaviour, whereas only a small percentage (less than 3%) of low-risk,

non-problem and non-gamblers reported having lifetime problem or lifetime pathological gambling behaviour.

On the other hand, not all lifetime problem or lifetime pathological gamblers report being problem gamblers or moderate-risk gamblers in the past 12 months—supporting the hypothesis that problem gambling behaviour waxes and wanes over time. Table 10 shows that almost one-half (44%) of the lifetime pathological gamblers and almost one-quarter (24%) of lifetime problem gamblers report problem gambling in the past 12 months. Approximately 29% of lifetime problem gamblers and 31% of lifetime pathological gamblers report being non-gamblers or non-problem gamblers in the past 12 months.

Table 9 Current gambling status compared to lifetime risk in Victorian population, 2008 (weighted, respondents who have ever gambled in life $n = 12,292$)

PGSI category	NODS CLiP2 category				Total (%)
	Lifetime non-problem gambler (%)	Lifetime at-risk gambler (%)	Lifetime problem gambler (%)	Lifetime pathological gambler (%)	
Non-gamblers	95.9	2.6	0.8	0.7	100.0
Non-problem gamblers	96.9	2.4	0.3	0.4	100.0
Low-risk gamblers	78.0	19.1	1.8	1.1	100.0
Moderate-risk gamblers	42.9	34.9	15.3	6.9	100.0
Problem gamblers	5.2	5.9	31.6	57.3	100.0
All Victorians	93.1	4.6	1.2	1.1	100.0

Note: Based on NODS CLiP2 score (lifetime risk) and the Problem Gambling Severity Index (PGSI) (gambling status).

Table 10 Lifetime risk compared with current gambling status in Victorian population, 2008 (weighted, respondents who have ever gambled in life $n = 12,292$)

PGSI category	NODS CLiP2 category			
	Lifetime non-problem gambler (%)	Lifetime at-risk gambler (%)	Lifetime problem gambler (%)	Lifetime pathological gambler (%)
Non-gambler	10.0	5.4	7.9	5.6
Non-problem gambler	82.7	41.6	21.1	25.0
Low-risk gambler	5.9	29.5	10.5	5.6
Moderate-risk gambler	1.4	22.2	36.8	19.4
Problem gambler	0.0	1.3	23.7	44.4
Total	100.0	100.0	100.0	100.0

Note: Based on NODS CLiP2 score (lifetime risk) and the Problem Gambling Severity Index (PGSI) (gambling status).

3.4 PROBLEM GAMBLING INCIDENCE

Incidence is the number of new cases of a condition in a population in a given time period. By following the same group of people over time, the longitudinal component of this study enabled an incidence rate of problem gambling for Victoria to be determined. While prevalence tells us how widespread problem gambling is, incidence provides the rate of occurrence of new cases and conveys information about the rate of developing problem gambling.

Analysing data from Wave 1 and Wave 2 provides a 12-month incidence rate for problem gambling. This involved adjusting the Wave 2 sample to make it more representative of the Victorian adult population.

3.4.1 TWELVE-MONTH INCIDENCE RATE

The 12-month incidence rate for the Victorian adult population was 0.36%. The rate includes participants who were problem gamblers

at some stage before the 12 months of the study period and accords with the fluid nature of problem gambling, where gamblers move in and out of risk categories over time.

3.4.2 INCIDENCE—NEW VERSUS RELAPSING PROBLEM GAMBLERS

Using the NODS CLiP2 screen, the incident cases of problem gambling in the 12-month period were analysed to estimate how many of the problem gamblers had a previous history of problem gambling and how many were first-time cases (see Figure 16).

Approximately one-third of the incidence rate (0.12%) was found to be problem gamblers without a previous history of problem or pathological gambling during their lifetime (new cases). Approximately two-thirds of the incidence rate (0.24%) were problem gamblers with a previous history of lifetime problem gambling or pathological gambling (relapse cases).

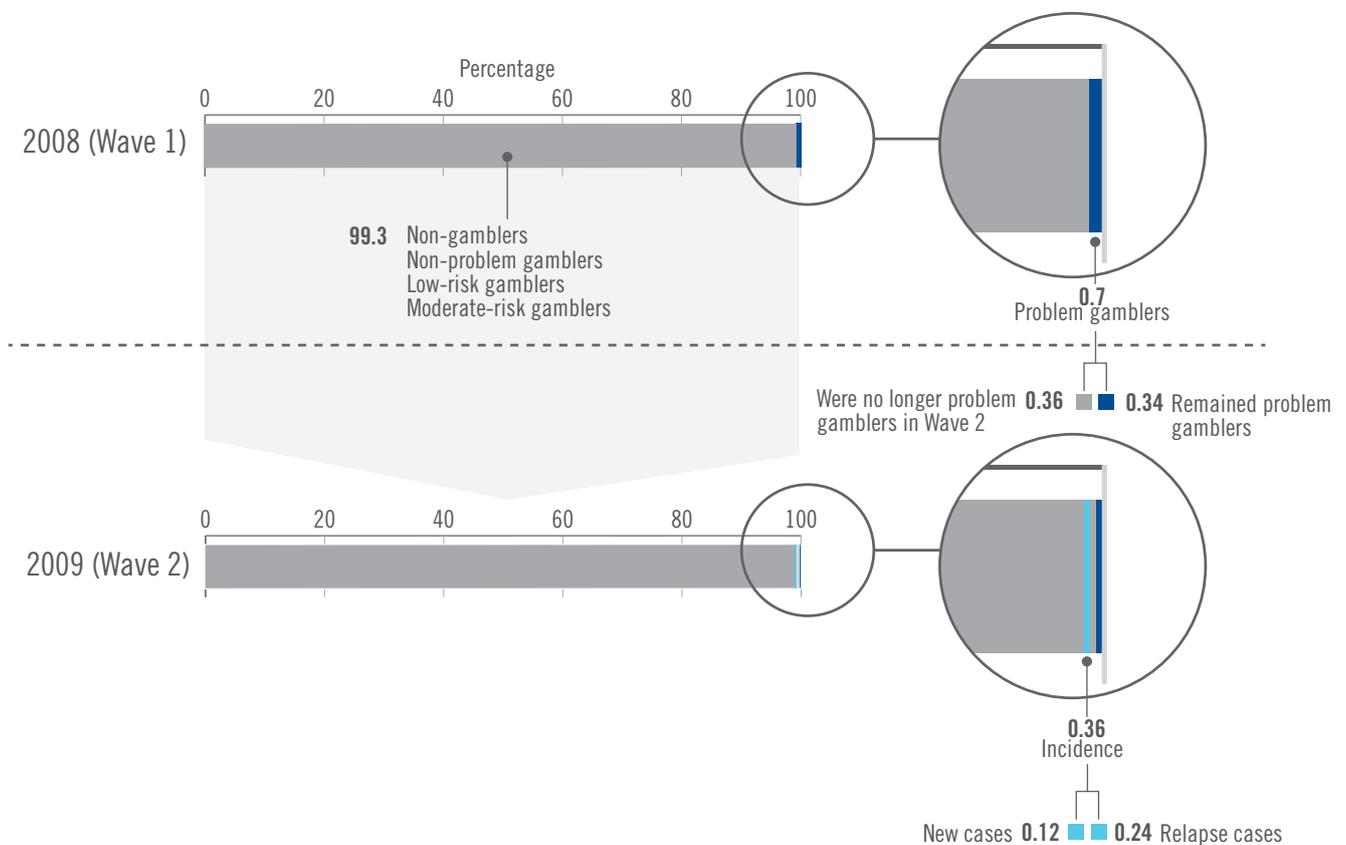


Figure 16 Prevalence and incidence of problem gambling in Victoria

CHAPTER 4

GAMBLING, HEALTH AND SOCIAL CONTEXT

One of the key objectives of the Victorian Gambling Study was to better understand the health and social dimensions of gambling. This chapter provides the key findings of the variables most strongly associated with gambling, health and social capital.

Last (2001) defines morbidity as any departure, subjective or objective, from a state of physiological or psychological wellbeing. Morbidity is a disorder or condition. Comorbidity refers to the presence of two or more disorders or conditions experienced simultaneously by one person. Comorbidities are often referred to as concurrent, co-existing or co-occurring conditions.

Associations between problem gambling and mental and physical health conditions are an important public health concern. Research has consistently shown an association between problem gambling and mental health conditions such as substance use, depression and anxiety (Abdollahnejad et al 2013, Black et al 2013, Haw et al 2013, Lorains et al 2011). Although evidence showing that problem gamblers are more likely to have physical health problems is weaker than the mental health association, there are some data indicating that this may be the case. For example, the report from Wave 1 of this study shows associations between problem gambling and lung conditions, asthma and obesity, as well as health risk factors such as smoking and drinking (Hare 2009). In addition, Black et al (2013) found links between some health conditions (e.g. obesity) and problem gambling.

There is an association between problem gambling and many comorbid disorders. This may include depressive disorders, anxiety, substance use disorders, mental illness or addiction crime (Haw et al 2013). The Productivity Commission (1999)—in its national survey of 10,500 adult gamblers—found that, among problem gamblers in Australia (using the South Oaks Gambling Screen [SOGS], not the Problem Gambling Severity Index [PGSI]):

- 58.1% ever had depression due to gambling compared with 2.1% of general population
- 9.2% ever seriously considered suicide due to gambling compared with 0.3% of general population.

In 2008 in Victoria, problem gamblers reported poorer health than non-problem gamblers according to a range of measures. These health results are presented more extensively in the first report from this study, but can be summarised as:

- 16.8% of problem gamblers self-reported poor health compared with 3.4% of non-problem gamblers

- 54.0% of problem gamblers were past-year smokers compared with 22.0% of non-problem gamblers
- 7.0% of problem gamblers had high levels of clinical alcohol abuse compared with 0.4% of non-problem gamblers
- 52.0% of problem gamblers reported having depression compared with 8.0% of non-problem gamblers
- 46.0% of problem gamblers reported having an anxiety disorder compared with 7.0% of non-problem gamblers
- 24.0% of problem gamblers were likely to have severe psychological distress compared with 1.4% of non-problem gamblers
- 27.0% of problem gamblers and 6.0% of moderate-risk gamblers reported considering taking their own life in the past year.

Schaffer and Korn (2002) note that there are many complexities of comorbidities. These may include:

- both disorders being independent of each other
- one disorder protecting against the other
- one disorder causing the other
- both disorders sharing the same cause or being components of a more complex set of symptoms.

Section 4.1 presents findings relating to associations between gambling and health comorbidities.

4.1 GAMBLING AND HEALTH

This section presents findings from across the four waves of the longitudinal study relating to health. It includes findings about self-reported health, mental health (psychological distress), past-year and current smoking, and clinically significant alcohol abuse (i.e. a CAGE score > 2). In general, problem gamblers reported more health issues across all four waves than other groups in the study population, including non-gamblers.

In Wave 1, all problem gamblers, moderate- and low-risk gamblers, and one in three non-problem gamblers were asked questions about their health. In waves 2–4, all participants were asked the same health questions. The proportion of the health characteristic and 95% confidence intervals (CIs) were calculated for each gambling risk segment. Gambler risk type was grouped into four categories: zero-risk participants (non-gamblers and non-problem

gamblers combined), low-risk gamblers, moderate-risk gamblers and problem gamblers for all waves.

Wave 1 did not sample non-gamblers for the health questions and therefore zero-risk gamblers in Wave 1 consisted of non-problem gamblers only. Odds ratios (ORs) with 95% confidence intervals for Wave 1 and Wave 4 were calculated to examine the strength and direction of the association between each health characteristic and problem gambling. Results were similar across all waves so only Wave 1 and Wave 4 are represented graphically for simplicity. The ORs compared the proportion of a health characteristic in problem gamblers with that of zero-risk gamblers. Data were unweighted in this section. Weighted results for Wave 1 are in the Wave 1 report (Hare 2009).

4.1.1 SELF-REPORTED HEALTH

When I'm not working, a lot of sleeping really. I'm diabetic and I get very tired. —female, Victorian Gambling Study, qualitative study

Self-reported health status is a strong predictor of future health care use and mortality, independent of other medical, behavioural or psychosocial risk factors (Victorian Department of Health 2003).

Respondents in all four waves were asked to summarise their own health status by indicating whether, in general, their health was excellent, very good, good, fair or poor. Most participants in the study, with the exception of problem gamblers, indicated that their overall health was fair, good, very good or excellent. Only a small proportion reported poor health.

In the 2010 Victorian Population Health Survey, the majority of Victorians aged 18 years and over (83.0%) reported excellent, very good or good health, and 12.7% and 2.6% reported fair and poor health, respectively (Victorian Department of Health 2010).

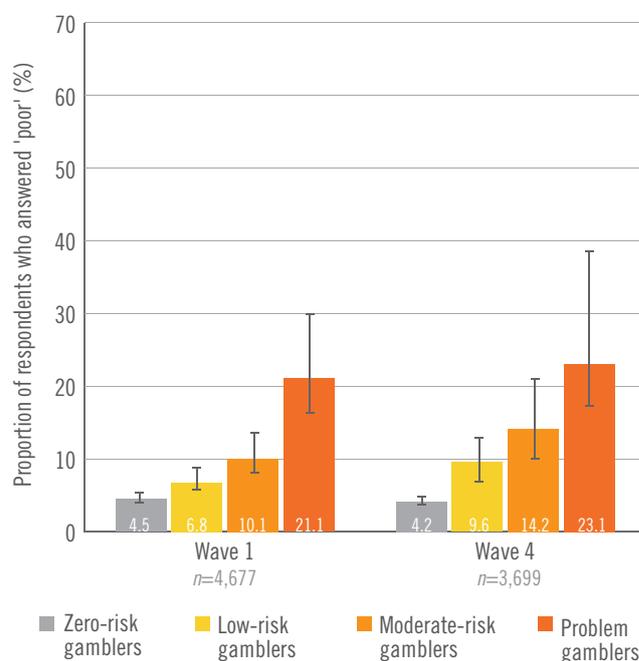
The proportion of the study population experiencing excellent, very good or good health decreases as gambling risk increases. In Wave 1:

- 84.5% of zero-risk participants reported excellent, very good or good health
- 71.6% of moderate-risk gamblers and 50.5% of problem gamblers reported excellent, very good or good health
- 11.0% and 4.5% of the zero-risk participants reported their health as fair and poor, respectively

- 18.3% and 10.1% of moderate-risk gamblers reported their health as fair and poor, respectively
- 28.4% and 21.1% of problem gamblers reported their health as fair and poor, respectively.

The results for waves 2 to 4 are similar to Wave 1. Approximately 10% and 5% of zero-risk participants reported fair and poor health, respectively. In contrast, 17–22% and 9–14% of moderate-risk gamblers, and 22–29% and 22–32% of problem gamblers reported fair and poor health, respectively. These data were not weighted.

Figure 17 details the responses of participants in Wave 1 and Wave 4 who responded to questions about their general health in the previous 12 months. Only Wave 1 and Wave 4 are shown for simplicity. Zero-risk gamblers comprised non-problem gamblers in Wave 1 and both non-gamblers and non-problem gamblers in subsequent waves. Problem gamblers and moderate-risk gamblers clearly rated their health as 'poor' more so than other risk categories. Compared to zero-risk participants, problem gamblers are more likely to report poor health (Wave 1: OR = 5.6, 95% CI 3.4–9.5, $P < 0.001$; Wave 4: OR = 6.9, 95% CI 3.2–14.8, $P < 0.001$).



Note: Question asked: 'Over the past 12 months, would you say that in general your health has been 1. Excellent, 2. Very good, 3. Good, 4. Fair, 5. Poor?' (Base: gamblers in Wave 1 and all respondents in Wave 4, excluding 'don't know' and refused to answer.)

Figure 17 Proportion of respondents reporting health as 'poor' in Wave 1 and Wave 4 (unweighted)

4.1.2 MENTAL HEALTH

But that's what happens. You get depressed, you go and blow your money and then you're depressed because you've blown your money. So work that out.
—male, Victorian Gambling Study, qualitative study

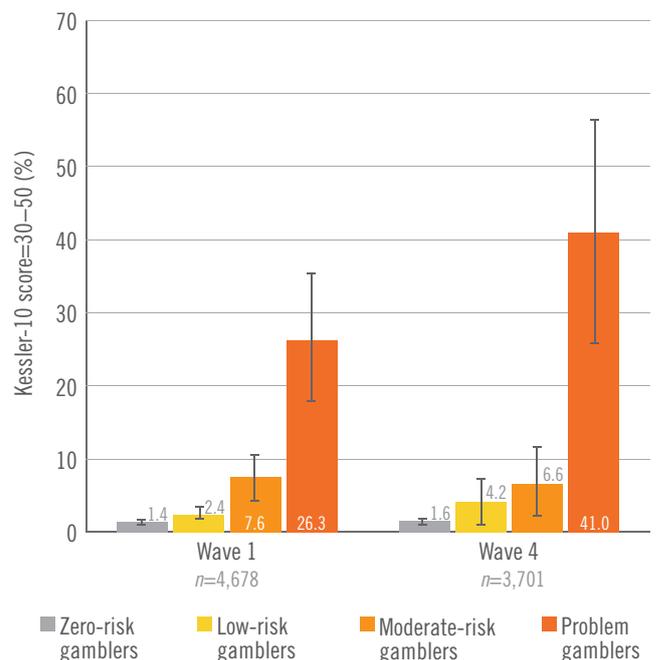
Mental health conditions such as anxiety and depression are commonly comorbid with problem gambling (Black et al 2013, Haw et al 2013, Lorains et al 2011). The Kessler Psychological Distress Scale (K10) was administered in all four waves of the study and covers the dimensions of depression and anxiety, such as restlessness, nervousness, hopelessness, sadness and worthlessness. The K10 questions relate to the four weeks preceding survey administration and responses are self-reported.

In the 2010 Victorian Population Health Survey (Victorian Department of Health 2010), the majority of Victorians aged 18 years and over (64.4%) reported low levels of psychological distress and a further 22.0% reported moderate levels. Only a small group of Victorians reported high (7.9%) and very high (2.6%) levels of distress.

In this study, the psychological risk level increased as the gambling risk level increased. In Wave 1, 1.4% of zero-risk participants reported severe levels of mental distress (categorised as very high in the Victorian Population Health Survey 2010). The proportion increased to 7.6% of moderate-risk gamblers and 26.3% of problem gamblers.

The percentage of the total longitudinal sample with severe psychological distress across all four waves was steady. In zero-risk participants, these ranged from 1.4% to 1.6%. The percentages of problem gamblers having severe psychological distress across all four waves increased from 26.0% to 41.0%; however, these changes are not statistically significant. This may be due to the small samples of problem gamblers in all four waves

Figure 18 shows the proportion of participants who reported severe psychological distress by gambling risk type. Only Wave 1 and Wave 4 are shown for simplicity. Zero-risk gamblers comprised non-problem gamblers in Wave 1 and both non-gamblers and non-problem gamblers in subsequent waves. Compared with zero-risk participants, problem gamblers are more likely to have severe psychological distress (Wave 1: OR = 24.6, 95% CI 14.4–42.1, $P < 0.001$; Wave 4: OR = 41.8, 95% CI 20.9–83.4, $P < 0.001$).



Note: Question asked: 'During the past four weeks, about how often did you feel ... (using the Kessler Psychological Distress Scale for non-specific psychological distress)?' (Base: all gamblers in Wave 1 and all respondents in Wave 4, excluding 'don't know' and refused to answer.)

Figure 18 Proportion of respondents having severe psychological distress in Wave 1 and Wave 4 (unweighted)

4.1.3 SMOKING

I suppose I was smoking less [after smoking bans] but it was worse for me because it'd be cold outside or you know, you'd be in such a hurry to make sure no one came out and pinched your machine or whatever that you'd be sucking it down ... and you know, you'd walk back inside and you'd just be like you know feeling really sick you know. —male, Victorian Gambling Study, qualitative study

Smoking prevalence was measured in two ways: past-year smoking and current smoking. All four waves of the study found a strong relationship between smoking and increased risk status for problem gambling. Problem gamblers have higher levels of cigarette smoking than other gamblers and the general Victorian population.

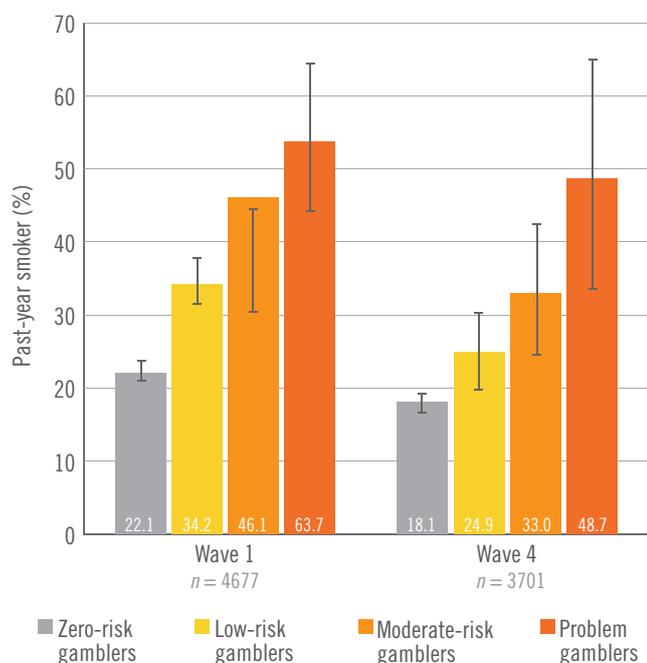
In 2010, approximately 16.8% of the Victorian population smoked, according to the Victorian Department of Health (2010). The survey defined current smokers as those persons who report smoking tobacco daily or occasionally, and the estimate is age standardised to the 2006 Victorian population. The Victorian Gambling Survey questions were different: 'Have you smoked at all in the past 12 months?' and 'Do you currently smoke?' Therefore, the results

are indicative of the results seen in the Victorian Population Survey, but are expected to be different.

In the Victorian Gambling Study, past-year smoking rates increased as the gambling risk level increased. The past-year smoking rate among zero-risk participants was approximately 22% in Wave 1. The rate increased to 34% for low-risk gamblers, 46% for moderate-risk gamblers and 54% for problem gamblers. Current smoking rates were slightly lower: 17% for zero-risk participants, 27% for low-risk gamblers, 43% for moderate-risk gamblers and 47% for problem gamblers.

As in the general population, smoking rates decreased slightly during the study. In Wave 4, past-year smoking rates were 18% for zero-risk participants, 25% for low-risk gamblers, 33% for moderate-risk gamblers and 49% for problem gamblers.

Figure 19 shows that the proportion of smokers in the past 12 months increased as gambling risk increased. Only smoking rates for Wave 1 and Wave 4 are shown for simplicity. Zero-risk gamblers comprised non-problem gamblers in Wave 1 and both non-gamblers and non-problem gamblers in subsequent waves. Compared with zero-risk participants, problem gamblers are more likely to have smoked in the past 12 months (Wave 1: OR = 4.1, 95% CI 2.7–6.2, $P < 0.001$; Wave 4: OR = 4.3, 95% CI 2.3–8.1, $P < 0.001$).



Note: Question asked: 'Have you smoked at all in the past 12 months?' (Base: all gamblers in Wave 1 and all respondents in Wave 4.)

Figure 19 Proportion of smokers in the past 12 months (unweighted)

4.1.4 ALCOHOL

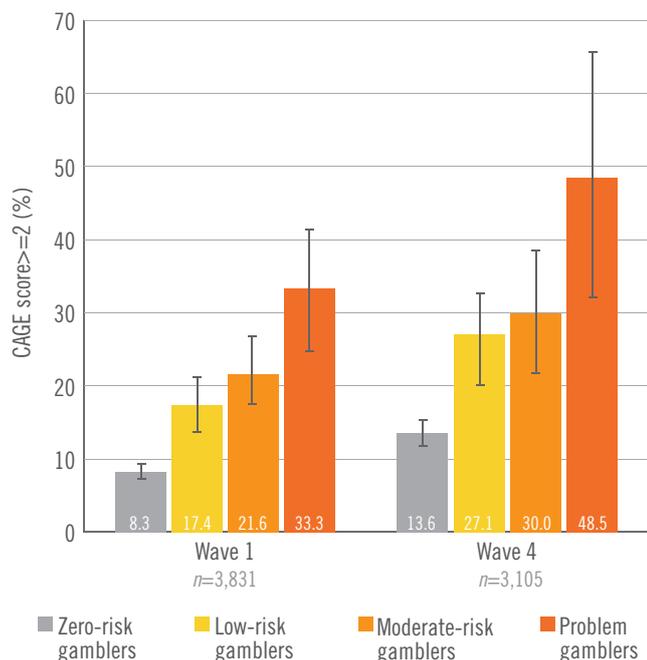
I ... we started drinking at three o' clock in the afternoon, and ended up going to bed at six am and woke up at six pm the next day and just thought, 'I've just blown that whole \$650', which I did. —male, Victorian Gambling Study, qualitative study

The CAGE alcohol screen is one of the most common short screens for assessing alcohol abuse and dependence. A score of two or more on the CAGE screen indicates clinically significant alcohol abuse.

In this study, the proportion of the population who reported signs of clinically significant alcohol abuse increased as the gambling risk level increased. The proportion of the population who reported signs of clinically significant alcohol abuse among zero-risk participants was approximately 8% in Wave 1. The proportion increased to 17% for low-risk gamblers, 22% for moderate-risk gamblers and 33% for problem gamblers.

In Wave 4, the proportion of the population who reported signs of clinically significant alcohol abuse was 14% in zero-risk participants, 27% for low-risk gamblers, 30% for moderate-risk gamblers and 49% for problem gamblers.

Figure 20 shows the proportion of the population who reported signs of clinically significant alcohol abuse increased as gambling risk increased. Only Wave 1 and Wave 4 are shown for simplicity. Zero-risk gamblers comprised non-problem gamblers in Wave 1 and both non-gamblers and non-problem gamblers in subsequent waves. Compared with zero-risk participants, problem gamblers are more likely to show signs of clinically significant alcohol abuse (Wave 1: OR = 5.6, 95% CI 3.3–9.2, $P < 0.001$; Wave 4: OR = 6.0, 95% CI 3.0–12.0, $P < 0.001$).



Notes:

1. Based on the CAGE four-item alcohol screen.
2. Question asked: 'The next questions are being asked to help work out if there is any link between alcohol and gambling patterns in the community. May I ask ...?' (Base: all gamblers in Wave 1 and all respondents in Wave 4, excluding 'don't know' and refused to answer.)

Figure 20 Alcohol abuse and gambling segment (unweighted)

4.2 GAMBLING AND SOCIAL CONTEXT

This section presents findings from the study relating to gambling and its social context. It includes findings about social capital, life events, and reasons or motivations for gambling.

Additional impetus for exploring this topic came from the qualitative interviews conducted between Wave 3 and Wave 4. These interviews highlighted the important role of a person's individual and social circumstances in influencing gambling behaviour.

Given this, participants in Wave 4 were asked questions about social connectedness and reasons for gambling, in addition to the other social connectedness questions asked in all waves. Wave 4 also reintroduced a question on trauma and hardship, which was asked in Wave 1, but not in Wave 2 or Wave 3.

4.2.1 SOCIAL CAPITAL

The pokie is like a refuge I think for a lot of older people ... who don't have a lot of things to do, or their social circumstances have diminished. You go into most pokies places these days and you'll see that most of the players are actually elderly women, 45 and over and they will be there by themselves, and they won't be looking very happy and you can go back the next day and they will be there again, and you can go back the next day and they'll be there again. —male, Victorian Gambling Study, qualitative study

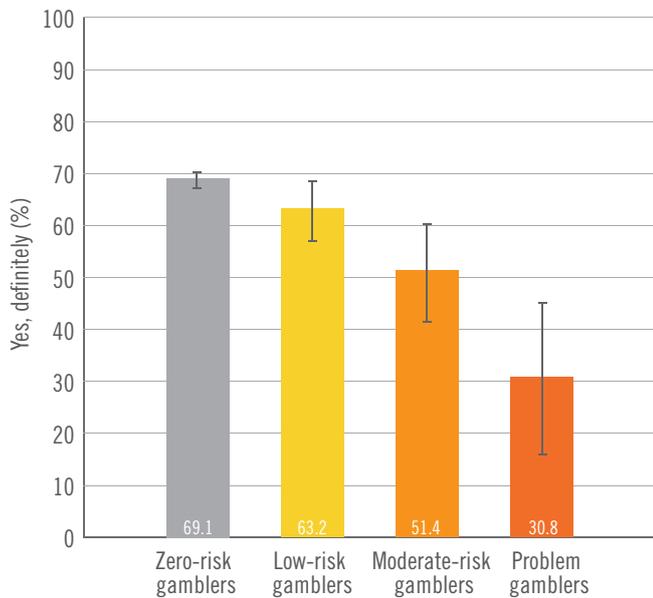
Social capital has been defined in many ways. It frequently refers to the features of social structures that make resources, advantages and opportunities available to individuals, and that can facilitate collective action. Most definitions of social capital are common in that they focus on networks among people that lead to cooperation and beneficial outcomes for all. Social capital affects health risk behaviour and, inversely, a lack of social capital can impair health. The association between strong social networks as a buffer to morbidity and mortality has been widely reported (Baum 2002, Lin et al 2007).

Problem gambling may also be associated with broader socioeconomic disadvantage. Rintoul et al (2013) link disadvantage and problem gambling at an area level. Electronic gaming machines are often located in areas of lower socioeconomic status, which often rate lower on measures of social capital. There is still debate about whether the higher gambling risk can be attributed to the easier access to the machines or the increased risk per se in these areas.

Several measures of social capital were included in one or more waves of the study, including questions relating to feeling valued, community participation, volunteering and the ability to raise money for an emergency. In Wave 1, all problem gamblers, moderate- and low-risk gamblers, and one in three non-problem gamblers were asked these questions. In waves 2–4, all participants were asked social capital questions. Therefore, in this section, zero-risk participants are the non-problem gamblers in wave 1, or the combined non-gamblers and non-problem gamblers in waves 2–4.

The first measure of social capital asked in waves 2–4 was whether participants felt valued by society. In Wave 4, problem gamblers were much less likely to answer 'yes, definitely' (31%) to this question compared with zero-risk participants (i.e. non-gamblers and non-problem gamblers who both score zero on the PGSI; 69%).

Findings from Wave 4 ($n = 3671$) show that, as participants' gambling risk level increased, the proportion of the group who reported that they 'feel valued by society' decreased. These differences are significant for all PGSI risk groups (see Figure 21).



Note: Question asked: 'Do you feel valued by society?' Prompts: Yes, definitely; Sometimes; No, not at all; Don't know; Refused. (Base: all respondents in Wave 4, excluding 'don't know' and refused to answer.)

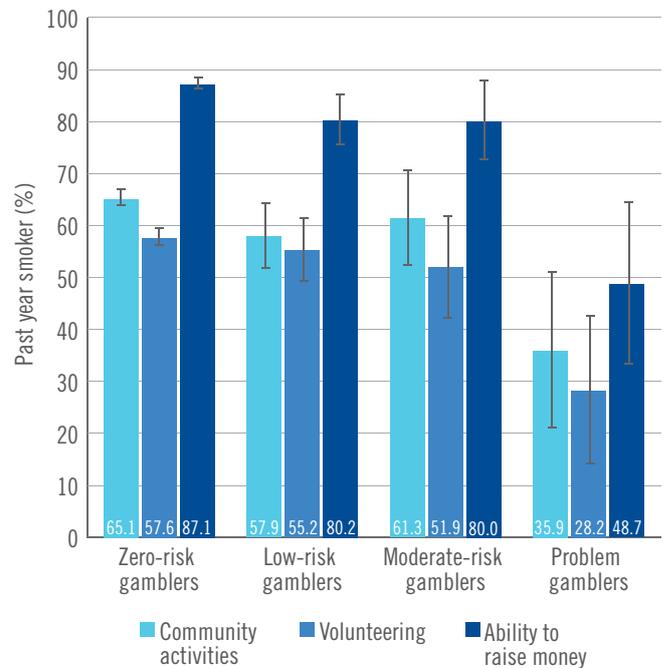
Figure 21 Feelings of value, Wave 4 ($n = 3671$, unweighted)

In addition to being asked whether they felt valued by society, participants were asked several other social capital measures. These were whether they:

- had been involved in any community activities or events in the past 12 months—for example, going to a local hall or community centre, playing a team sport, meeting with interest groups or clubs (in waves 2–4)
- had volunteered to help out the community in any way in the past 12 months (in Wave 4 only)
- could raise \$2000 within two days in an emergency (in Wave 4 only).

Figure 22 shows findings from these questions. It shows that problem gamblers were significantly less likely to answer 'yes, definitely' to involvement in community activities compared with zero-risk participants (36% versus 65%). In terms of voluntary community work, problem gamblers were much less likely to answer 'yes, definitely' compared with zero-risk participants (28% versus 58%). Finally, problem gamblers were much less likely to answer

'yes, definitely' to being able to raise \$2000 in an emergency compared with zero-risk participants (49% versus 87%). Once again, non-gamblers and non-problem gamblers were combined and labelled as zero-risk gamblers.



Note: Questions asked (items in the indicators of community strength survey): 'And may I also ask ...' 'Have you been involved in any community activities or events in the past 12 months (e.g. going to a local hall or community centre, playing a team sport, meeting with interest groups or clubs)?', 'Have you volunteered to help out in the community in any way in the past 12 months?' and 'If you needed to, could you raise \$2000 within two days in an emergency?' (Base: all respondents in Wave 4, excluding 'don't know' and refused to answer.)

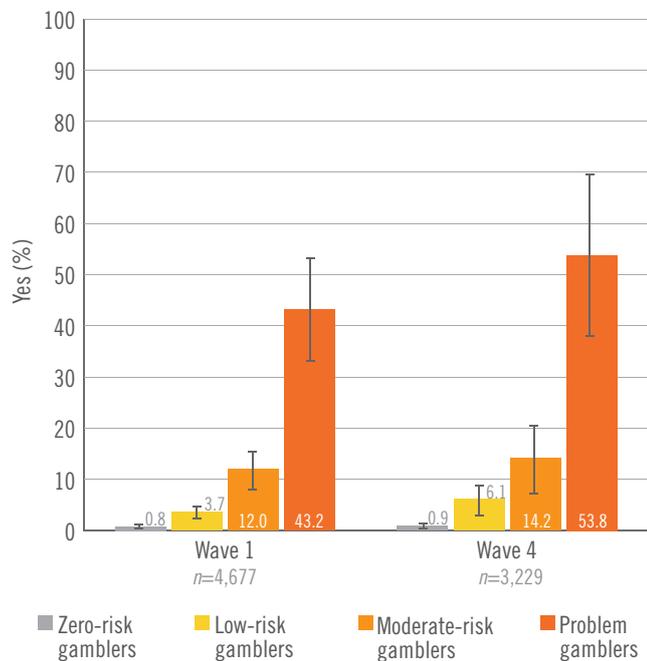
Figure 22 Community activities, volunteering and ability to raise money, Wave 4 (unweighted)

4.2.2 LIFE EVENTS, TRAUMA AND HARDSHIP

Basically it was a horror marriage ... psychologically unfit, he was diagnosed as a narcissist with paranoid schizophrenic tendencies and other things, I can't remember, he molested our children... —female, Victorian Gambling Study, qualitative study

Figure 23 shows the responses to life events as a trigger for increased gambling in the previous 12 months for Wave 1 and Wave 4 respondents. In Wave 1, the percentages of problem gamblers who indicated that they had a life event as a trigger to increase their gambling was 43.2% compared with less than 1% of zero-risk participants. In Wave 4, 53.8% of problem gamblers

indicated that they had a life event as a trigger to increase their gambling compared to less than 1% of zero-risk participants.



Notes:

1. Gambling segment based on the Problem Gambling Severity Index.
2. Question asked: 'Did any particular life event trigger an increase in your gambling in the past 12 months, even if only temporarily?' (Base: all gamblers in Wave 1 and all gamblers in Wave 4, excluding 'don't know' and refused to answer.)

Figure 23 Life events triggering an increase in gambling, by gambling segment (unweighted)

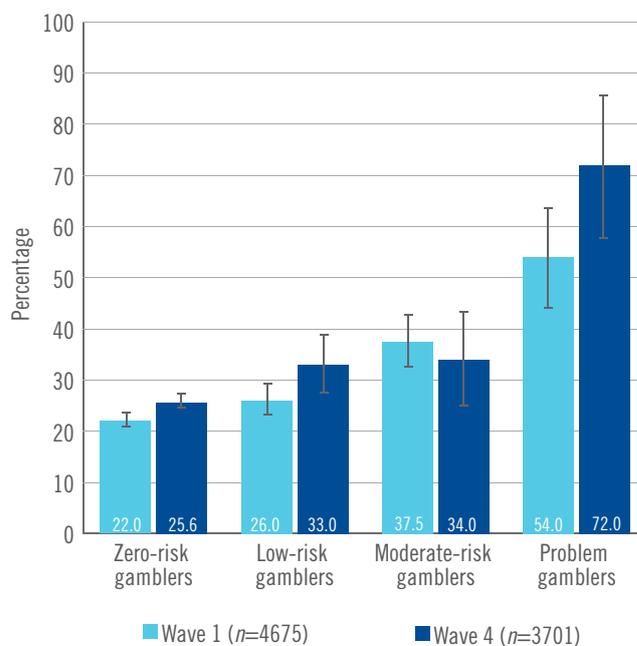
Moderate-risk and problem gamblers cited life events—such as death, divorce, retirement, injury and illness—as triggers for gambling. Compared with zero-risk participants, problem gamblers were more likely to report that at least one particular life event triggered an increase in their gambling in the past 12 months (Wave 1: OR = 95.6, 95% CI 54.9–166.6, $P < 0.001$; Wave 4: OR = 130.6, 95% CI 62.1–274.4, $P < 0.001$). In Wave 1, non-gamblers were not asked these questions; however, in Wave 4, non-gamblers were asked. Non-problem gamblers and non-gamblers were combined as zero-risk participants.

Trauma and hardship have been shown to be associated with problem gambling. In Wave 1, all gamblers were asked about trauma and hardship; however, these questions were not included in Wave 2 or Wave 3. The qualitative interviews after Wave 3 revealed that, for many people, trauma and hardship were present in their lives. This was explored in Wave 4 again and also asked

of non-gamblers. Non-gamblers and non-problem gamblers were combined in a zero-risk category.

Participants were asked to consider their personal background and indicate whether they did or did not have a lot of major problems, hardships and trauma. In Wave 1 and Wave 4, problem gamblers reported having a lot of major problems, hardships and trauma more frequently (54% in Wave 1 and 72% in Wave 4) than the other gambling groups. All other groups reported proportions of less than 38% (e.g. zero-risk gamblers report 22% and 26% in Wave 1 and Wave 4, respectively).

Figure 24 shows that as gambling risk increases, the proportion of respondents reporting having major problems, hardships and trauma also increases.



Notes:

1. Gambling segment based on the Problem Gambling Severity Index.
2. Question asked: 'Thinking of your personal background, would you say that you are someone who has had: 1. No really major problems, hardships or traumas in their life or upbringing, 2. A lot of trauma, hardship and problems in their life or upbringing?' (Base: all gamblers in Wave 1 and all respondents in Wave 4, excluding 'don't know' and refused to answer.)

Figure 24 Gambling risk group and major problems, hardships and trauma, Wave 1 and Wave 4 (unweighted)

4.3 GAMBLING AND PERCEPTIONS

... like you walk past the TAB and you just go, you know, it doesn't look good in terms of the type of people, like you are hanging in there and around, in terms of you know me, they don't look very successful and they just hang around looking really desperate, but in terms of yeah, someone's chronically just going out the pokies, you think they do look like losers, where as in terms of races, you know, going to the races, I know it's a stereotype, and it's not true, but if they are dressed up and they are looking, and all that stuff, you know, you think ok, that seems fine, it seems socially acceptable.
—female, Victorian Gambling Study, qualitative study

This section explores the gambling perceptions, attitudes and reasons provided by participants in the study.

4.3.1 REASONS FOR GAMBLING

I went to the pokies a lot, I found it difficult having little kids to, I suppose, have a life, so you find your escape in the evening when they are asleep and dad's home, and you can go out, quiet time for me. —
female, Victorian Gambling Study, qualitative study

One way in which this study investigated the social context of gambling was to explore the reasons why people do or do not gamble. Participants who did not gamble were asked to give reasons why they did not do so (multiple responses were allowed). The most frequent responses were that gambling was a boring activity or they had no interest in gambling (23%) and that gambling was a waste of money (22%).

Participants who had engaged in at least one gambling activity in the past 12 months and were able to identify their highest-spend gambling activity, were asked 'What are the top three main reasons you like to play your main gambling activity?' This section provides results relating to overall reasons for gambling from Wave 4, with more detailed results for key reasons for gambling associated with higher risk gamblers.

Table 11 shows reasons for gambling by PGSI gambling risk category. This shows that the three most common reasons for gambling (30% or more) were:

- social reasons
- to win money
- general entertainment.

The next most common reasons were:

- to raise money for charity
- to raise money for a school, club or local community
- for fun
- to win prizes.

Table 11 also shows that as gambling risk increased, so did the proportion of participants who reported loneliness, stress relief, taking their mind off things and boredom as reasons for gambling.

Loneliness plays an important part in problem gambling behaviour. This was highlighted by the qualitative component of the Victorian Gambling Study, where many participants discussed gambling due to loneliness. Given this was frequently reported in the face-to-face interviews, loneliness was added as a reason for gambling in the Wave 4 survey, following the qualitative study.

Findings from Wave 4 show that problem gamblers were much more likely to report loneliness as one of the top three reasons for gambling (23%) compared with moderate-risk gamblers (11%), low-risk gamblers (2%) and non-problem gamblers (less than 1%).

Problem gamblers were also much more likely to report stress relief as one of the top three reasons for gambling (26%) compared with moderate-risk gamblers (10%), low-risk gamblers (6%) and non-problem gamblers (1%).

Finally, problem gamblers were much more likely to report that gambling takes their mind off things as one of the top three reasons for gambling (21%) compared with moderate-risk gamblers (17%), low-risk gamblers (5%) and non-problem gamblers (2%).

Wave 4 also shows that problem gamblers were much more likely to report boredom as one of the top reasons for gambling (62%) compared with moderate-risk gamblers (29%), low-risk gamblers (10%) and non-problem gamblers (4%).

4.3.2 GAMBLING ON EVENTS

I love the horses, Melbourne Cup is the best friggin' day of my life. I seem to back the winner every year.
—male, Victorian Gambling Study, qualitative study

An interesting finding of Wave 3 was that participants who were classified as non-gamblers by indicating at the start of the Wave 3 survey that they had not gambled in the previous year, reported participating in major events like the Melbourne Spring

Table 11 Reasons for participating in main gambling activity (unweighted, Wave 4, *n* = 3213)

Reason	Non-problem gamblers, <i>n</i> = 2808 (%)	Low-risk gamblers, <i>n</i> = 261 (%)	Moderate-risk gamblers, <i>n</i> = 105 (%)	Problem gamblers, <i>n</i> = 39 (%)	Total gamblers, <i>n</i> = 3213 (%)
Social reasons	37.3	39.8	34.3	28.2	54.2
To win money	46.5	60.5	46.7	61.5	47.8
General entertainment	31.0	44.4	56.2	33.3	32.9
To raise money for charity/fundraising	21.3	3.8	1.9	0.0	19.0
To raise money for school/club/local community	13.5	3.1	0.0	0.0	12.0
For fun	9.8	8.8	14.3	2.6	9.8
Boredom	3.6	10.3	28.6	61.5	5.7
To win prizes	6.0	5.4	1.0	0.0	5.7
Other (specify)	4.1	2.7	5.7	2.6	4.0
Habit	3.8	5.4	4.8	0.0	3.9
Takes your mind off things	2.1	5.4	17.1	20.5	3.1
Just felt like it	2.9	3.1	3.8	0.0	2.9
Relieves stress	1.3	6.1	9.5	25.6	2.2
Presents/birthday presents	1.4	0.8	0.0	0.0	1.3
Loneliness	0.2	1.9	11.4	23.1	1.0

Notes:

1. Gambling status based on the Problem Gambling Severity Index.

2. Results excluded 'don't know' and refused to answer.

Racing Carnival, later in the Wave 3 survey. In Wave 3, 6% of non-gamblers placed bets on events such as the Melbourne Cup, Caulfield Cup and the Cox Plate.

The proportion participating in major events increased with increasing PGSI risk category:

- 36% of zero-risk gamblers (i.e. non-gamblers and non-problem gamblers) compared with 70% of problem gamblers gambled in the Melbourne Spring Racing Carnival
- 2.8% of zero-risk gamblers compared with 10% of problem gamblers participated in large lottery jackpots
- 30% of zero-risk gamblers compared with 52% of problem gamblers gambled on sporting events such as the Australian Football League (AFL) Grand Final and the FIFA World Cup.

4.3.3 RECALL OF FIRST BIG WIN AND PLAYING LINKED JACKPOTS

I'll put it ... if you gamble for the first time and you lose, you win ... where if you gamble for the first time and you win, and for the rest of your life you are a loser.
—male, Victorian Gambling Study, qualitative study

In Wave 3, the proportion of participants who reported that they always or often played machines with linked jackpots or who recalled their first big win in gambling, also increased with increasing PGSI risk category:

- 2.6% of zero-risk gamblers compared with 39.6% of problem gamblers always or often played machines with linked jackpots (asked of EGM players only)
- 13.0% of zero-risk gamblers compared with 66.0% of problem gamblers could recall their first big win in gambling (asked of all gamblers).

CHAPTER 5

GAMBLING PATHWAYS AND PREDICTORS

This chapter explores the changing Problem Gambling Severity Index (PGSI) gambling risk categories of participants across the longitudinal study. The results presented are based on all four waves of data from the longitudinal study, and improve our understanding of gambling pathways and the factors that predict changes in gambling behaviour.

This chapter reports on the study objective of investigating the pathways in and out of problem gambling. The results show the stability or consistency of gambling risk levels in individuals, and the probability of their risk level changing over time.

Section 5.1 presents results on the transition of participants between different gambling risk categories and Section 5.2 provides findings on the factors that predict these transitions. Section 5.3 predicts gambling risk according to gambling activity and frequency.

All the results in this chapter are unweighted.

5.1 TRANSITIONS IN GAMBLING RISK STATUS

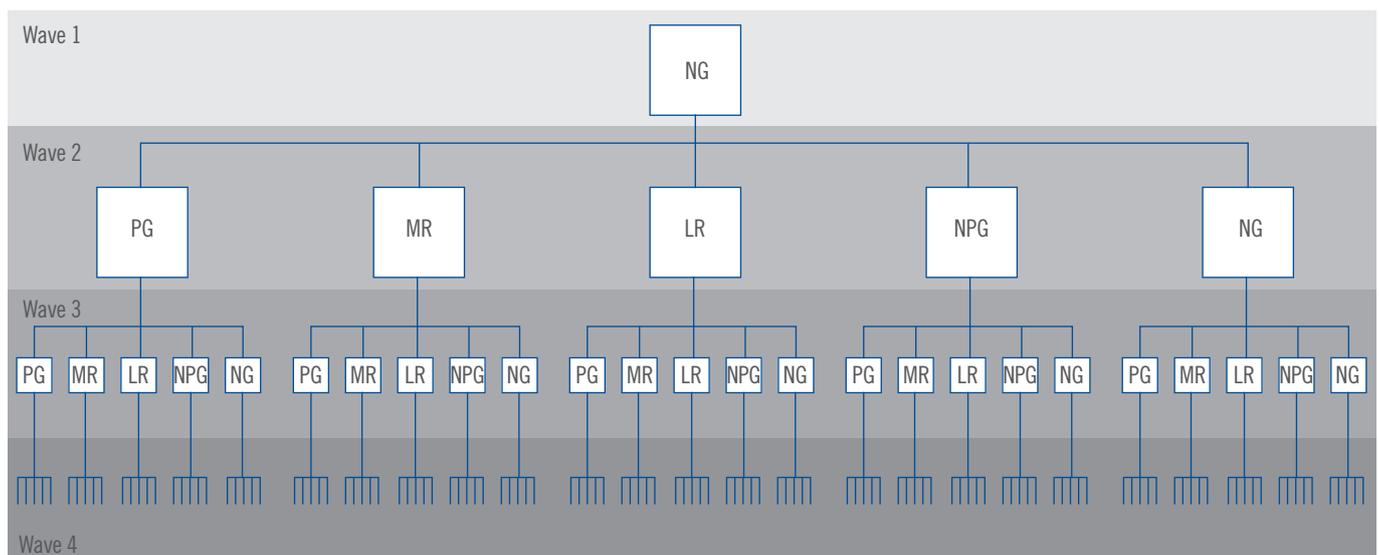
During a four-year longitudinal study, the possible gambling pathways are numerous and complex. In this study, the gambling risk of participants, determined using the PGSI, was tracked over the four waves. Participants who start in one of five PGSI risk categories (i.e. non-gambler, non-problem gambler, low-risk gambler, moderate-risk gambler or problem gambler) in Wave 1 may stay or move in Wave 2, and then again in subsequent waves. Ultimately, for the five possible

risk categories over four waves, there are 625 possible pathways. Although these pathways are too complex to show in one diagram, Figure 25 provides an example of the pathways that are possible by showing all possible transitions for participants who were non-gamblers in Wave 1.

Because of the complexity of describing so many pathways, this section does not cover all possible transition findings. Instead, it describes the following five transitions:

- transitions from Wave 1: how the Wave 1 PGSI risk groups moved over the waves of the study
- transitions to Wave 4: where the Wave 4 PGSI risk groups came from in earlier waves
- movers and non-movers: which PGSI risk groups changed or did not change
- risk group stability in person-years: how stable PGSI risk categories were during the four waves
- models of transitions: how likely PGSI risk groups are to change during the four waves.

For simplicity, the analysis on transitions presented below in sections 5.1.1, 5.1.2 and 5.1.3 combine non-gambling and non-problem gambling risk categories. Both categories score zero on the PGSI, and the difference may simply reflect participation in one gambling activity, such as a scratch ticket or a bet on the Melbourne Cup. This combined group is named the zero-risk participants group.



LR = low risk, MR = moderate risk, NG = non-gambler, NPG = non-problem gambler, PG = problem gambler
 Note: Gambling status based on the Problem Gambling Severity Index.

Figure 25 All possible shifts from non-gambler status in Wave 1

5.1.1 TRANSITIONS FROM WAVE 1

Figure 26 illustrates the transition of participants between gambling risk groups from Wave 1 to Wave 4 of the study. Table 12 is a second illustration of this, which shows how many participants from the Wave 1 risk groups stayed or moved in each subsequent wave.

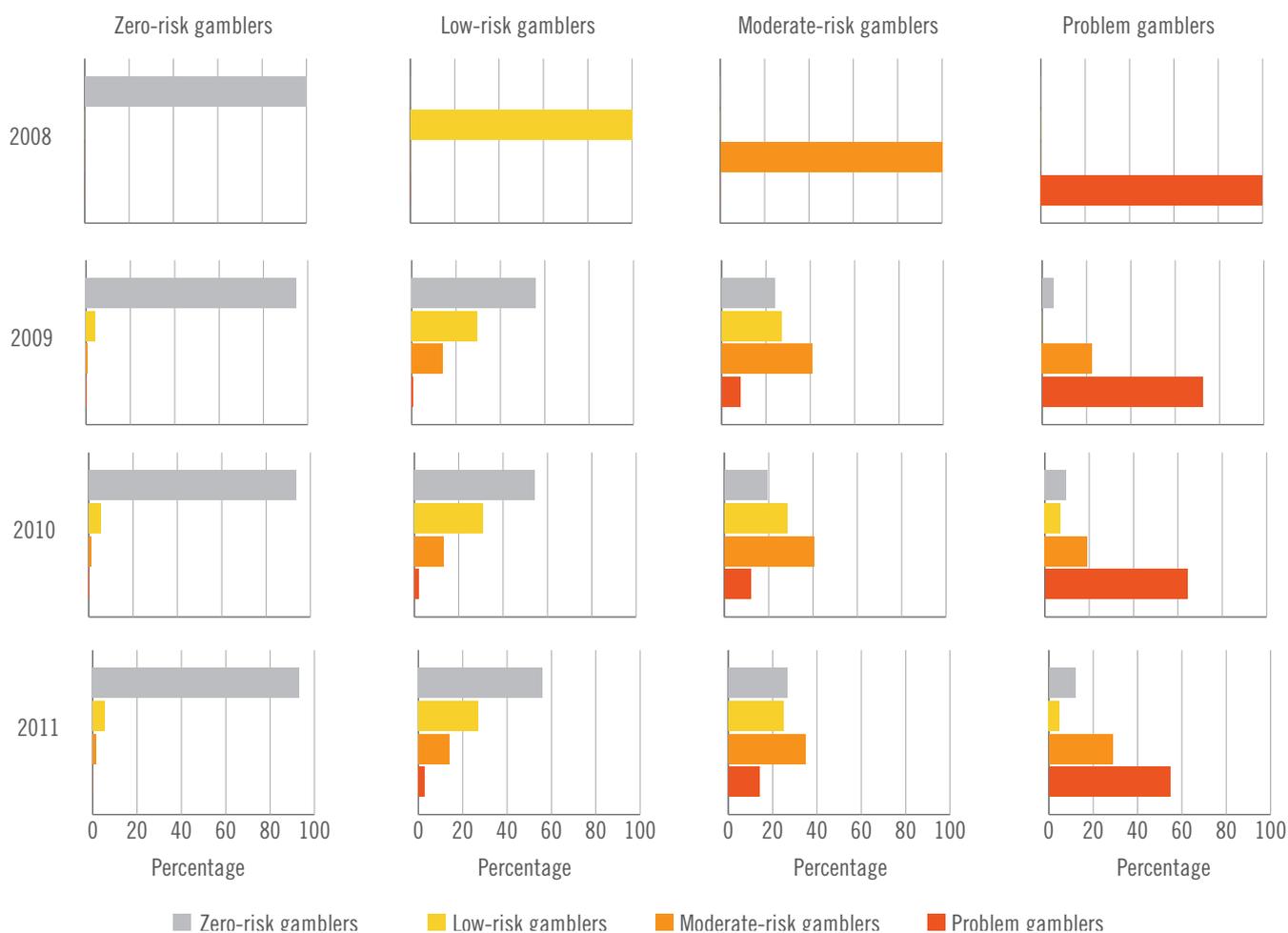
Figure 26 and Table 12 both show that the zero-risk group is very stable over time. During the four years of the study, more than 93% remained in the zero-risk group, with less than 7% moving to a higher risk group. Other PGSI categories were less stable and shifted to higher risk or lower risk PGSI categories more frequently. Interestingly, the proportion of a risk group that transitioned to the problem gambler group increased with risk level.

During the four years of the study:

- of the low-risk gamblers
 - 54–56% moved to zero risk
 - 27–30% stayed at low risk

- 13–14% increased to moderate risk
- 0.7–2.7% increased to problem gamblers
- of the moderate-risk gamblers
 - 19–26% moved to zero risk
 - 25–27% moved to low risk
 - 35–41% stayed at moderate risk
- of the problem gamblers
 - 5–12% moved to zero risk
 - 0–7% moved to low risk
 - 19–29% moved to moderate risk.

The proportion of the Wave 1 moderate-risk group that moved to the problem gambler group increased during the study, from 8% in Wave 2 to 14% in Wave 4. The proportion of the Wave 1 problem gambler group that remained problem gamblers decreased over time, down to 73% in Wave 2 and 55% in Wave 4.



Note: Gambling status based on the Problem Gambling Severity Index.

Figure 26 Gambling risk groups from Wave 1 and their gambling risk groups in subsequent waves (unweighted)

Table 12 Transitions of participants' gambling states in Wave 1 during the next three waves (unweighted, number of respondents)

Wave	PGSI category	Wave 1 (2008)				Total
		Zero risk	Low-risk gamblers	Moderate-risk gamblers	Problem gamblers	
Wave 2 (2009)	Zero risk	4361	153	23	2	4539
	Low-risk gamblers	193	81	26	0	300
	Moderate-risk gamblers	33	38	39	9	119
	Problem gamblers	6	2	8	29	45
	Total	4593	274	96	40	5003
Wave 3 (2010)	Zero risk	4842	160	21	4	5027
	Low-risk gamblers	279	91	31	3	404
	Moderate-risk gamblers	48	39	44	8	139
	Problem gamblers	4	6	13	27	50
	Total	5173	296	109	42	5620
Wave 4 (2011–12)	Zero risk	3168	103	19	5	3295
	Low-risk gamblers	191	50	18	2	261
	Moderate-risk gamblers	43	26	25	12	106
	Problem gamblers	1	5	10	23	39
	Total	3403	184	72	42	3701

PGSI = Problem Gambling Severity Index

Notes:

1. Grey cells indicate those who remained in the same PGSI category in that wave.
2. Blue cells indicate those who decreased their PGSI category in that wave.
3. Orange cells indicate those who increased their PGSI category in that wave.

5.1.2 TRANSITIONS TO WAVE 4

Figure 27 and Table 13 illustrate the risk groups that participants transitioned through to reach their Wave 4 risk group.

The zero-risk group in Wave 4 was quite stable across the previous waves. During the four years of the study, less than 5% of the Wave 4 zero-risk group had been in any of the higher risk groups.

Other groups were less stable, and shifted to higher risk or lower risk more often. The proportion of a risk group that had been in the problem gambler group at any time during the four years increased with risk level of the group.

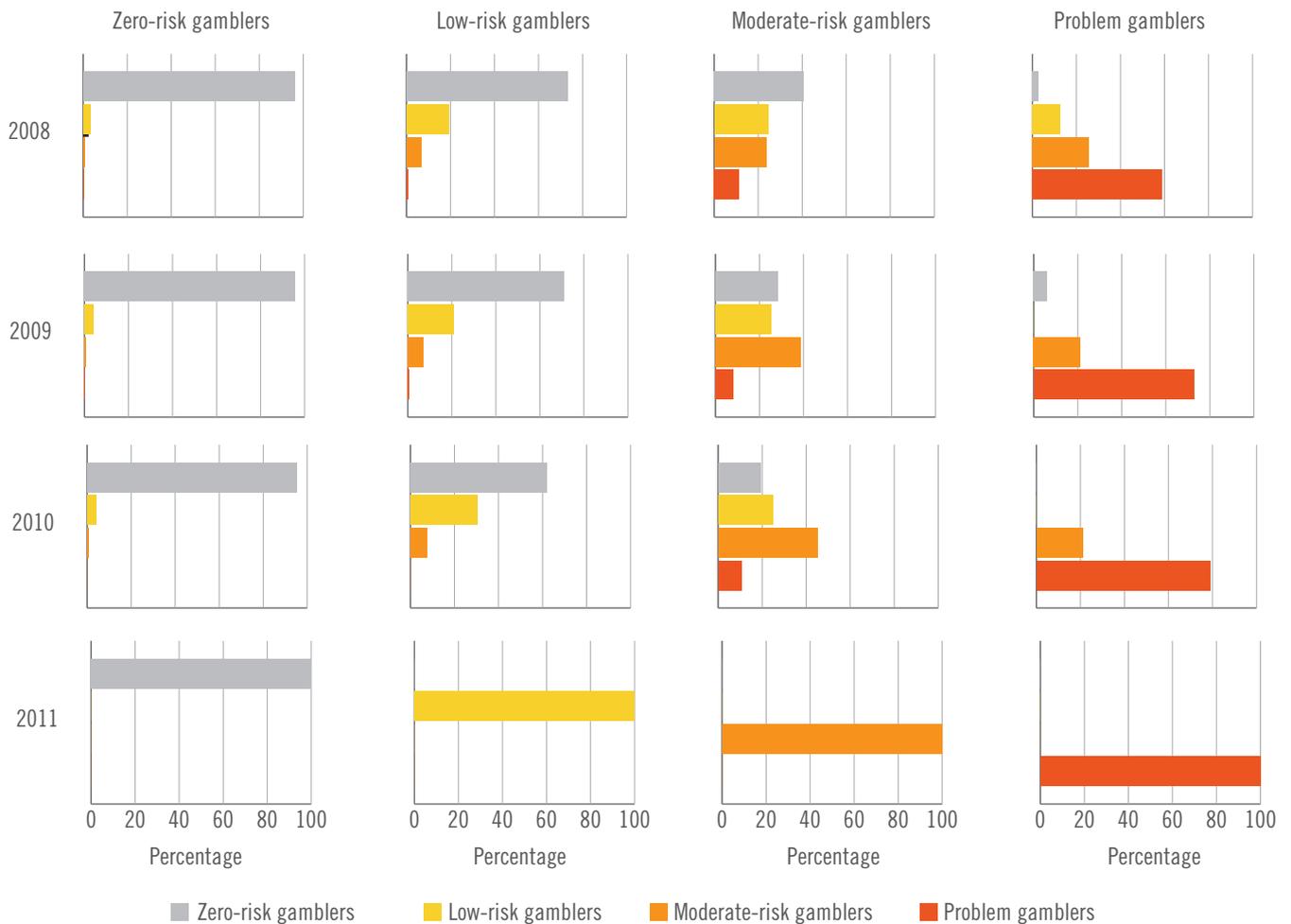
During the four waves of the study:

- of the low-risk gamblers in Wave 4
 - 62–73% came from the zero-risk group
 - 19–30% came from the low-risk risk
 - 7–8% decreased from moderate risk
 - less than 1% came from the problem gambler group
- of the moderate-risk gamblers in Wave 4
 - 20–41% came from the zero-risk group
 - 25–27% came from the low-risk risk group
 - 25% were previously moderate risk
 - 8–11% were from the problem gambler group
 - more than 65% were zero- or low-risk gamblers in Wave 1
 - 53% were zero- or low-risk gamblers in Wave 2
 - 44% were zero- or low-risk gamblers in Wave 3

- of the problem gamblers in Wave 4
 - 60–69% were previously problem gamblers
 - 21–26% were previously moderate-risk gamblers
 - more than 41% were zero, low or moderate risk in Wave 1
 - 27% were zero, low or moderate risk in Wave 2

- 21% were zero, low or moderate risk in Wave 3.

Over time, more of the moderate-risk gamblers in Wave 4 came from the lower risk gambling groups than from the problem gambling risk group.



Note: Risk status based on the Problem Gambling Severity Index.

Figure 27 Gambling state in Wave 4 compared with state in previous waves

Table 13 Transition of participants' gambling states from previous waves into Wave 4 (unweighted)

Wave	PGSI category	Wave 4 (2011–12)				Total
		Zero-risk gamblers	Low-risk gamblers	Moderate-risk gamblers	Problem gamblers	
Wave 1 (2008)	Zero-risk gamblers	3168	191	43	1	3403
	Low-risk gamblers	103	50	26	5	184
	Moderate-risk gamblers	19	18	25	10	72
	Problem gamblers	5	2	12	23	42
	Total	3295	261	106	39	3701
Wave 2 (2009)	Zero-risk gamblers	3146	185	29	2	3362
	Low-risk gamblers	127	55	26	0	208
	Moderate-risk gamblers	19	19	40	7	85
	Problem gamblers	2	2	8	24	36
	Total	3294	261	103	33	3691
Wave 3 (2010)	Zero-risk gamblers	3135	161	20	0	3316
	Low-risk gamblers	141	79	26	0	246
	Moderate-risk gamblers	18	20	47	8	93
	Problem gamblers	0	0	11	30	41
	Total	3294	260	104	38	3696

PGSI = Problem Gambling Severity Index

Notes:

1. Grey cells indicate those who remained in the same PGSI category in that wave.
2. Blue cells indicate those who decreased their PGSI category in that wave.
3. Orange cells indicate those who increased their PGSI category in that wave.

5.1.3 MOVERS AND NON-MOVERS

The movement or non-movement of participants in terms of gambling risk across the four waves of the longitudinal study was analysed. Here, 'non-movers' were defined as those who remained in the same PGSI risk group during the four years of the study. The 'movers' were those who moved to another risk group at any stage in the four years (see Table 14).

Zero-risk gamblers were the most stable group, with 87% remaining zero-risk gamblers in all four waves. Problem gamblers were the next most stable with almost half (48%) being classified as problem gamblers across all four waves. Low-risk gamblers and moderate-risk gamblers were more likely to shift categories than remain in the same category during the four years.

Table 14 Transitions across all four years of the study, by gambling risk group (unweighted, completed study sample)

PGSI category	Mover		Non-mover		Total	
	Number	%	Number	%	Number	%
Zero-risk gamblers	447	13	2956	87	3403	100
Low-risk gamblers	170	93	12	7	182	100
Moderate-risk gamblers	61	87	9	13	70	100
Problem gamblers	16	52	15	48	31	100
Total	694	19	2992	81	3686	100

PGSI = Problem Gambling Severity Index

5.1.4 RELATIVE FREQUENCY OF PGSI RISK SEGMENTS IN PERSON-YEARS

The relative frequency of PGSI risk segments was also explored. The analysis relies on the concept of person-years, an analytical technique where each year a participant contributes to a study is considered one person-year. For example, a Wave 4 participant contributed four years, or four person-years, to the study.

Person-years can be used in the context of gambling risk categories to describe the cumulative frequency of PGSI risk segments over time. For example, a participant who was a non-gambler in all four waves contributed four person-years as a non-gambler. In comparison, a person who was a low-risk gambler in Wave 1, a moderate-risk gambler in Wave 2, a low-risk gambler again in Wave 3 and a problem gambler in Wave 4 contributed two person-years as a low-risk gambler, one person-year as a moderate-risk gambler and one person-year as a problem gambler.

This analysis did not combine non-gamblers and non-problem gamblers into a zero-risk category. The results are unweighted. Participants with four survey waves ($n = 3686$) containing complete PGSI scores were included in the analysis.

Table 15 provides an overview of the study by person-years. Overall, 3686 participants who participated in all four waves contributed a total of 14,744 person-years, and:

- 2148 person-years (14.6% of the total person-years) were as non-gamblers
- 11,225 person-years (76.1% of the total person-years) were as non-problem gamblers
- 896 person-years (6.1% of the total person-years) were as low-risk gamblers
- 345 person-years (2.3% of the total person-years) were as moderate-risk gamblers
- 130 person-years (0.9% of the total person-years) were as problem gamblers.

These unweighted values for the cohort correspond very well with the population prevalence estimates from 2008 of:

- 64.3% non-problem gamblers (95% confidence interval [CI] 63.3–65.3)
- 5.7% low-risk gamblers (95% CI 5.23–6.21)
- 2.4% moderate-risk gamblers (95% CI 2.06–2.70)
- 0.7% problem gamblers (95% CI 0.55–0.90).

This consistency suggests that the longitudinal cohort remains relatively representative of the population, despite priority follow-up of problem and moderate-risk gamblers. More time and resources were invested in retaining these participants given the small number of them, reflecting the low prevalence of problem gambling in the population.

Table 15 Overall person-years by PGSI categories over four years (unweighted, completed study sample $n = 3686$)

PGSI category	Overall (4 waves)	
	Number of person-years	%
Non-gambler	2,148	14.6
Non-problem gambler	11,225	76.1
Low-risk gambler	896	6.1
Moderate-risk gambler	345	2.3
Problem gambler	130	0.9
Total	14,744	100.0

PGSI = Problem Gambling Severity Index

5.1.5 RISK GROUP STABILITY

Table 16 shows the amount of time participants spent in each risk group as a proportion of their total experience. This gives an idea of the stability of that category. Analysis found that people who had been non-problem gamblers at any time in the study had spent 82.5% of their time as non-problem gamblers. This was the most stable category. The second most stable category was the problem gambler category. People who had been problem gamblers at any point in the study had spent 59.1% of their time in that category.

Table 16 Stability of PGSI categories over four years (unweighted, completed study sample $n = 3686$)

PGSI category	Stability (% of person-years spent in this category)
Non-gambler	48.9
Non-problem gambler	82.5
Low-risk gambler	35.7
Moderate-risk gambler	43.3
Problem gambler	59.1

PGSI = Problem Gambling Severity Index

5.1.6 MODELS OF TRANSITIONS

The probability of transitioning in and out of gambling risk states was also calculated. As outlined in Section 5.1, there are 625 possible transition pathways for the five possible states in four waves. These pathways were explored using Markov transition probabilities. Markov transition probabilities show the probability of participants transitioning from one gambling state or remaining in same state between consecutive waves. This analysis did not combine non-gamblers and non-problem gamblers into a zero-risk category.

This analysis relies on the concept of person-years as outlined in Section 5.1.4.

Table 17 shows that most problem gamblers (71.4%) were likely to remain problem gamblers from one year to the next. Approximately 22.5% of problem gamblers (in person-years) were likely to decrease to moderate-risk states. The probability that problem gamblers were likely to cease gambling was very low (1%).

This analysis also showed that moderate-risk gamblers, compared with all other risk categories, had the greatest probability (9%) of transitioning to problem gambling. Non-gamblers and non-problem gamblers had a very low probability (0.1%) of becoming problem gamblers.

5.2 PREDICTORS OF TRANSITION IN GAMBLING RISK STATUS

This section explores the temporal relationship between gambling risk and transition (change) or persistence (no change) in gambling behaviour over time. This explores the risk and protective factors for gambling problems, and the relationship between gambling risk and health.

Risk factors are attributes associated with the development of gambling problems, and protective factors are attributes that provide resilience or protection from the development of gambling problems.

The risk and protective factors investigated in this section are problem or pathological gambling lifetime risk category, demographics, health status, psychological distress, substance use, life events and triggers, social capital, and readiness to change. These results are not weighted.

Section 5.2.1 looks at the lifetime gambling risk as a predictor of past-year problem gambling. Section 5.2.2 explores factors that predict changes in gambling risk and Section 5.3.3 investigates comorbidity and problem gambling temporality.

Table 17 Between wave transitions in PGSI categories (in person-years, unweighted, completed study sample $n = 3686$)

PGSI category (origin)	PGSI category (destination)					Total (%)
	Non-gambler (%)	Non-problem gambler (%)	Low-risk gambler (%)	Moderate-risk gambler (%)	Problem gambler (%)	
Non-gambler	874 (52.1)	764 (45.5)	31 (1.9)	8 (0.5)	1 (0.1)	1,678 (100)
Non-problem gambler	546 (6.5)	7,364 (87.7)	433 (5.2)	54 (0.6)	5 (0.1)	8,402 (100)
Low-risk gambler	16 (2.5)	354 (55.7)	190 (29.9)	75 (11.8)	1 (0.2)	636 (100)
Moderate-risk gambler	2 (0.8)	46 (18.9)	58 (23.8)	116 (47.5)	22 (9.0)	244 (100)
Problem gambler	1 (1.0)	3 (3.1)	2 (2.0)	22 (22.5)	70 (71.4)	98 (100)
Total	1,439 (13.0)	8,531 (77.2)	714 (6.5)	275 (2.5)	99 (0.9)	11,058 (100)

PGSI = Problem Gambling Severity Index

Notes:

1. Based on Markov transition probabilities
2. Grey cells indicate those who remained in the same PGSI category.
3. Blue cells indicate those who decreased their PGSI category.
4. Orange cells indicate those who increased their PGSI category.

5.2.1 LIFETIME GAMBLING RISK

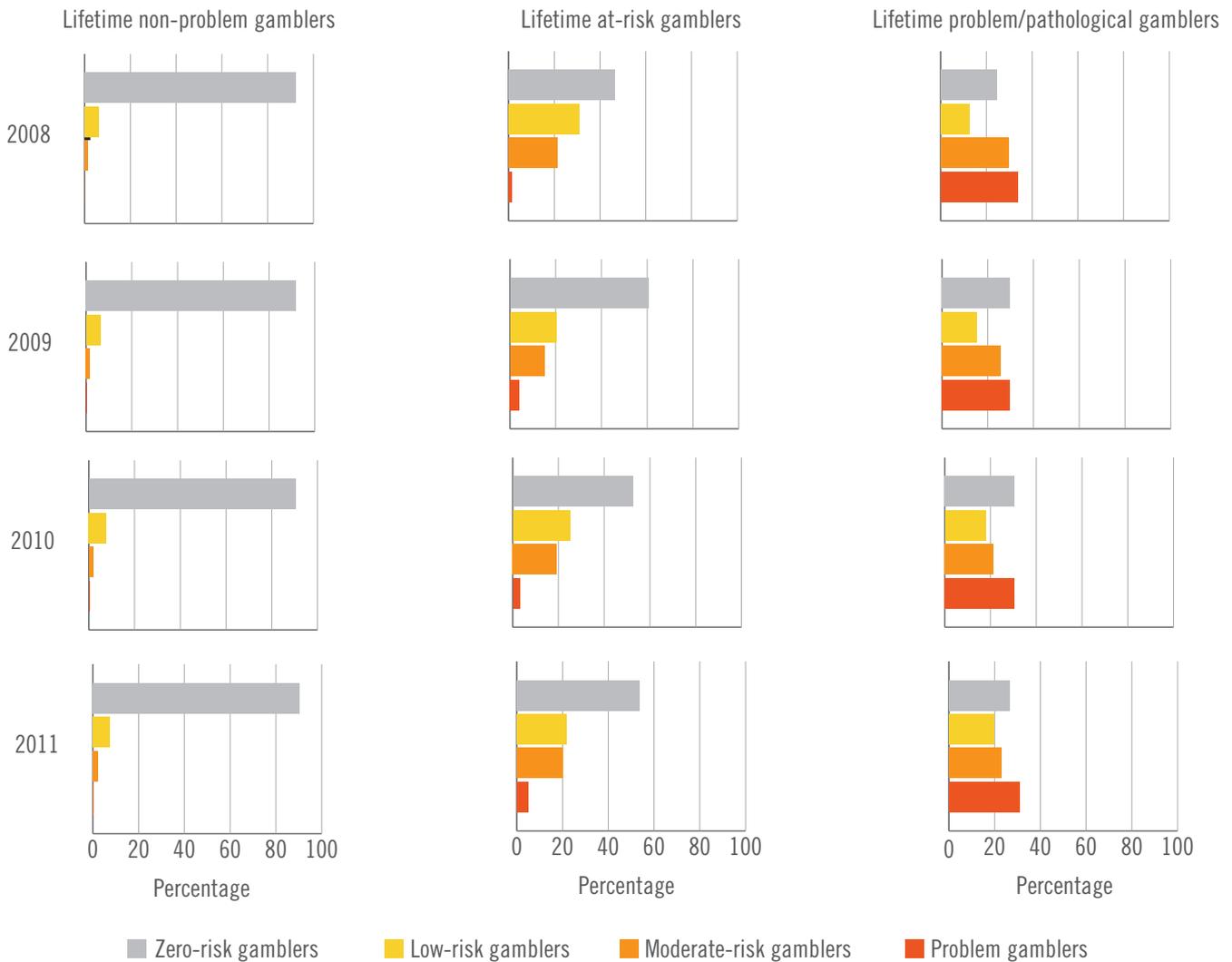
This section provides results on the relationship between lifetime gambling risk (based on NODS CLiP2 results from Wave 1) and PGSI risk status in each wave of the study. Once again, participants who were either non-gamblers or non-problem gamblers according to their PGSI scores were combined as zero-risk gamblers. In addition, for simplicity and statistical robustness, the NODS CLiP2 lifetime pathological and problem gambler categories were combined for the graphical representation in Figure 28.

Figure 28 and Table 18 show gambling risk status for NODS CLiP2 lifetime gamblers in 2008 compared with PGSI risk for all four waves. They show that lifetime non-problem gamblers were the

most stable group in terms of PGSI categories across the study. Of this group, 93% were zero-risk gamblers in each of the four waves.

Lifetime at-risk gamblers were less stable than lifetime non-problem gamblers. Approximately 50% were zero-risk gamblers in all four waves. Less than 2% of lifetime at-risk gamblers were problem gamblers in the past 12 months in all waves.

One-third of the sample of lifetime pathological and problem gamblers in 2008 were classified as problem gamblers in any one wave. A further 20–30% were moderate-risk gamblers, with the highest proportion reporting this in the first year. This is the same year in which the lifetime risk was measured. It is interesting that 25–30% of the lifetime pathological and problem gamblers in 2008 were zero-risk gamblers in each wave.



Note: Based on NODS CLiP2 questions.

Figure 28 Lifetime gambling risk compared with Problem Gambling Severity Index category across all four waves (unweighted)

Table 18 Transitions of participants' gambling states from previous waves into Wave 4 (unweighted)

Wave (n)	PGSI category	NODS CLIP2 category in Wave 1 (%)			
		Lifetime non-problem gamblers	Lifetime at-risk gamblers	Lifetime problem gamblers	Lifetime pathological gamblers
Wave 1, 2008 (12,292)	Zero-risk gamblers	93.08	49.51	26.81	31.11
	Low-risk gamblers	5.69	29.24	13.77	9.63
	Moderate-risk gamblers	1.20	20.08	38.41	17.04
	Problem gamblers	0.03	1.17	21.01	42.22
	Sample size	11,506	513	138	135
Wave 2, 2009 (4336)	Zero-risk gamblers	92.56	62.43	36.00	30.00
	Low-risk gamblers	5.71	19.34	14.00	15.00
	Moderate-risk gamblers	1.56	14.36	38.00	13.33
	Problem gamblers	0.17	3.87	12.00	41.67
	Sample size	4,045	181	50	60
Wave 3, 2010 (4854)	Zero-risk gamblers	91.21	55.61	33.96	35.82
	Low-risk gamblers	6.89	23.41	20.75	13.43
	Moderate-risk gamblers	1.68	18.05	28.30	13.43
	Problem gamblers	0.22	2.93	16.98	37.31
	Sample size	4,529	205	53	67
Wave 4, 2011–12 (3240)	Zero-risk gamblers	91.09	56.39	35.56	29.63
	Low-risk gamblers	6.85	20.30	26.67	11.11
	Moderate-risk gamblers	1.89	18.80	24.44	18.52
	Problem gamblers	0.17	4.51	13.33	40.74
	Sample size	3,008	133	45	54

PGSI = Problem Gambling Severity Index

5.2.2 PREDICTORS OF GAMBLING RISK CATEGORY TRANSITION OR PERSISTENCE

This section reviews what predicts changes in the PGSI gambling risk category over time. As such, it relates to the central hypotheses that guided the study. The variables considered were demographics, health status, psychological distress, substance use, lifetime gambling risk, life events and triggers, social capital, and readiness to change.

These results were determined using complex analytical techniques such as generalised estimating equations and multivariate regression analyses. The analyses were based on data from

waves 1–3. Small numbers and zero cells made analysis less robust when applied to data from all four waves of the study. Much of this analysis combined moderate-risk gamblers and problem gamblers into one group, because the number of problem gamblers alone was insufficient for individual analysis.

The following factors were investigated to determine what predicted changes (or not) in gambling risk:

- predictors of transition from moderate-risk gambling to problem gambling
- predictors of moderate-risk gamblers in all three waves

- predictors of relapse moderate-risk gamblers versus incident (new) moderate-risk gamblers
- predictors of non-problem gamblers moving to any higher risk level
- predictors of low-risk gamblers moving to moderate-risk gamblers
- predictors of a lagged transition to higher risk gambling.

PREDICTORS OF TRANSITION FROM MODERATE-RISK TO PROBLEM GAMBLING

The characteristics of moderate-risk gamblers in Wave 1, who either progressed or did not progress to problem gambling, were examined. In waves 2–3, 18.9% (seven participants) of moderate-risk gamblers increased their risk to problem gambling and 81.1% (30 participants) did not. The univariate analysis revealed some association between gambling and the Kessler Psychological Distress Scale (K10 score), the NODS CLiP2 score and self-reported anxiety; the multivariable logistic regression did not yield any significant results. The small numbers ($n = 37$) in the analysis limit the robustness of the model.

PREDICTORS OF HIGH-RISK GAMBLING PERSISTING IN THREE WAVES

Predicting high-risk gambling across waves 1–3 involved four separate analyses, summarised in Table 19. Each consisted of a univariate analysis followed by multivariable analysis of the significant variables.

For the purposes of this analysis, gambling risk groups are represented by the following symbols. The groups are defined in Table 19 as follows:

- non-problem gamblers (NPG)
- low-risk gamblers (LRG)
- moderate-risk and problem gamblers (MPG)
- not high-risk gamblers (<MPG)
- not high risk or high-risk gamblers (\leq MPG) in this wave.

In all four analyses, the NODS CLiP2 category of lifetime pathological gambling was the strongest predictor of persistent high-risk gambling behaviour, with high odds ratios (ORs) varying from 24 to 897.

PREDICTORS OF RELAPSE VERSUS INCIDENT HIGH-RISK GAMBLING

The factors that predict relapse high-risk gambling versus incident high-risk gambling were also investigated.

Relapse high-risk gambling is defined as the participants who were high risk in Wave 1, not high risk category in Wave 2 and returned to high risk in Wave 3. In contrast, incident cases refers to participants who were first classified as high risk in Wave 2 or Wave 3 (see Table 20).

Participant numbers in this analysis proved to be too small for robust analysis and no significant variables were found.

Table 19 Summary of four analyses of predictors of persistent high-risk gambling (unweighted, completed study, waves 1–3 only, $n = 4158$)

Analysis	Outcome	PGSI category			Participant numbers
		Wave 1	Wave 2	Wave 3	
1,2,3,4	Persistent MPG	MPG	MPG	MPG	58
Comparison group					
1	Persistent non-problem gamblers (NPG)	NPG	NPG	NPG	2388
2	Persistent low-risk gamblers (LRG)	LRG	LRG	LRG	26
3	Non-persistent moderate-risk and problem gamblers (MPG)	MPG	<MPG	<MPG	31
4	Decreased high risk (MPG)	MPG	\leq MPG	<MPG	42

LRG = Low-risk gamblers, NPG = non-problem gamblers, MPG = moderate risk and problem gamblers, <MPG = not high-risk gamblers, \leq MPG = not high or high-risk gamblers, PGSI = Problem Gambling Severity Index

Table 20 Definitions of relapse and incidence for analysis (unweighted)

Definition	PGSI category			n (%)
	Wave 1	Wave 2	Wave 3	
Relapse	MPG	<MPG	MPG	10 (12.7)
Incident	<MPG	≤ MPG	MPG	69 (87.3)

MPG = moderate risk and problem gamblers, <MPG = not high-risk gamblers, ≤MPG = not high or high-risk gamblers, PGSI = Problem Gambling Severity Index

PREDICTORS OF NON-PROBLEM TO HIGHER RISK GAMBLING

This section presents results on the factors offering protection from, and contributing to, the development of high-risk gambling behaviour. The terms ‘risky’ and ‘non-risky’ behaviour are used.

Participants displaying risky behaviour were those that were classified as non-problem gamblers in Wave 1 and increased PGSI classification in subsequent waves. Participants showing non-risky behaviour were those who maintained non-problem gambler status in all three waves.

Over waves 1–3, 202 non-problem gamblers from Wave 1 (7.8%) developed risky behaviour. In comparison, 2388 non-problem gamblers (92.2%) retained non-risky behaviour (see Table 21). Multivariate logistic regression compared non-problem gamblers in all three waves (non-risky gamblers) with those who were non-problem gamblers in the first wave, but who increased their risk status in waves 2 and 3 (risky gamblers).

Table 21 Predictors of persistent non-problem gambling (unweighted)

Definition	PGSI category			n (%)
	Wave 1	Wave 2	Wave 3	
Risky	NPG	≥NPG	>NPG	202 (7.8)
Non-risky	NPG	NPG	NPG	2388 (92.2)

NPG = non-problem gamblers, >NPG = low, moderate or problem gamblers, ≥NPG = NPG or low, moderate or problem gamblers, PGSI = Problem Gambling Severity Index

This analysis only found one factor that separated the non-risky group from the group that increased risk (an identified protective factor). This factor was being female (OR = 1.8, 95% CI 1.0–3.3, $P = 0.05$).

The analysis found a number of factors associated with an increase in risk:

- language other than English (OR = 0.3, 95% CI 0.1–0.9, $P = 0.02$)

- education levels at year 10 or lower (OR = 0.1, 95% CI 0.03–0.60, $P = 0.01$)
- signs of alcohol dependence (OR = 0.4, 95% CI 0.1–0.9, $P = 0.03$)
- NODS CLiP2 at-risk category (OR = 0.1, 95% CI 0.04–0.4, $P < 0.001$)
- anxiety (OR = 0.4, 95% CI 0.2–1.0, $P = 0.04$)
- obesity (OR = 0.3, 95% CI 0.2–0.7, $P = 0.003$).

PREDICTORS OF LAGGED EFFECTS

This section presents results on factors in Wave 1 that might be associated with the development of higher-risk gambling by Wave 3. The variables considered were demography, health status, psychological distress, substance use, life events and triggers, social capital and the Readiness-to-Change scale. Three separate analyses were conducted to investigate this ‘lagged’ effect.

In the first analysis, 40 participants (1%) who were incident high-risk gamblers (i.e. moderate-risk or problem gamblers for the first time in Wave 3) were compared with 3948 participants (99%) who were not moderate-risk or problem gamblers in any of the three waves (see Table 22). Multiple logistic regression of baseline variables was used.

Final logistic regression modelling found two areas of interest for predicting incident high-risk gambling. These were household type and NODS CLiP2. The particular variables predicting incident high-risk gambling were:

- being in a one-parent family (OR = 6.3, 95% CI 2.6–15.2, $P < 0.001$)
- being in the category of ‘other’ family (OR = 7.5, 95% CI 2.4–23.3, $P < 0.001$)
- at-risk NODS category (OR = 11.6, 95% CI 5.1–24.9, $P < 0.001$)
- pathological NODS category (OR = 16.8, 95% CI 3.5–79.3, $P < 0.001$).

Table 22 Frequency distribution of behaviours, lagged effects, non-high risk compared with incident high risk (unweighted)

Behaviour	PGSI category			n (%)
	Wave 1	Wave 2	Wave 3	
Non-high risk	<MPG	<MPG	<MPG	3948 (99.0)
Incident high-risk	<MPG	<MPG	MPG	40 (1.0)

MPG = moderate risk and problem gamblers, <MPG = not high-risk gamblers, PGSI = Problem Gambling Severity Index

The second analysis compared respondents whose gambling risk increased to higher than non-problem gambling in Wave 3 only, with those who persistently remained a non-problem gambler across all three waves (see Table 23). Final logistic regression modelling found that NODS CLiP2 was the only variable that predicted incident risky versus persistent non-problem gambling. This was for all NODS CLiP2 lifetime risk levels, with ORs between 5.3 and 6.5.

Table 23 Frequency distribution of behaviours, lagged effects, persistent non-problem gambling compared with incident risky behaviour (unweighted)

Behaviour	PGSI category			n (%)
	Wave 1	Wave 2	Wave 3	
Persistent non-problem gambling	NPG	NPG	NPG	2388 (94.2)
Incident risky behaviour	NPG	NPG	>NPG	148 (5.8)

NPG = non problem gamblers, >NPG = low, moderate or problem gamblers, PGSI = Problem Gambling Severity Index

The third analysis compared respondents whose gambling risk increased to higher than low-risk gambling in Wave 3 only with those who persistently remained a low-risk gambler across all three waves. Final logistic regression modelling of incident risky versus persistent low-risk gambling found one variable of interest—that age was a continuous variable. This means that the risk of progressing from low-risk gambler status from Wave 1 to Wave 3 decreased as age increased.

Table 24 Frequency distribution of behaviours, lagged effects, persistent low-risk gambling compared with incident risky behaviour (unweighted)

Behaviour	PGSI category			n (%)
	Wave 1	Wave 2	Wave 3	
Persistent low-risk gambling	LRG	LRG	LRG	26 (78.8)
Incident risky behaviour	LRG	LRG	MPG	7 (21.2)

LRG = low-risk gamblers, MPG = moderate risk and problem gamblers, PGSI = Problem Gambling Severity Index

5.2.3 HEALTH COMORBIDITIES

Prospective cohort studies are one way of exploring the temporal sequences of associations between problem gambling and health

comorbidities. Two questions related to comorbidities were analysed using conditional logistical regression. These involved analysis of Wave 1 and Wave 2 for:

- the relationship between onset (new cases) of high-risk gambling behaviour (moderate and problem gambling) and comorbidities
- the relationship between onset (new cases) of comorbid conditions and high-risk gambling behaviour (moderate and problem gambling).

Traditional epidemiologic approaches were used to answer the two questions. A nested case-control methodology was applied, with cases and controls matched for age and gender. A nested case-control study refers to a case-control study design that is applied to a population already identified in an existing study.

NEW ONSET HIGH-RISK GAMBLING

New onset high-risk gamblers (moderate-risk or problem gamblers) in Wave 2 were compared with controls (those who were non-high-risk gamblers in Wave 1 and Wave 2). The analysis used conditional logistic regression to analyse any health comorbidity on incident high-risk gambling behaviour.

The presence of any health condition was associated with incident high-risk gambling behaviour (OR = 2.7, 95% CI 1.1–6.7, $P = 0.027$). Scoring as an ‘at-risk lifetime gambler’ on NODS CLiP2 was significantly associated with new onset high-risk gambling behaviour during the study period (OR = 6.3, 95% CI 1.7–23.9, $P = 0.007$), as was being a current smoker (OR = 2.7, 95% CI 1.1–6.8, $P = 0.035$).

The independent effect of specific health conditions on the onset of high-risk gambling behaviour was analysed. After adjusting for the effect of smoking and the NODS CLiP2 score, participants with anxiety in Wave 1 were four times more likely to develop new onset cases of moderate-risk or problem gambling behaviour in Wave 2. Anxiety was significantly associated with incident high-risk gambling behaviour (OR = 4.0, 95% CI 1.1–6.7, $P = 0.036$).

NEW ONSET HEALTH CONDITIONS

A nested case-control was used to compare new onset health conditions in Wave 2 (cases) with controls (those who had no health conditions in Wave 1 and Wave 2). The analysis used conditional logistic regression to analyse the association between PGSI risk state and incident health conditions.

Four associated variables were found to be of interest:

- being male (OR = 2.0, 95% CI 1.3–3.0, $P = 0.002$)

- age, by year (OR = 1.02, 95% CI 1.0–1.03, $P = 0.008$)
- having a disability (OR = 2.1, 95% CI 1.9–4.0, $P = 0.03$)
- problem gambling in Wave 1 (OR = 4.2, 95% CI 0.9–18.9, $P = 0.06$).

5.3 GAMBLING RISK PREDICTED BY GAMBLING ACTIVITY AND FREQUENCY

This section explores the relationship between gambling risk category, gambling activity and frequency of gambling. The relationship between gambling activity and gambling risk is considered, as is the relationship between gambling frequency, gambling activity and gambling risk.

5.3.1 GAMBLING ACTIVITY AND GAMBLING RISK

The association between participation in specific types of gambling activities and increase in high-risk gambling behaviour was explored. High-risk gambling behaviour was defined as moderate-risk and problem gambling.

Table 25 shows the ORs for high-risk gambling behaviour for gamblers participating in each gambling activity. Both the crude and adjusted ORs were estimated. All analyses were adjusted for lifetime NODS CLiP2 score and K10 category, as these are strongly associated with high-risk gambling behaviour. The analyses for gambling using electronic gaming machines (EGMs) and on racing were also adjusted for occupation and self-reported depression.

Participants with high-risk gambling behaviour were significantly more likely to participate in all gambling activities, except for raffles or sweeps. However, when adjusted for lifetime NODS CLiP2 score and K10 category, high-risk gambling is independently predicted by participation in four gambling activities: EGMs, table games, informal betting and race betting.

5.3.2 GAMBLING FREQUENCY, GAMBLING ACTIVITY AND GAMBLING RISK

To better examine the effect of frequency of gambling participation, the longitudinal study population from Wave 4 ($n = 3632$) was divided into two distinct groups based on the NODS CLiP2 lifetime gambling risk categories identified in Wave 1. The first group ($n = 3535$) included participants classified as non-problem or at-risk gamblers as defined by the NODS CLiP2. The second group consisted of those who were classified as lifetime problem or

Table 25 Crude and adjusted relationships between high-risk gambling and specific gambling activities (unweighted)

Gambling activity	Crude odds ratio (95% CI)	Adjusted odds ratio (95% CI)
EGMs	39.3 (23.6–65.6) ^a	5.5 (2.5–12.3) ^a
Table games	10.2 (4.5–23.4) ^a	3.9 (1.7–9.0) ^b
Informal betting	5.7 (2.6–12.5) ^a	2.9 (1.1–7.4) ^b
Race betting	3.5 (2.2–5.5) ^a	2.2 (1.1–4.3) ^b
Sports betting	7.1 (3.0–16.8) ^a	1.7 (0.6–4.8)
Scratch tickets	3.3 (2.0–5.4) ^a	1.7 (0.8–3.4)
Telephone or SMS competitions	1.8 (1.0–3.3) ^b	1.6 (0.6–3.7)
Lotto	3.0 (1.9–4.7) ^a	1.4 (0.6–3.2)
Bingo	8.0 (2.9–21.8) ^a	1.4 (0.2–8.5)
Keno	5.7 (2.5–13.0) ^a	1.2 (0.3–4.3)
Raffles or sweeps	1.4 (0.9–2.0)	0.9 (0.5–1.8)

CI = confidence interval; EGM = electronic gaming machine

^a $P < 0.001$

^b $P < 0.05$

Notes:

1. Adjustments made for informal betting, table games, sports betting, Keno and Lotto were occupation, Kessler Psychological Distress Scale (K10) score and NODS CLiP2 lifetime risk.
2. Adjustments made for EGM and racing were occupation, K10 score, NODS CLiP2 lifetime risk and depression.

pathological gamblers by the NODS CLiP2 ($n = 97$). The two groups were labelled ‘low lifetime risk’ and ‘high lifetime risk’, respectively.

The analysis considered results for gambling on three activities: EGMs, horse and greyhound race betting, and table games.

Table 26 shows the relative frequency of participation of the low lifetime risk and high lifetime risk groups on these activities.

Using the frequency and participation analyses of low lifetime and high lifetime risk groups, the independent impact of EGM use, table games, and horse and greyhound betting were analysed.

Adjustments were made for sex, language other than English, smoking status, alcohol dependence and psychological distress. When comparing EGMs with race betting, two distinct relationships occur between frequency and the level of lifetime risk. This analysis could not be conducted for table game gambling due to the small sample size.

Figure 29 shows that using EGMs was associated with a monotonic increase in risk score with increasing levels of frequency. This

Table 26 Gambling participation (frequency and activity) in Wave 1 (unweighted)

Activity and frequency	Low lifetime risk, n = 3535 (%)	High lifetime risk, n = 97 (%)
Electronic gaming machines		
Not at all	2610 (73.8)	30 (30.9)
Less than once per month	692 (19.6)	28 (28.9)
1 to 3 times per month	173 (4.9)	19 (19.6)
Weekly or more	60 (1.7)	20 (20.6)
Race betting		
Not at all	2861 (80.9)	64 (66)
Less than once per month	512 (14.5)	16 (16.5)
1 to 3 times per month	77 (2.2)	4 (4.1)
Weekly or more	85 (2.4)	13 (13.4)
Table games		
Not at all	3424 (96.9)	86 (88.7)
Less than once per month	98 (2.8)	9 (9.3)
1 to 3 times per month	10 (0.3)	1 (1.0)
Weekly or more	3 (0.1)	1 (1.0)

Notes:

1. Lifetime risk based on NODS CLiP2 score.
2. Question asked: 'How often did you take part in [insert activity] in the past 12 months?'

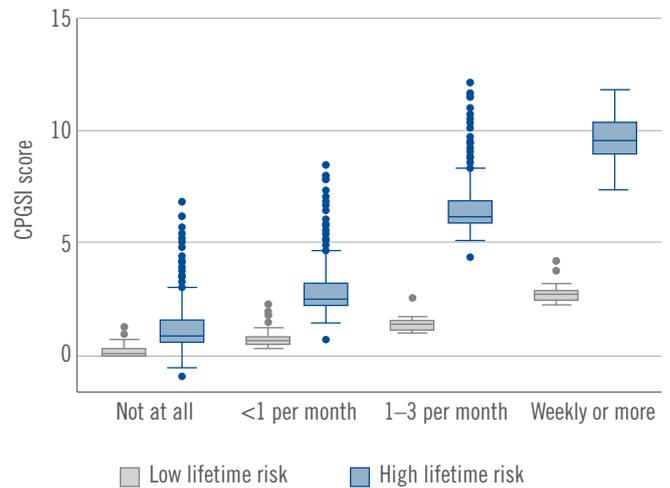
means that the more frequently EGMs were used, the higher the PGSI score was over time. This is true of both low lifetime risk gamblers and of high lifetime risk gamblers.

The association is markedly so in those who had a high lifetime risk score at inception. The PGSI cut-point for problem gambling is > 8. Increasing frequency of gambling is also seen in those with a high lifetime risk score in the problem gambling PGSI range. For those who were classified as low lifetime risk gamblers, the more they gambled, the higher their PGSI score.

Figure 30 shows the relationship between horse and greyhound betting, and gambling frequency. There appears to be a level of horse and greyhound betting frequency (1–3 times per month) at which the PGSI score increases, suggesting a threshold pattern.

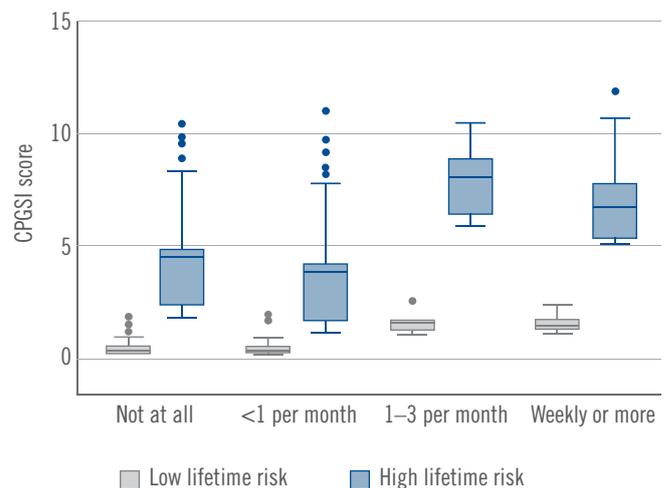
There was a relationship between frequency of horse and greyhound betting, and increasing PGSI scores over time, regardless of

whether there was a high or low lifetime risk. However, for the high lifetime risk group, the associative factor appears to be stronger.



PGSI = Problem Gambling Severity Index
 Note: Questions asked were 'Which of the following activities have you spent any money on in the past 12 months?' and 'How often did you use EGMs in the past 12 months?' (Base: all respondents.)

Figure 29 Problem Gambling Severity Index score by frequency of using electronic gaming machines (unweighted, n = 3632)



PGSI = Problem Gambling Severity Index
 Note: Questions asked were 'Which of the following activities have you spent any money on in the past 12 months?' and 'How often did you take part in race betting in the past 12 months?' (Base: all respondents.)

Figure 30 Problem Gambling Severity Index score by frequency of wagering on horse and greyhound racing (unweighted, n = 3632)

CONCLUSIONS AND NEXT STEPS

The Victorian Gambling Study: A longitudinal study of gambling and health in Victoria 2008–2012 has made an important contribution to understanding gambling in Victoria, Australia. The study is groundbreaking—it is the first to follow a population of Victorian adults for four years investigating their gambling, health, recreation, lifestyle and wellbeing factors. It adds to the body of knowledge regarding gambling behaviour, frequency, participation, aetiology and determinants of problem gambling.

The findings from this study are many and varied, and this report presents only key findings from the four years of data collection. Although these findings are extremely useful and interesting, they are yet to be explored or replicated in other longitudinal research. Given this, all findings should be interpreted with caution.

This study is based on epidemiologic approaches, such as cross-sectional surveys, cohort studies and nested case–control studies. It provides information on a wide range of gambling and health-related matters. The cross-sectional design tells of the distribution of, participation in and frequency of gambling activities. In particular, four key activities—electronic gaming machine (EGM) gambling, race betting, table games and sports betting—are investigated in terms of their associations with higher risk gambling behaviours. Analyses have shown that gamblers who do not have problems with their gambling are significantly less likely to engage in multiple forms of gambling and do not gamble as frequently as those who do have problems.

Most significantly, this study provides the first incidence estimate for problem gambling in Australia. It has shown that problem gambling onset in a one-year period is comprised of gamblers who have relapsed or returned to earlier gambling behaviours (two-thirds of cases) as well as people who are new to problematic behaviour (one-third of cases). This has important implications for prevention programs, intervention activities and treatment services.

The study highlights the interesting relationship between EGM gambling and frequency of gambling. The study found that the more frequently people gambled on EGMs over time, the higher their Problem Gambling Severity Index score.

The Victorian Gambling Study also provides important information about pathways, predictors and patterns of transitions in gambling behaviour. For example, person-years calculations and Markov modelling were used to show that most problem gamblers in the study are likely to remain problem gamblers from one year to the next.

In addition, a nested case–control design investigated the temporal associations between problem gambling and other conditions, such as anxiety and health conditions. Gamblers with anxiety in Wave 1 were four times more likely to develop problem gambling in Wave 2 than those without anxiety.

Large longitudinal studies of gambling are rare and challenging, and require a high level of commitment and persistence. In addition, problem gambling is a rare condition and requires very large populations to be followed. For example, although this study is the largest prospective study to date in Australia, some analyses could not be conducted for all four waves due to sample size limitations.

The project board for this study collaborated with international gambling researchers in Europe, Canada and Oceania to share knowledge and learnings on methodology, design and instruments developed through this study. Because there are so few comparable studies worldwide, and because the study takes a relatively new methodological direction in the gambling field, it is critical that data from large studies are pooled and shared. Data from the Victorian Gambling Study have already been shared and they will continue to be made available, and analyses from this study continue.

Overall, the Victorian Gambling Study has presented a wealth of new information about gambling and health in Victoria. The findings from this study will be of great value in the development of gambling policies, programs and activities in Victoria, Australia and overseas.

APPENDIX A

CHANGES IN THE LONGITUDINAL STUDY SAMPLE

Appendix A describes how the participant sample changed over the course of the Victorian Gambling Study. This is important in a longitudinal study, because it may affect the validity of its results. For example, some groups may be more likely to drop out, whereas other groups may be more likely to continue to participate.

Changes in the demographic, gambling participation, problem gambling risk, and health and wellbeing characteristics of the Victorian Gambling Study longitudinal sample are summarised below.

Results are reported as the estimated percentage of the population with error bias showing the 95% CI of the estimate.

GENDER

The proportion of females (61%) was higher throughout the study compared with the Victorian population (51%). The overrepresentation of females was maintained throughout the study.

AGE

Victorians less than 34 years old were underrepresented and those 35 years and over were overrepresented. Throughout the

study, these differences gradually increased in significance (see Figure 31).

MIGRATION AND LANGUAGE OTHER THAN ENGLISH

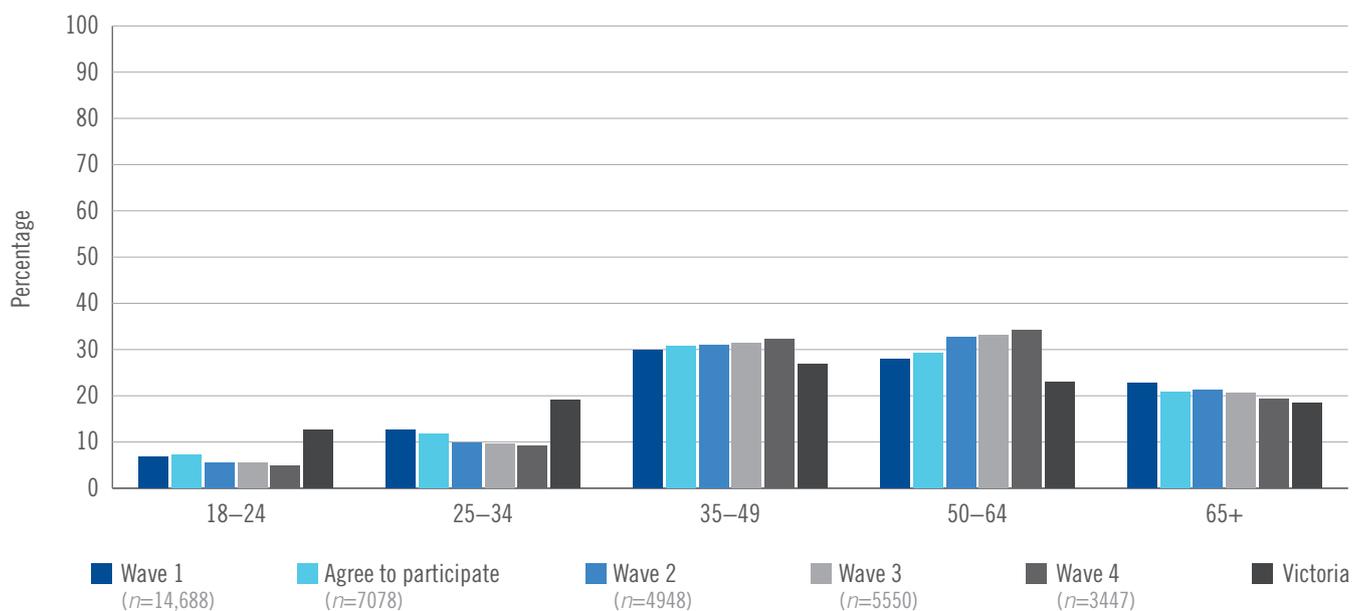
Recent migrants and those who spoke a language other than English at home halved across the study. Recent migrants went from 4% to 2% of the sample, and those that spoke a language other than English decreased from 17% to 9% of the sample (see Figure 32).

HIGHEST EDUCATION LEVEL

Across the study there was a small but significant increase in the proportion of the sample with a TAFE or trade qualification, from 20% to 22% (see Figure 33).

HOUSEHOLD INCOME

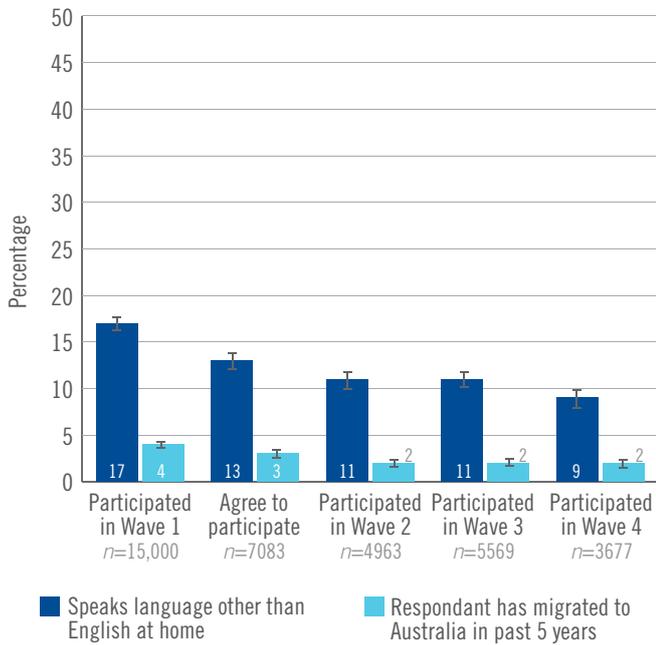
During the study, the only significant change was that the lowest household income bracket of \$0–33,799 decreased from 26% to 22% of the sample (see Figure 34).



Note: Results excluded answers of 'don't know' and refused to answer.

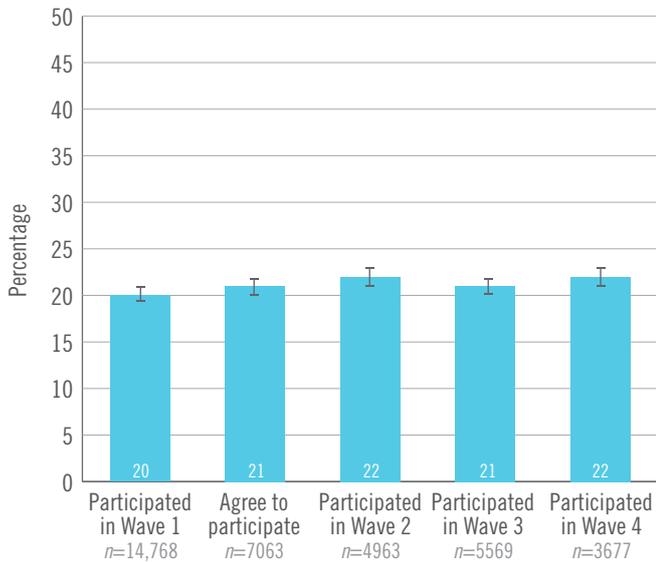
Source: Australian Bureau of Statistics (2012). *Victorian adult population: Australian demographic statistics*, Table 52, Estimated resident population by single year of age, Victoria, timeseries spreadsheet, cat. no. 3101.0, ABS, Canberra.

Figure 31 Proportion of each age group across the waves and compared with Victorian population (weighted)



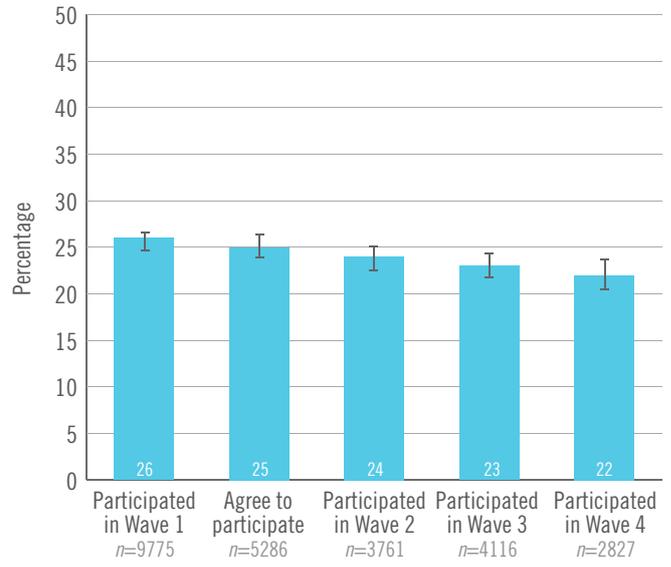
Note: Questions asked: 'Do you speak a language other than English at home?' and 'Have you migrated to Australia in the past 5 years?'

Figure 32 Proportion of respondents who have migrated to Australia in past 5 years and who speak a language other than English at home (unweighted)



TAFE = technical and further education
 Note: Question asked: 'What is your highest level of completed education?'

Figure 33 Proportion of respondents with a TAFE or trade qualification (unweighted)

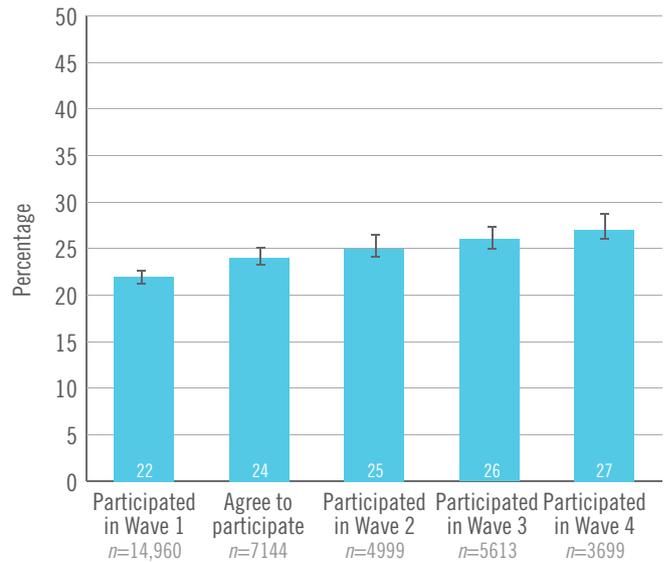


Note: Question asked: 'What is the approximate total income of all people combined in your household (weekly or annual household income, before tax and including any government payments)?'

Figure 34 Proportion of respondents with an annual household income of \$0-\$33,799 (unweighted)

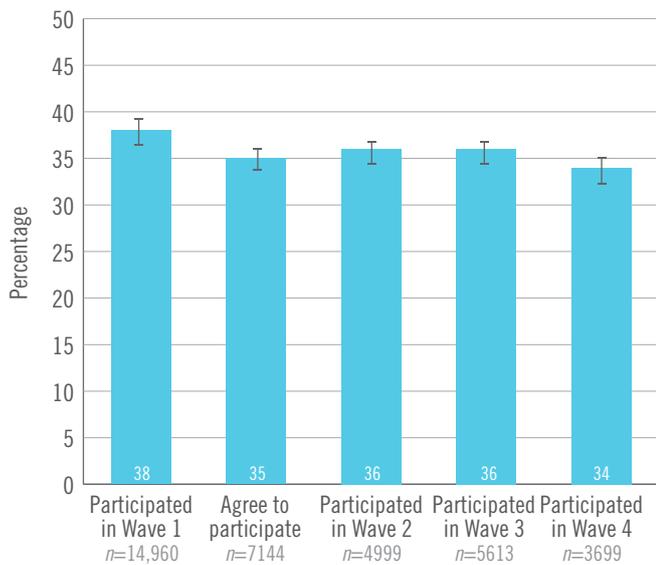
EMPLOYMENT

The proportion of part-time workers increased significantly from 22% to 27% and the proportion not in the workforce or away from work decreased from 38% to 34% (see figures 35 and 36).



Note: Questions asked: 'Do you currently work or are you looking for work? Full time or part time?'

Figure 35 Proportion of respondents with part-time employment status (unweighted)

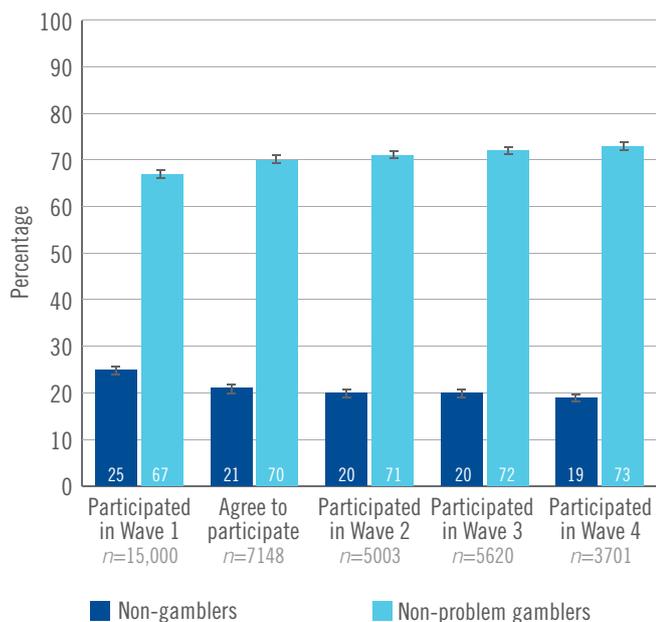


Note: Questions asked: 'Do you currently work or are you looking for work? Full time or part time?'

Figure 36 Proportion of respondents not in workforce or away from work (unweighted)

GAMBLING RISK

Across the study, there was a significant increase in non-problem gamblers in the sample, from 67% to 73%. There was also a corresponding decrease in the proportion of non-gamblers, from 25% to 19% (see Figure 37).

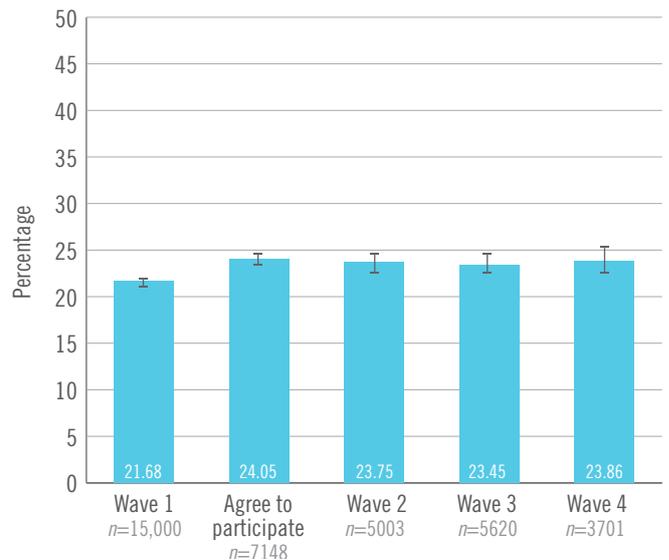


Note: Gambling status based on the Problem Gambling Severity Index.

Figure 37 Proportion of non-gamblers and non-problem gamblers (unweighted)

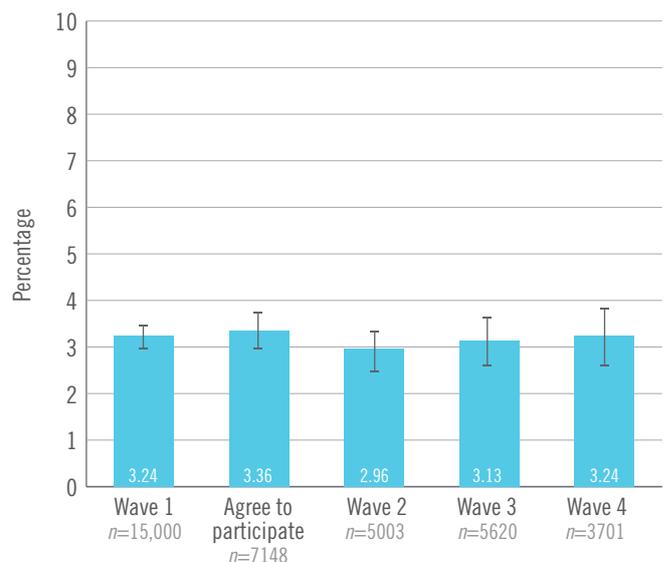
GAMBLING ACTIVITY

Throughout the study there was a small but significant increase in higher prevalence gambling activities such as EGMs (22% to 24%), and betting on horse and greyhound racing (15% to 17%). There was no change in lower prevalence activities such as table games (3.2%) and betting on sports or event results (2.9%) (see figures 38–49).



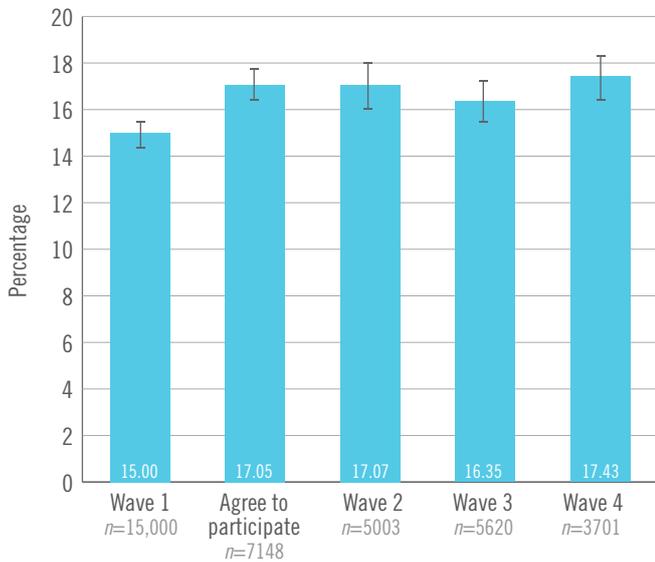
Note: Question asked: 'Which of the following activities have you spent any money on in the past 12 months?' (Base: all respondents.)

Figure 38 Proportion of respondents playing electronic gaming machines (unweighted)



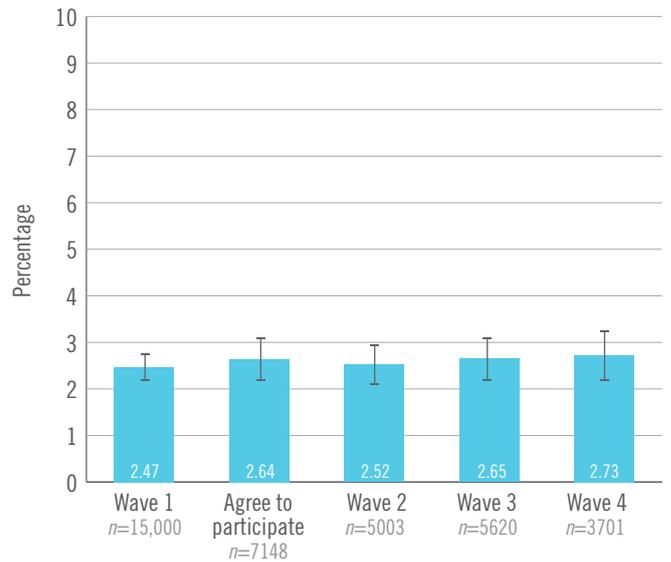
Note: Question asked: 'Which of the following activities have you spent any money on in the past 12 months?' (Base: all respondents.)

Figure 39 Proportion of respondents playing table games (unweighted)



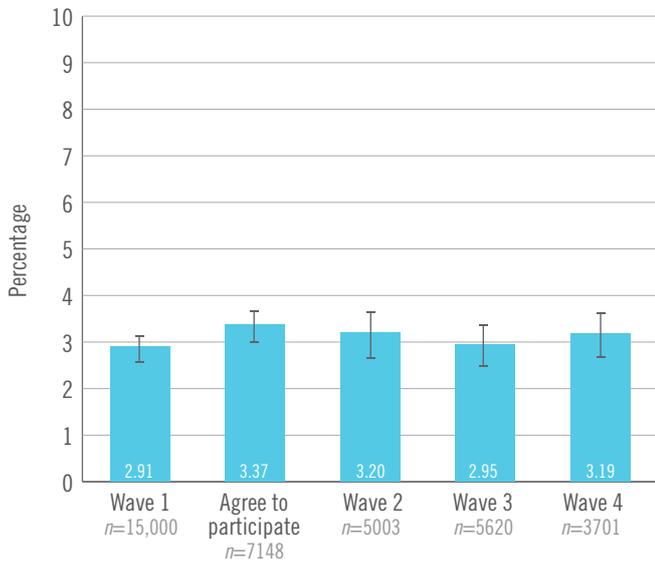
Note: Question asked: 'Which of the following activities have you spent any money on in the past 12 months?' (Base: all respondents.)

Figure 40 Proportion of respondents betting on horse and greyhound racing (unweighted)



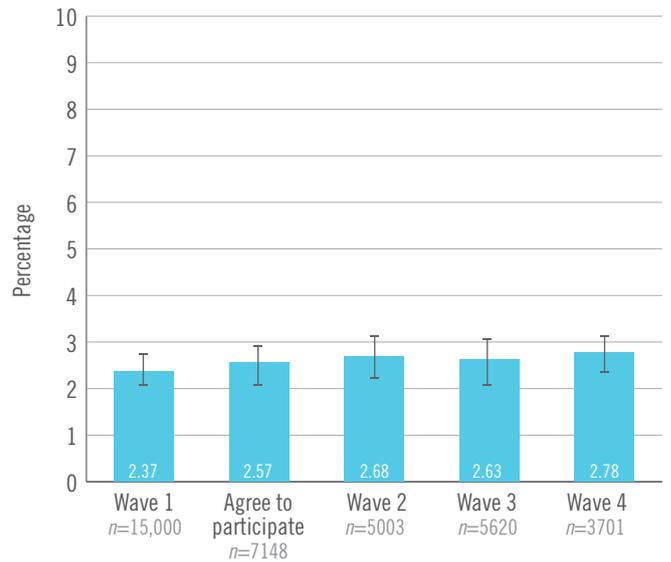
Note: Question asked: 'Which of the following activities have you spent any money on in the past 12 months?' (Base: all respondents.)

Figure 42 Proportion of respondents participating in informal private betting across the four waves (unweighted)



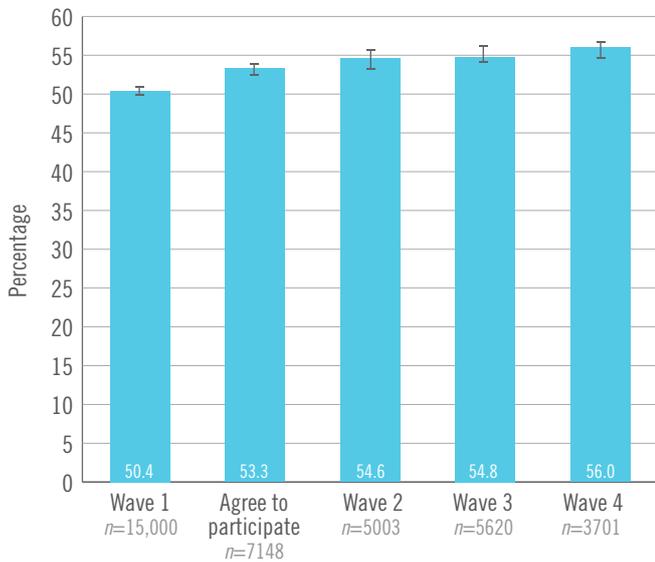
Note: Question asked: 'Which of the following activities have you spent any money on in the past 12 months?' (Base: all respondents.)

Figure 41 Proportion of respondents betting on sports (unweighted)



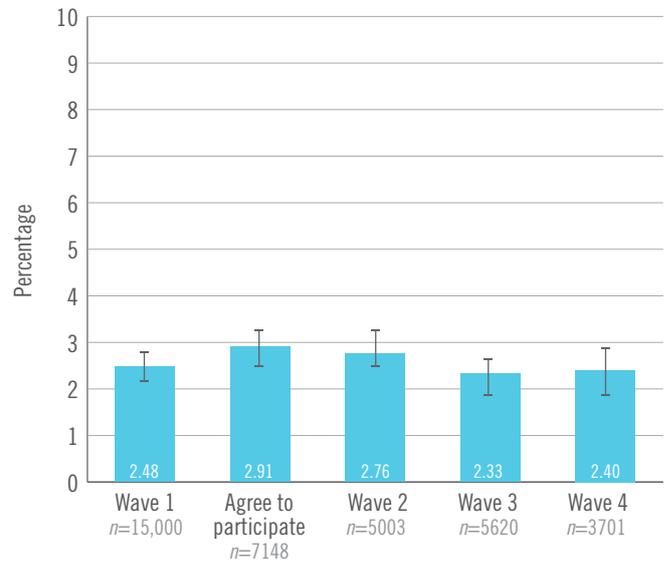
Note: Question asked: 'Which of the following activities have you spent any money on in the past 12 months?' (Base: all respondents.)

Figure 43 Proportion of respondents participating in Keno across the four waves (unweighted)



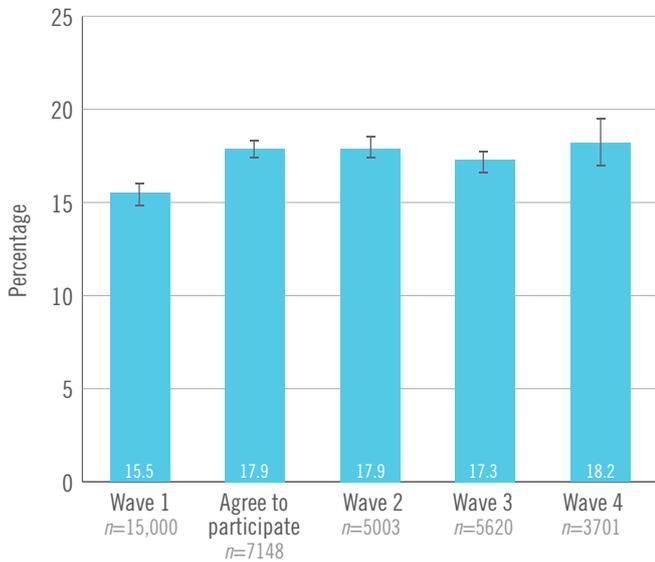
Note: Question asked: 'Which of the following activities have you spent any money on in the past 12 months?' (Base: all respondents.)

Figure 44 Proportion of respondents participating in Lotto across the four waves (unweighted)



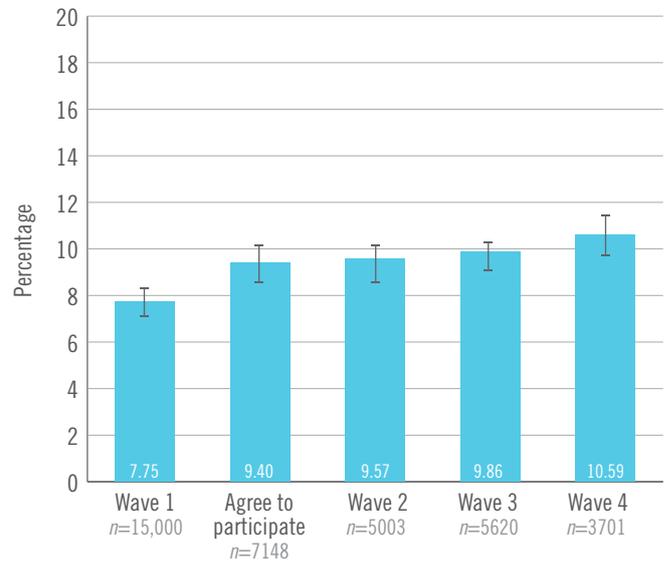
Note: Question asked: 'Which of the following activities have you spent any money on in the past 12 months?' (Base: all respondents.)

Figure 46 Proportion of respondents participating in bingo across the four waves (unweighted)



Note: Question asked: 'Which of the following activities have you spent any money on in the past 12 months?' (Base: all respondents.)

Figure 45 Proportion of respondents participating in scratch ticket betting across the four waves (unweighted)

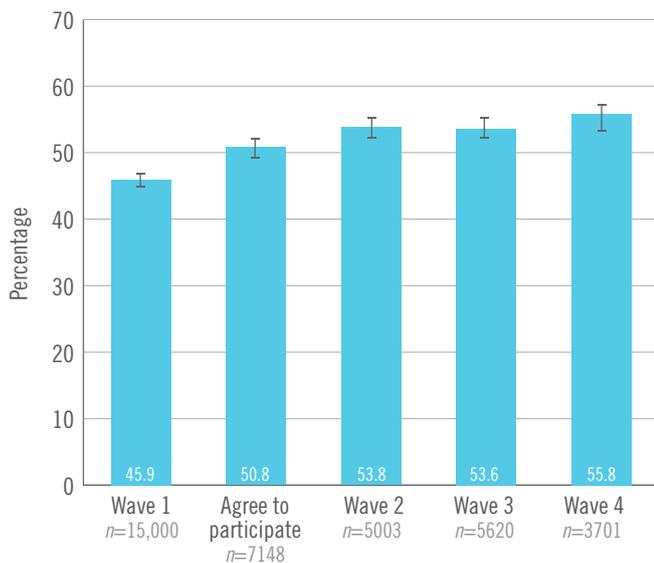


Note: Question asked: 'Which of the following activities have you spent any money on in the past 12 months?' (Base: all respondents.)

Figure 47 Proportion of respondents participating in phone or SMS competitions across the four waves (unweighted)

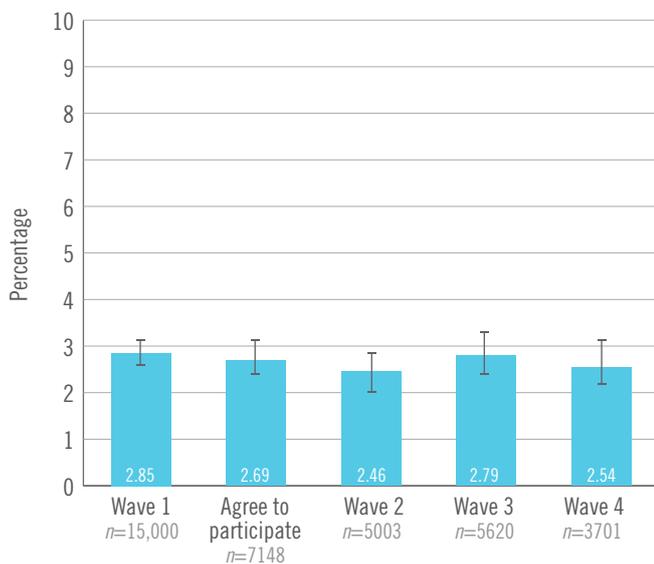
HEALTH AND WELLBEING INDICATORS

There was little change across the study in terms of health and wellbeing indicators. These included smoking in the past 12 months, being a current smoker, consumption of alcoholic drinks in the past 12 months, increased alcohol risk, signs of alcohol abuse, experienced trauma or hardship, levels of distress and self-reported health status.



Note: Question asked: 'Which of the following activities have you spent any money on in the past 12 months?' (Base: all respondents.)

Figure 48 Proportion of respondents participating in raffles or sweeps across the four waves (unweighted)



Note: Question asked: 'Which of the following activities have you spent any money on in the past 12 months?' (Base: all respondents.)

Figure 49 Proportion of respondents participating in speculative investments across the four waves (unweighted)

APPENDIX B

FURTHER RESULTS ON GAMBLING ACTIVITIES, FREQUENCY AND RISK

Appendix B presents further results on the relationship between gambling activity, frequency of gambling on that activity and Problem Gambling Severity Index (PGSI) gambling risk category. These results are based on data collected in the 2008 prevalence component of the Victorian Gambling Study. Results are for gambling activities other than electronic gaming machines, table games, race betting and sports betting, which are presented in Section 3.2.

Table 27 summarises participation in the additional gambling activities by problem gambling risk category.

A number of tables show participation in each of the activities individually by problem gambling risk category:

- informal private betting (see Table 28)
- Keno (see Table 29)
- Lotto (see Table 30)
- scratch tickets (see Table 31)
- bingo (see Table 32)
- phone or SMS competitions (see Table 33)
- raffles and sweeps (see Table 34).

Note that tables and figures are not provided for speculative investments, as participants were not asked to report frequency for this activity.

Table 27 Participation in gambling activities, by gambling risk category, in Victoria, 2008 (weighted, all respondents $n = 15,000$)

Activity	Population rate	PGSI category			
		Non-problem gambler	Low-risk gambler	Moderate-risk gambler	Problem gambler
Lotto, Powerball or the pools	47.5	64.3	68.2	72.7	75.8
Raffles and sweeps	42.9	59.6	54.2	48.6	43.0
Scratch tickets	15.3	19.6	30.8	28.8	36.0
Phone and SMS competitions	7.4	9.8	12.3	9.7	12.7
Informal private betting	3.5	3.7	11.0	17.4	6.1
Speculative investments	3.2	4.0	8.3	4.8	6.2
Keno	2.3	2.7	6.1	7.6	11.1
Bingo	2.1	2.4	5.0	10.4	9.1
Other gambling activity	0.03	–	–	–	–

– = no gambling activity; PGSI = Problem Gambling Severity Index

Note: Questions asked: 'Which of the following activities have you spent any money on in the past 12 months?' and 'How often did you take part in [insert activity] in the past 12 months?'

Table 28 Frequency of informal private betting, by risk group (weighted, all respondents $n = 15,000$)

Frequency	PGSI category					Total (%)
	Non-gamblers (%)	Non-problem gamblers (%)	Low-risk gamblers (%)	Moderate-risk gamblers (%)	Problem gamblers (%)	
Not at all	100.0	96.3	89.0	82.1	93.1	96.5
Less than once per month	0.0	2.9	6.1	12.6	0.0	2.5
1–3 times per month	0.0	0.5	3.1	4.2	3.5	0.7
Once a week or more	0.0	0.3	1.8	1.1	3.5	0.4

PGSI = Problem Gambling Severity Index

Note: Questions asked: 'Which of the following activities have you spent any money on in the past 12 months?' and 'How often did you take part in [insert activity] in the past 12 months?'

Table 29 Frequency of playing Keno, by risk group (weighted, all respondents $n = 15,000$)

Frequency	PGSI category					Total (%)
	Non-gamblers (%)	Non-problem gamblers (%)	Low-risk gamblers (%)	Moderate-risk gamblers (%)	Problem gamblers (%)	
Not at all	100.0	97.3	94.3	92.6	89.3	97.7
Less than once per month	0.0	2.1	4.0	3.2	7.1	1.7
1–3 times per month	0.0	0.2	0.9	0.0	3.6	0.2
Once a week or more	0.0	0.4	0.9	4.2	0.0	0.4

PGSI = Problem Gambling Severity Index

Note: Questions asked: 'Which of the following activities have you spent any money on in the past 12 months?' and 'How often did you take part in [insert activity] in the past 12 months?'

Table 30 Frequency of playing Lotto, by risk group (weighted, all respondents $n = 15,000$)

Frequency	PGSI category					Total (%)
	Non-gamblers (%)	Non-problem gamblers (%)	Low-risk gamblers (%)	Moderate-risk gamblers (%)	Problem gamblers (%)	
Not at all	100.0	35.7	31.7	27.4	24.1	52.5
Less than once per month	0.0	27.7	21.3	25.3	24.1	19.8
1–3 times per month	0.0	12.5	15.2	20.0	13.8	9.5
Once a week or more	0.0	24.2	31.7	27.4	37.9	18.3

PGSI = Problem Gambling Severity Index

Note: Questions asked: 'Which of the following activities have you spent any money on in the past 12 months?' and 'How often did you take part in [insert activity] in the past 12 months?'

Table 31 Frequency of playing scratch tickets, by risk group (weighted, all respondents $n = 15,000$)

Frequency	PGSI category					Total (%)
	Non-gamblers (%)	Non-problem gamblers (%)	Low-risk gamblers (%)	Moderate-risk gamblers (%)	Problem gamblers (%)	
Not at all	100.0	80.4	69.3	71.3	64.3	84.7
Less than once per month	0.0	15.0	21.9	18.1	17.9	11.4
1–3 times per month	0.0	3.3	6.1	8.5	10.7	2.8
Once a week or more	0.0	1.3	2.6	2.1	7.1	1.1

PGSI = Problem Gambling Severity Index

Note: Questions asked: 'Which of the following activities have you spent any money on in the past 12 months?' and 'How often did you take part in [insert activity] in the past 12 months?'

Table 32 Frequency of playing bingo, by risk group (weighted, all respondents $n = 15,000$)

Frequency	PGSI category					Total (%)
	Non-gamblers (%)	Non-problem gamblers (%)	Low-risk gamblers (%)	Moderate-risk gamblers (%)	Problem gamblers (%)	
Not at all	100.0	97.6	94.8	90.4	92.9	97.9
Less than once per month	0.0	1.2	2.2	4.3	3.6	1.0
1–3 times per month	0.0	0.4	0.9	2.1	3.6	0.4
Once a week or more	0.0	0.8	2.2	3.2	0.0	0.7

PGSI = Problem Gambling Severity Index

Note: Questions asked: 'Which of the following activities have you spent any money on in the past 12 months?' and 'How often did you take part in [insert activity] in the past 12 months?'

Table 33 Frequency of entering competitions via phone or SMS, by risk group (weighted, all respondents $n = 15,000$)

Frequency	PGSI category					Total (%)
	Non-gamblers (%)	Non-problem gamblers (%)	Low-risk gamblers (%)	Moderate-risk gamblers (%)	Problem gamblers (%)	
Not at all	100.0	90.2	87.8	90.5	86.2	92.7
Less than once per month	0.0	8.3	9.6	8.4	10.3	6.1
1–3 times per month	0.0	1.5	1.8	1.1	0.0	1.1
Once a week or more	0.0	0.1	0.9	0.0	3.5	0.2

PGSI = Problem Gambling Severity Index

Note: Questions asked: 'Which of the following activities have you spent any money on in the past 12 months?' and 'How often did you take part in [insert activity] in the past 12 months?'

Table 34 Frequency of playing raffles and sweeps, by risk group (weighted, all respondents $n = 15,000$)

Frequency	PGSI category					Total (%)
	Non-gamblers (%)	Non-problem gamblers (%)	Low-risk gamblers (%)	Moderate-risk gamblers (%)	Problem gamblers (%)	
Not at all	100.0	40.4	45.9	51.0	57.1	57.1
Less than once per month	0.0	51.3	42.8	39.6	32.1	36.6
1–3 times per month	0.0	6.9	8.7	6.3	7.1	5.1
Once a week or more	0.0	1.5	2.6	3.1	3.6	1.2

PGSI = Problem Gambling Severity Index

Note: Questions asked: 'Which of the following activities have you spent any money on in the past 12 months?' and 'How often did you take part in [insert activity] in the past 12 months?'

ACRONYMS AND ABBREVIATIONS

CATI	computer-assisted telephone interviewing
CI	confidence interval
EGM	electronic gaming machine
LGA	local government area
K10	Kessler Psychological Distress Scale
OR	odds ratio
PGSI	Problem Gambling Severity Index

GLOSSARY

Attrition

Loss to follow-up—that is, the loss of participants due to dropout through successive waves of a longitudinal study.

CAGE questionnaire

A brief screening tool for alcohol use and disorder.

Cohort

A group of persons followed or traced over time.

Comorbidity

An illness, sickness or condition occurring at the same time as another. In this report, it means occurring at the same time as problem gambling.

Confidence interval (CI)

A computed interval with a given probability (usually 95%) that the true value of the variable of interest (e.g. a mean, proportion or rate) is contained within that interval.

Confounders or confounding variables

A variable that can cause or prevent the outcome of interest, is not an intermediate variable and is associated with the factor under investigation (Last and Abramson 1995).

Continuous gambling activity

A gambling activity that is re-enforcing—any winnings can be immediately re-invested, such as when gambling on electronic gaming machines.

DSM-IV

Diagnostic and statistical manual of mental disorders, fourth edition, 1994, American Psychiatric Association.

Electronic gaming machine

A slot machine that has three or more reels that spin when a button is pushed. Often referred to as ‘poker machines’ or ‘pokies’ (Australia), ‘the slots’ (Canada) or ‘fruit machines’ (United Kingdom).

Epidemiology

The study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to the control of health problems.

Hard refusal

A hard refusal denotes the participant has clearly indicated refusal to participate in a survey by clearly saying so. See also *Soft refusal*.

High-risk gambling behaviour

In this report, high-risk gambling behaviour refers to gamblers who were classified as moderate-risk gamblers or problem gamblers according to their Problem Gambling Severity Index score.

Incidence

The number of instances of new illness or conditions (such as problem gambling) during a given period in a specified population (Last and Abramson 1995).

Kessler Psychological Distress Scale (K10)

A measure of distress based on 10 questions about the anxiety and depression an individual has experienced in the previous four weeks (Kessler et al 2002).

Lagged effects

The effect that factors present in earlier waves have on the outcome in later waves. In this report, we examined the effect of several factors in Wave 1 on incident high-risk gambling behaviour in Wave 3.

Logistic regression

Statistical method for analysing data used where the outcome variable is dichotomous (e.g. yes/no, true/false). Types of logistic regression used in this report are:

- univariable: logistic regression using only one predictor variable and a dichotomous outcome variable
- multiple: logistic regression using multiple predictor variables and a dichotomous outcome variable
- conditional: logistic regression used for matched data.

Longitudinal

A study that involves repeated observations of a population over a long period of time (usually years).

Markov chain Monte Carlo

An established modelling technique designed to provide solutions to complex probability problems.

Nested case–control study

A case–control study in which the cases and controls are drawn from the population in a cohort study. As some data are already available about both the cases and the controls, the effects of some potential confounding variables are reduced or eliminated.

New onset health morbidities

New cases of a health condition, such as depression, anxiety, diabetes, lung conditions or other health-related states, during the course of a study period.

NODS CLiP2

A brief screen that measures lifetime prevalence of pathological gambling. The NODS CLiP2 used in this study was not published. It was developed by Rachel Volberg and Yoku Shaw Taylor.

Odds ratio (OR)

A measure of the strength of association between two variables, based on the ratio of two odds (Szumilas 2010):

- OR = 1: exposure does not affect odds of outcome
- OR > 1: exposure associated with higher odds of outcome
- OR < 1: exposure associated with lower odds of outcome.

P-value

Probability value, represented by *P*. Also see *Statistical significance*. The probability that a test statistic would be as extreme as or more extreme than observed if the null hypothesis were true (Last, 2001).

Pathological gambler

A persistent and recurrent maladaptive gambling behaviour as indicated by five (or more) behaviours listed in the DSM-IV.

Person-years

Each year that a participant contributes to the study can be described as a person-year. The concept of person-year can be used to describe the changes in gambling behaviour and risk during the course of the study.

Prevalence

The number of events, such as instances of a given disease or other condition, in a given population at a designated time.

Problem gambler

Problem gambling is characterised by difficulties in limiting money and/or time spent on gambling, which leads to adverse consequences for the gambler and others, or for the community (Neal et al 2005).

Problem Gambling Severity Index (PGSI) score

A score based on nine questions, which can be used to estimate an individual's gambling risk status in the preceding 12 months.

Psychological distress

Negative emotional states as measured by the Kessler Psychological Distress Scale (K10 score). See also *Kessler Psychological Distress Scale*.

Relapse

Relapse is the re-emergence of gambling that may cause harm to the individual or others, or the community, after a period of abstinence or controlled gambling (Lesieur and Blume 1987). In this report, relapse refers to those participants who were high-risk gamblers in Wave 1, lower risk in Wave 2 and high risk again in Wave 3.

Soft refusal

During a call to a participant, a soft refusal occurs when the participant declines immediate participation because they are busy or preoccupied at the time of the call, but do not explicitly refuse future participation. See also *Hard refusal*.

South Oaks Gambling Screen (SOGS)

A self-administered screen that contains 20 questions based on DSM-III criteria for pathological gambling (Lesieur and Blume 1987).

Statistical significance

Statistical methods allow an estimate to be made of the probability of the observed or greater degree of association between independent and dependent variables under the null hypothesis. From this estimate, in a sample of given size, the statistical 'significance' of a result can be stated. Usually the level of statistical significance is stated by the *P*-value (Last, 2001).

The smaller the *P*-value, the more likely that the null hypothesis is not true. Researchers generally reject the null hypothesis if the statistical significance is a *P*-value of less than 0.05 ($P < 0.05$).

Statistical test

A procedure that is intended to determine whether a hypothesis about the distribution of one or more variables should be rejected or accepted (Last, 2001).

Weighted data

Adjustments or weightings are applied to the data to make it more representative of a broader population (such as the Victorian adult population). They are based on the combined probabilities of a person being selected in the survey. In this case, the household selection probability, the intraregional selection probability and the population benchmark selection probability. Data in Chapter 3 were weighted to the Victorian 2008 population, whereas data in chapters 4 and 5 were unweighted.

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