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EXECUTIVE SUMMARY

This report describes the second phase of the 2012 National Gambling Study, presenting and discussing results from the 12-month follow-up assessment of participants conducted in 2013 (Wave 2). It focuses on incidence of problem gambling (i.e. the number of 'new' cases of problem gambling arising since 2012; Wave 1), transitions between gambling states (no gambling, non-problem gambling, low-risk gambling, moderate-risk gambling and problem gambling), risk and resilience for problem and at-risk gambling, and factors that predict some of these transitions including problem gambling remission ('natural recovery').

A randomly selected national sample of 6,251 people aged 18 years and older living in private households was interviewed face-to-face from March to October 2012 (Wave 1). The response rate was 64% and the sample was weighted to enable generalisation of the survey findings to the general adult population. One year later from March to November 2013 (Wave 2), 3,745 participants were re-contacted and re-interviewed. Due to budgetary constraints, attempts were only made to re-contact 5,266 of the original 6,251 participants. Therefore, a 71% response rate was achieved in 2013 (60% of the total original sample).

There was some differential attrition from Wave 1 to Wave 2. While the differences between the samples were generally small, there was greater attrition among younger participants, Asian people, people who had not gambled in the past year, people who had experienced five or more major life events in the past year, and people whose quality of life was below the median score. There was greater retention among people resident in Wellington and Christchurch, non-problem gamblers and people who had not sought help (from formal or informal sources) for gambling in the past year. Wave 2 data analyses were adjusted to account for attrition effects. These adjustments for differential attrition and weighting enabled findings to be generalised to the New Zealand adult population.

The survey instrument for the 2013 12-month follow-up (Wave 2) of the National Gambling Survey was similar to the baseline survey (Wave 1) and covered 11 key areas:

1. Leisure activities and gambling participation
2. Past gambling and recent gambling behaviour change
3. Problem gambling
    - Problem Gambling Severity Index
    - Formal and informal help-seeking behaviours
    - Gambling in households
4. Life events and on-going hassles
5. Mental health
    - General psychological distress
    - Quality of life
6. Alcohol use/misuse
7. Substance use/misuse
    - Tobacco
    - Other drugs
8. Health conditions
9. Social connectedness
10. New Zealand Individual Deprivation Index
11. Demographics

Results

New Zealand gambling and problem gambling prevalence: 2012 and 2013

Gambling participation

- In 2013 it was estimated that 77.9% of adults participated in one or more gambling activities during the past 12 months, slightly less than in 2012 (79.8%).
- There were no major changes from 2012 to 2013 in regard to the proportion of non-gamblers, infrequent gamblers, regular non-continuous gamblers and regular continuous gamblers.
    - In 2013, 22.1% were non-gamblers, 57.1% infrequent gamblers, 14.6% regular non-continuous gamblers and 6.1% regular continuous gamblers
- There were no major changes from 2012 to 2013 in gambling frequency, overall gambling expenditure, most preferred gambling activity, who they gambled with and knowing other people with a gambling problem.
- There was a slight reduction in the proportion of adults who took part in seven to nine gambling activities during the past 12 months, from 2012 (3.3%) to 2013 (2.0%), as well as for people who participated in some continuous gambling activities including pub and casino electronic gaming machines (EGMs), casino table games, sports betting and making bets with friends or workmates. There was no major change in the proportion of adults participating in four to six gambling activities between 2012 (17.6%) and 2013 (15.5%).
- 2013 monthly participation in all gambling activities was similar to 2012, apart from past month EGM participation (pubs, casinos and clubs combined) which was slightly lower in 2013.

At-risk and problem gambling

- Overall, there were no major differences from 2012 to 2013 in the proportion of problem gamblers, moderate-risk gamblers, low-risk gamblers and non-problem gamblers.
    - In 2013, 0.5% of adults were problem gamblers, 1.5% moderate-risk gamblers, 5.6% low-risk gamblers and 70.3% non-problem gamblers.
- Māori and Pacific people continued to have higher prevalence of moderate-risk and/or problem gambling in 2013 than European/Other. Asian people had a similar prevalence to European/Other.
    - Māori: 1.6% problem gamblers, 4.4% moderate-risk gamblers, 11.9% low-risk gamblers and 65.7% non-problem gamblers.
    - Pacific people: 0.6% problem gamblers, 6.3% moderate-risk gamblers, 9.0% low-risk gamblers and 55.4% non-problem gamblers.
    - Asian people: 0.4% problem gamblers, 1.3% moderate-risk gamblers, 5.1% low-risk gamblers and 49.4% non-problem gamblers.
    - European/Other: 0.3% problem gamblers, 0.9% moderate-risk gamblers, 4.7% low-risk gamblers and 74.6% non-problem gamblers.

Use of ways to stop gambling too much and help-seeking

- Similar percentages in both 2012 and 2013 used the following methods to stop gambling too much: a trusted person managing gambling money (0.4% in 2013), leaving automated teller machine (ATM)/credit cards at home (1.1%), setting a time limit for gambling (1.2%) and avoiding betting/gambling venues (1.5%).
- Somewhat lower percentages reported setting a money limit for gambling in Wave 2 (16% in 2012; 13% in 2013) and separating betting money and stopping when it was used (3.5%; 2.0%).
- There was no difference in the percentage of adults who sought help (from formal and informal sources) for gambling in 2012 and 2013 (0.3% in both years).

Significant life events: 2012 and 2013

- Generally, similar percentages of adults experienced major life events in both waves, with the exception of those who experienced one event (26.3% in 2012; 30.0% in 2013).
- In 2013, 28.9% had not experienced any life event, 30.0% experienced one event, 40.3% experienced two or three events, and 10.8% experienced four or more events.

Quality of life, health, psychological distress and substance use/misuse: 2012 and 2013

- There were similar levels of quality of life (low quality of life; 42% in 2012, 41% in 2013), psychological distress (low level; 74% in 2012, 76% in 2013), hazardous alcohol consumption (37% in 2012, 35% in 2013) and tobacco use (ever smoked; 66% in 2012, 65% in 2013) in both years.
- A somewhat lower percentage of adults used recreational drugs (other than alcohol and tobacco) and illegal drugs in 2013 than in 2012 (14.7% in 2012; 11.4% in 2013).

Transitions from 2012 to 2013 including problem gambling incidence and relapse

Incidence and relapse

- Based on the number of participants who became problem gamblers during the 12 month period between the two waves, it is estimated that the national incidence rate for problem gambling is 0.28% (CI 0.10 - 0.45); approximately 8,046 people (CI 2,874 - 12,931).
- Of those who developed problems between 2012 and 2013, 51.6% (CI 14.5 - 88.7) were new problem gamblers and 48.4% were people who, while not problem gamblers during the 12 months prior to 2012, were assessed as having previously been a problem or probable pathological gambler.
- It is estimated that 1.1% (CI 0.7 - 1.5), approximately 31,158 people (CI 19,828 - 42,488), became moderate-risk gamblers in 2013, who were not moderate-risk or problem gamblers in 2012.
- Of those who became moderate-risk gamblers in 2013, 71.1% (CI 54.2 - 87.9) were people who were not past problem or probable pathological gamblers prior to 2012, and 28.9% were people who had previously been problem or probable pathological gamblers.
- Overall 74.3% (CI 58.9 - 89.7) of 2013 ‘new’ problem and moderate-risk gamblers were assessed as not having been a problem or probable pathological gambler prior

to 2012; 25.7% were assessed as previously having been a problem (24.5%, CI 9.2 - 39.7) or probable pathological gambler (1.2%, CI 0.0 - 3.7).

Problem cessation

- Of those who were problem gamblers in 2012, 55.9% (CI 35.0 - 76.8), approximately 7,261 people (CI 4,546 - 9,976), were no longer problem gamblers in 2013; 9.7% became moderate-risk gamblers and 46.2% became low-risk or non-problem gamblers.
- Of those who were moderate-risk gamblers in 2012, 62.9% (CI 49.3 - 76.5), approximately 25,782 people (CI 20,207 - 31,356) were no longer moderate-risk or problem gamblers in 2013.

Stability of PGSI groups

- Non-problem and non-gamblers were the most stable between 2012 and 2013 with 82.5% and 64.7% respectively staying in the same group.
- Problem gamblers were the next most stable with 44.1% staying in the same group.
- Participants in the low-risk and moderate-risk groups were the least stable with only 25.7% and 27.5% respectively remaining in the same group.

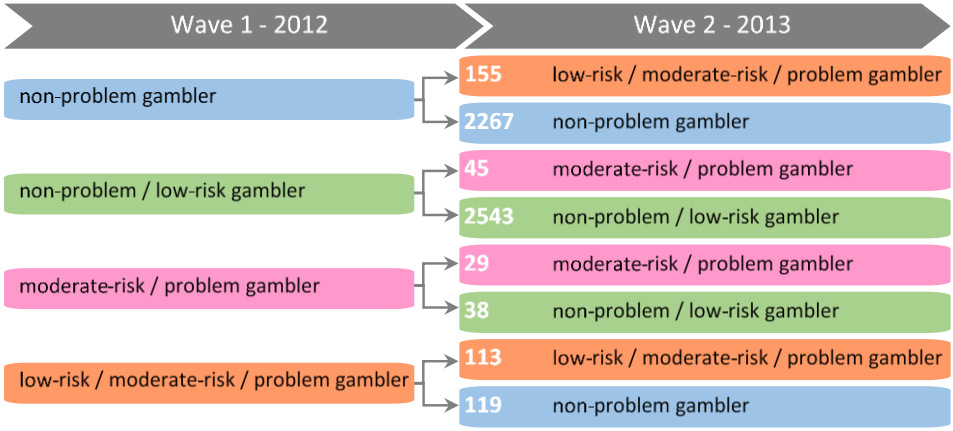
Transition to increased risk or problem gambling

- A third of non-gamblers in 2012 became non-problem gamblers in 2013; 2.2% became low-risk or moderate-risk gamblers and 0.1% became problem gamblers.
- A small proportion (5.5%) of 2012 non-problem gamblers became low-risk or moderate-risk gamblers in 2012 and 0.1% became problem gamblers.
- A somewhat larger proportion (11.7%) of low-risk gamblers became moderate-risk gamblers in 2013 and 0.8% transitioned to problem gambling.
- Around one in ten (9.6%) moderate-risk gamblers became problem gamblers in 2013.
- Although moderate-risk gamblers had a much higher probability of becoming problem gamblers than did low-risk, non-problem and non-gamblers, as a consequence of their greater size approximately half of new problem gamblers came from these groups.

Transition to lower risk, non-problem gambling and non-gambling

- A third of 2012 problem gamblers moved into the non-problem gambling category in 2013, 26.6% became low-risk and gamblers and 9.7% became moderate-risk gamblers.
- Over half of moderate-risk gamblers moved into the low-risk (25.3%) or non-problem groups (30.7%) and 6.9% stopped gambling.
- Over half (54.6%) of low-risk gamblers became non-problem gamblers and 7.2% stopped gambling.

Transitions to increased or lower risk are shown pictorially below.



Risk and protective factors and associations with transition to moderate-risk/problem gambling

In 2013, 45 participants (adjusted data) transitioned into the moderate-risk or problem gambling groups from being non-problem or low-risk gamblers in 2012.

Gambling participation measures, assessed in 2012, were generally the strongest predictors (risk factors) of movement from non-problem and low-risk gambling to problem and moderate-risk gambling in 2013. For example, relative to adults who participated in one gambling activity in the past 12 months, those who took part in seven to nine (Odds Ratio (OR) 4.6) or 10 or more (OR 16.0) activities were respectively nearly five and sixteen more times more likely to become a problem or moderate-risk gambler. Relative to infrequent gamblers, regular continuous gamblers (OR 2.7) were around three times more likely to develop problems. High typical monthly gambling expenditure ($101 - $500, OR 4.1) was also a risk factor, as were both annual and monthly participation in a wide variety of particular gambling activities. Monthly or more frequent participation in EGMs was particularly strongly linked (casino EGMs OR 11.5; club EGMs OR 14.1; pub EGMs OR 6.1) to the development of problem and moderate-risk gambling as was longer average EGM sessions in these venues. Gambling with other people was a protective factor (approximately 0.3 times) relative to gambling alone. Setting a dollar figure before leaving home (OR 3.0), avoiding places that have gambling or betting (OR 5.2) and seeking help (from formal and informal sources) in the past year for gambling (OR 26.0) were additional risk factors. Thirty-one percent of new moderate-risk or problem gamblers said they had sought help (from formal and informal sources) in the past year.

Ethnicity was also significantly associated with the development of problem and moderate-risk gambling with Pacific adults being at particularly high risk (OR 7.1) relative to European/ Other. Māori (OR 3.7) and Asian people (OR 3.2) also were more likely to develop problems than European/Other. Additional demographic risk factors included being non-New Zealand born (OR 1.9) and having household incomes of $40,001 - $60,000 (OR 2.7) or $60,001 - $80,000 (OR 3.3) relative to <$20,000. Psychological distress (mid-high range, OR 5.1, relative to low range) was the only health-related factor significantly associated with the transition to problem or moderate-risk gambling.

Given the substantial overlap between the various measures, a multivariate logistic regression analysis was conducted to identify the strongest independent predictors. Past year participation in casino table games or EGMs in New Zealand (OR 5.2) and overseas (OR 3.9) were the only gambling participation measures that remained. Gambling with other people was again found to be protective (OR 0.2 for gambling with one other person; OR 0.3 for gambling with several people/a group) and avoiding places that have betting or gambling (OR 4.1) remained a risk factor. Pacific (OR 6.0), Māori (OR 3.5) and Asian (OR 3.2) ethnicity also remained significant risk factors when confounding factors were controlled, as did mid-high psychological distress (OR 4.4).

Risk and protective factors and associations with transition to low-risk/moderate-risk/ problem gambling

In 2013, 155 participants (adjusted data) transitioned into the low-risk, moderate-risk or problem gambling categories from the non-problem gambling category in 2012.

As with the transition to moderate-risk or problem gambling, a large number of gambling participation measures predicted future low-risk, moderate-risk or problem gambling. Similar to the previous analyses, strong participation predictors included number of activities engaged in (7 - 9 OR 7.1; 10+ OR 17.1) and high typical monthly expenditure ($101 - $500 OR 5.5; >$500 OR 5.0). Relative to other participation categories, regular continuous gamblers (OR 4.0) were also at higher risk. As with the prediction of the transition to moderate-risk or problem gambling, annual and monthly participation in a wide variety of continuous gambling activities were implicated. The strongest predictors again were monthly EGM participation (casino EGMs OR 14.7; club EGMs OR 8.2; pub EGMs OR 10.1; EGMs overall OR 10.6). For this transition, monthly housie or bingo participation was also a strong risk factor (OR 9.4). Time spent playing EGMs in an average day were additional predictors and were strongest for pub (31 - 60 minutes OR 5.9; >60 minutes OR 9.7) and club (31 - 60 minutes OR 6.0; >60 minutes OR 10.9) EGMs. Gambling with other people was not protective of progression to low-risk or more serious gambling risk or problems. Setting a dollar figure before leaving home (OR 1.9), separating gambling money from other money (OR 3.4) and setting a time limit (OR 3.9) were additional predictors, as was knowing other people with a gambling problem (OR 1.8).

As in the earlier analyses, ethnicity was again strongly implicated with high odds ratios for Pacific (4.1), Māori (3.2) and Asian (2.6) adults. Being non-New Zealand born was not a risk factor for moving into the low-risk, moderate-risk and problem gambling categories; however, a number of additional demographic factors were, including older age which was protective (55 - 64 years and 56+ years both OR 0.4) relative to younger age (18 - 24 years); area of residence (Christchurch OR 0.3; Wellington OR 0.5) relative to Auckland and religion (Other Christians OR 2.2; Other religion OR 2.2) relative to people with no religion.

In contrast to the situation for the development of moderate-risk and problem gambling, experiencing major life events was a risk factor that reached significance for people who experienced one, two, three or five or more events (OR range 2.0 - 3.8) relative to those who reported none. Also in contrast, household income was not a risk factor. Psychological distress was again implicated (high range OR 5.1; mid-high range OR 2.6). A number of additional health-related factors were predictive of low-risk, moderate-risk and problem gambling development, namely quality of life (below median score OR 2.1; median score OR 2.0; relative

to above median score), cannabis use (OR 2.8), daily tobacco use (OR 2.2) and other drug use (non-drug use OR 0.4 relative to drug use).

A multivariate logistic regression substantially reduced the number of statistically significant predictors. As for the transition to moderate-risk or problem gambling, ethnicity and psychological distress remained significant. Pacific (OR 5.0), Māori (OR 2.6) and Asian (OR 3.9) adults were at high risk relative to European/Other adults, as were adults with high (OR 7.4) and mid-range (OR 2.4) psychological distress. The strongest gambling participation predictor was monthly EGM participation overall (OR 7.6), followed by typical monthly gambling expenditure ($51 - $100 OR 2.9; $101 - $500 OR 3.2; >$500 OR 4.6). The other predictors that remained were major life events (4 of 5 groups who experienced one or more events had higher odds ratios (range of 2.1 - 3.4) relative to the group that experienced no major events, and cannabis use (OR 2.1).

Risk and protective factors and associations with staying a moderate risk/problem gambler

In 2013, 29 participants (adjusted data) remained in the moderate-risk and problem gambling categories. Thirty-eight moderate-risk and problem gamblers shifted to lower risk (low-risk, non-problem and non-gambling) categories.

A number of gambling participation measures predicted a continuation of moderate-risk and problem gambling from 2012 to 2013, namely regular continuous gambling (OR 5.6), at least weekly gambling (OR 4.5) and spending 31 to 60 minutes playing club EGMs on an average day (OR 3.3). Leaving ATM and credit cards at home (OR 0.2) was protective, being associated with a lower probability of continuing to experience moderate-risk and problem gambling. In contrast, having sought help (from formal and informal sources) for gambling during the past year (OR 5.2) predicted a continuation of problems or moderate-risk status.

Relative to people born in New Zealand, migrants had a lower risk of staying as a moderate-risk or problem gambler (0.2 times). People aged 55 years and older (OR 7.5) and daily smokers (OR 9.8) appeared to be at high risk; however, small sample size and wide confidence intervals mean that these results are not conclusive and should be treated with caution.

A multivariate analysis was conducted but results were not sufficiently robust for interpretation.

Risk and protective factors and associations with staying a low-risk/moderate-risk/ problem gambler

In 2013, 113 participants (adjusted data) stayed in the low-risk/moderate-risk/problem gambling categories. One hundred and nineteen participants shifted to non-problem and non-gambling categories.

A substantial number of gambling participation measures predicted a continuation of at-risk and problem gambling from 2012 to 2013. Regular continuous gamblers had over three times (OR 3.3) the probability of remaining in these categories than did infrequent gamblers. Increased risk was also found for people who gambled at least weekly (OR 6.1) or monthly (OR 3.4), and for people who typically lost $500 or more gambling per month (OR 6.9).

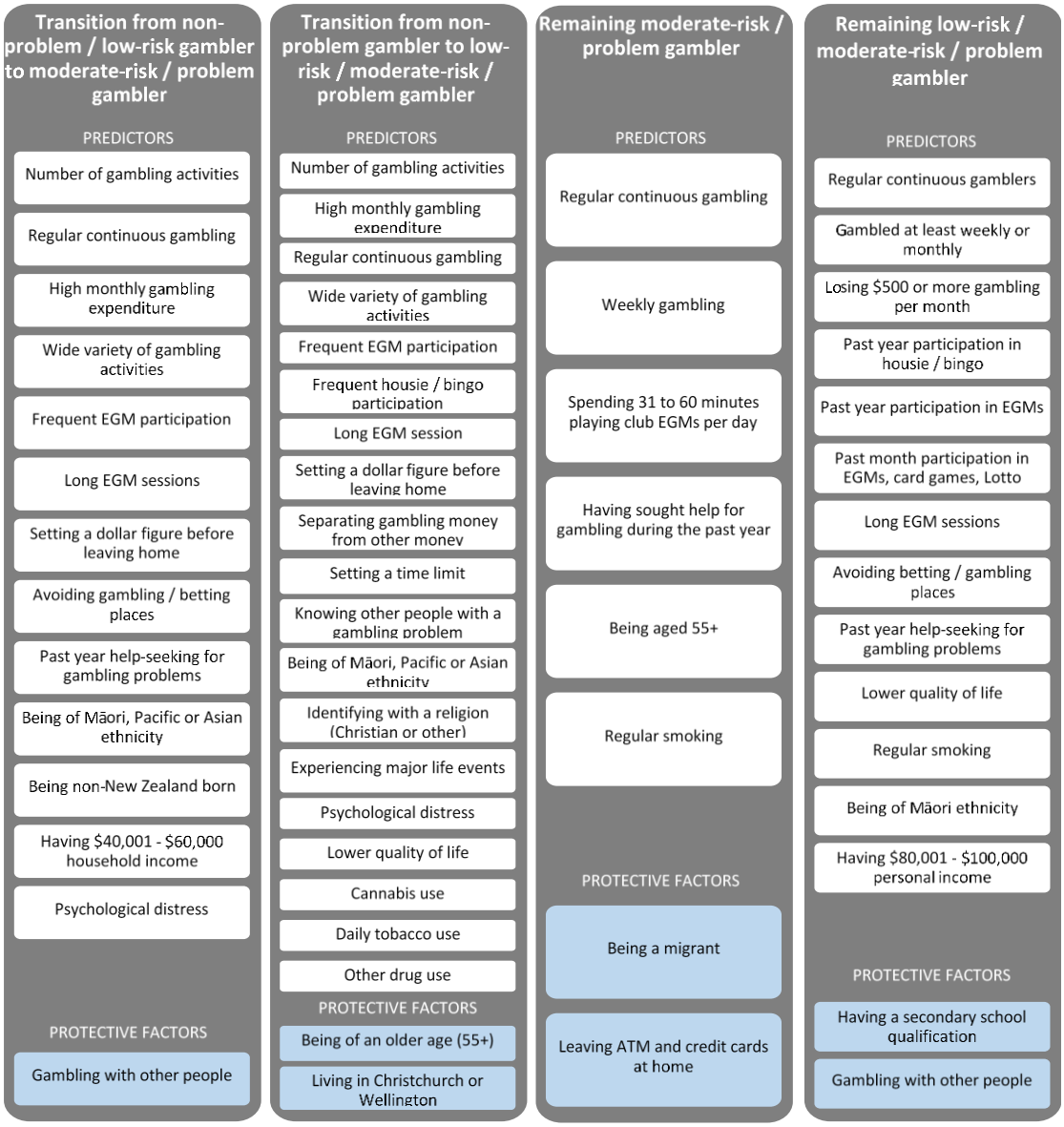
Elevated risk was also evident for past year participation in housie or bingo (OR 4.6), club EGMs (OR 5.1) and EGMs overall (OR 4.0). Additionally, past month participation in card games (OR 4.3), Lotto (OR 2.1), casino EGMs (OR 4.4), pub EGMs (OR 3.8), club EGMs (OR 5.9) and EGMs overall (OR 5.3) was associated with higher risk of remaining in the risk and problem categories. Further gambling-related risk factors included time spent playing EGMs on a typical day. For casino EGMs increased risk was found for those who played for more than 60 minutes (OR 3.4). Similar results were obtained for pub (OR 3.8 for 31 - 60 minutes participation; OR 4.8 for 60 or more minutes) and club (OR for 31 - 60 minutes 32.7; OR 7.7 for 60 or more minutes) EGM participants. Avoiding places with betting or gambling (OR 2.5) and seeking help (from formal and informal sources) for gambling in the past year (OR 7.4) were additional risk factors.

Lower quality of life (below median OR 2.4) and weekly or more frequent smoking (OR 44.4) also predicted continued risk or problem gambling.

Only a few demographic risk factors were identified, namely Māori ethnicity (OR 2.9) and having a personal income of $80,001 - $100,000 (OR 7.3). Having a secondary school qualification (OR 0.3) was protective relative to people with no high school qualifications.

A greatly reduced number of variables remained when confounding factors were controlled in a multivariate logistic regression analysis. The variables associated with greater likelihood of continued at-risk and problem gambling were overall monthly EGM (OR 7.5) and card games participation (OR 6.4), and annual gambling on housie or bingo (OR 4.5). Gambling with one other person (OR 0.3) or several people/a group (OR 0.1) was associated with lower risk than gambling alone. This finding just failed to reach a level of statistical significance in the univariate analyses.

Risk and protective factors and associations with transitions to higher or lower problem gambling categories or for staying in a category are shown pictorially in the figure overleaf.



Note that the sample size for remaining in the moderate-risk/problem gambler categories was very small so results should be considered cautiously

Initiation of gambling in 2013

In 2013, 165 participants (adjusted data) who did not gamble in 2012 and had also not gambled in the past, started gambling during 2013. A further 354 (adjusted data) remained non-gamblers.

Māori (OR 2.6) were more likely to start gambling than people in other ethnic groups. Relative to New Zealand-born, recent migrants were less likely (OR 0.3) to start gambling. Relative to people with no religion, Other Christians (OR 0.3) less often commenced gambling. Other risk factors included hazardous alcohol consumption (OR 1.7) and a number of smoking measures (ever smoked OR 2.0, smoked more than 100 cigarettes in lifetime OR 2.5, ever smoked daily

for a period of time OR 2.5 and smokes at least once a day now OR 3.4). People in the low-mid psychological distress range had a lower risk (0.4) of starting gambling than those in the lowest distress group.

Multivariate logistic regression analyses, controlling for confounding factors, showed that recent migrants (OR 0.3), Other Religion (OR 0.4) and people in the low-mid psychological distress range (OR 0.4) remained at lower risk of starting gambling in 2013. Daily current tobacco use (OR 2.8) remained significantly associated with taking up gambling.

Re-initiation of gambling in 2013

In 2013, 99 participants (adjusted data) who in 2012 had not gambled in the past year, but who had gambled prior to that at some time, started gambling again.

Deprivation was the strongest predictor of starting gambling again with people who reported one or four deprivation characteristics at greater risk (ORs respectively 2.4 and 7.9) than those who reported no deprivation characteristics. Ever smoked tobacco, ever smoked daily for a period of time and current daily or more frequent use (ORs 2.1, 2.0 and 3.7 respectively) and hazardous alcohol consumption (OR 2.3) were additional predictors. People who did not use drugs had a lower risk (OR 0.4) which means that those who used drugs had higher risk.

In the multivariate analysis, only deprivation was retained as a significant predictor with people reporting one or four characteristics at higher risk. The odds ratios were unchanged from the univariate analysis.

Conclusion

The 12 month follow-up findings confirm the major gambling participation, at-risk and problem gambling prevalence estimates from the baseline survey, although there was some reduction in regular EGM participation and in the number of people who took part in large numbers of gambling activities. The longitudinal nature of this study means that, for the first time, problem gambling and at-risk gambling incidence estimates for the New Zealand adult population can be estimated. The problem gambling incidence rate was approximately half the prevalence rate. This indicates that around half of the current problem gamblers recently developed problems. The prevalence rate did not change because a comparable number of problem gamblers in 2012 ceased being problem gamblers in 2013. However, the at-risk groups were less stable, with around three-quarters of low- and moderate-risk gamblers transitioning over the 12 month period.

The NGS also included lifetime measures of problem gambling as well as current measures. It was found that just over half of the 'new' 2013 problem gamblers had previously been problem gamblers and were relapsing. Over a quarter of the 'new' moderate-risk gamblers had previously been a problem or probable pathological gambler. This finding confirms that problem and at-risk gambling are often transitory over the short-term, but that relapse is common. Additionally, it indicates that relapse propensity increases with problem severity. It is of note that lifetime measures are highly conservative when re-administered with a long time-lag so it is probable that the actual proportions of 'new' problem and moderate-risk gamblers who are relapsing are considerably larger than the study estimates.

Risk factors that predicted continued problem and at-risk gambling were identified and included heavy gambling involvement, gambling alone, Māori ethnicity, being New Zealand born, lack of formal qualifications, current tobacco use and low quality of life. People who sought help (from formal and informal sources) for gambling and who avoided gambling venues were also more likely to continue to be at-risk or problem gamblers whereas those who left automated teller machine (ATM) and credit cards at home when gambling were less likely. The proportion of people seeking help (from formal and informal sources) for gambling problems during the past year was around 80% of the current problem gamblers. Just less than a third of new problem and moderate-risk gamblers said they had sought help (from formal and informal sources) during this period. This indicates a high level of help-seeking.

A number of the risk factors were common both to initiating gambling and developing at-risk or problem gambling. There were also a few notable exceptions. Māori more often took up gambling than did people of other ethnicities. Recent migrants and other Christians were less likely to do so. All three of these groups were also at high risk for the development of at-risk and problem gambling. Psychological distress, tobacco and hazardous alcohol use also predicted both taking up gambling and developing gambling problems. Deprivation, and tobacco and hazardous alcohol use also predicted re-initiating gambling. Apart from prior history of problem gambling, intensity of involvement in a number of continuous forms of gambling including EGMs were the strongest predictors of problem gambling development. Pacific and Asian ethnicity were also strong risk factors for problem development.

Given the high proportion of 'new' problem and moderate-risk gamblers that are relapsing rather than developing problems for the first time, it is important that public education and prevention programmes target both first time onset and problem recurrence. Treatment services could also give greater attention to relapse prevention. Of those who developed gambling problems, similar numbers came from the moderate-risk gambling group and the remaining low-risk, non-problem gambling and non-gambling groups. It is likely that both whole-of-population and at-risk group prevention strategies will be required to reduce the incidence and prevalence of problem gambling and other gambling-related harms. This could include greater attention to high risk ethnic and other social groups. High incidence as well as prevalence rates in these groups, and apparently higher problem chronicity for Māori, suggest that long-standing disparities will remain or increase unless more effective ways are found to address them.

1. OVERVIEW AND PURPOSE OF THE PROJECT

Introduction

Wave 1 of the National Gambling Study (NGS) collected information from 6,251 participants across New Zealand via a national cross-sectional gambling survey of people aged 18 years and older, employing face-to-face household recruitment and interviews. The sample design followed that used in the 2006/7 New Zealand Health Survey (NZHS). It was a multi-stage, stratified, probability proportional to size sample. Māori, Pacific people and Asian people were over-sampled. Wave 2 re-contacted and interviewed 3,745 participants 12 months after the initial interview.

A range of measures was included in the Wave 1 baseline survey including measures of problem gambling. Other measures included demographics, gambling participation, gambling strategies and cognitions, gambling attitudes, health and well-being, psychological status, readiness to change, substance use/misuse, life events, and social capital/support. Many of these measures have been used in previous New Zealand and international gambling studies, facilitating comparison with these studies as well as with future New Zealand surveys and high quality gambling prevalence and incidence studies underway in Victoria, Australia and Sweden. Most measures were repeated in Wave 2 after 12 months in order to measure change over time and identify factors predictive of change in gambling and problem gambling.

This report describes the second phase of the 2012 National Gambling Study, presenting and discussing results from the 12-month follow-up assessment of participants conducted in 2013 (Wave 2). The baseline (2012, Wave 1) results are presented in three previous reports covering an overview of gambling and gambling participation findings (Abbott, Bellringer, Garrett, & Mundy-McPherson, 2014a), gambling harm and problem gambling (Abbott et al., 2014b), and attitudes towards gambling (Abbott et al., 2015).

This chapter provides an outline of the study objectives and background information.

Study objectives

The primary aims of Wave 2 of the National Gambling Study were to:

- Investigate incidence of problem gambling (i.e. the number of 'new' cases of problem gambling arising since 2012)
- Investigate transitions between gambling states (no gambling, non-problem gambling, low-risk gambling, moderate-risk gambling and problem gambling)
- Investigate risk and resilience for problem gambling
- Investigate factors associated with 'natural recovery'.

Background and context

During the past few decades, in many parts of the world there has been unprecedented growth in gambling availability, participation and expenditure. It has been argued that this expansion is qualitatively and quantitatively unprecedented, driven by a growing acceptance of legal gambling, the intersection of gambling and financial technologies, impacts of the internet, the spread of gambling to traditionally non-gambling settings and other forces of globalisation (Abbott & Volberg, 1999). While gambling is now widespread, some societies had little or no exposure to it until recently (Binde, 2005). Others have experienced cycles of liberalisation and restriction going back many hundreds of years. Restriction generally arose from increasing public and official concern about gambling leading to personal and social harm (Miers, 2004; Rose, 2003). The present global gambling boom has also led to increased awareness of, and concern about, harm of this type. Governments responded and commissioned general population surveys to quantify the extent of problem gambling. They also conducted inquiries and established commissions to examine various aspects of gambling, including gambling-related harm. The first general population study of problem gambling to use a validated measure, at a national level, was undertaken in New Zealand in 1990 (Abbott & Volberg, 1991; 1996).

Gambling surveys and other studies, in New Zealand and elsewhere, contributed to awareness and understanding of problem gambling and other personal, family and social costs associated with commercial gambling. In a number of jurisdictions this research informed political and public debate and played a part in the initiation of legislative and other measures to assist problem gamblers and people adversely affected by their behaviour. New Zealand, commencing in 1993, was among the first countries to establish nationwide services for problem gamblers (Sullivan, Abbott, McAvoy & Arroll, 1994). It was the first, in 2004, to place gambling within an explicit public health framework with a harm reduction emphasis. This legislation also tightened regulation, especially concerning electronic gaming machines (EGMs) and other gambling activities that had been shown to be strongly associated with gambling-related harm. Additionally, it mandated and provided ongoing funding for independent research to inform Government's gambling health strategy including public education and prevention programmes, and a range of counselling and other support services.

As documented in Abbott, Bellringer, Garrett and Mundy-McPherson (2014a), from 1987 onwards new forms of gambling were introduced to New Zealand. Participation and expenditure initially increased rapidly. Although further gambling activities continued to be made available and ways of accessing them diversified, since the mid-1990s participation declined markedly. This decline was most evident for weekly or more frequent participation, especially in high risk activities. Additionally, a decline occurred in the proportion of adults taking part in multiple gambling activities (Abbott et al., 2014a). Since 2004, official gambling expenditure also decreased. During the past decade it has reduced by a fifth in inflation-adjusted terms. Nevertheless, New Zealand remains among the top ranked countries in terms of average gambling expenditure per adult (The House Wins, The Economist 2014). It is highly likely that gambling-related harm, including problem gambling, reduced during the 1990s. However it has remained at about the same level since (Abbott, Bellringer, Garrett, Mundy-McPherson, 2014b). These findings are consistent with both the availability and adaptation hypotheses (Abbott, 2006). The former states that during exposure to new forms of gambling, particularly EGMs and other continuous activities, previously unexposed individuals, population sectors and societies are at elevated risk for the development of gambling problems. The latter proposes that over time adaptation ('host' immunity and protective environmental

changes) typically occurs and problem levels reduce, even in the face of increasing gambling exposure. The adaptation hypothesis was initially controversial and contested (Orford, 2005a; 2005b). However, a similar pattern to that found in New Zealand has since been observed in a number of other jurisdictions (Abbott et al., 2014b; Abbott, Romild & Volberg, 2014; Williams, Volberg & Stevens, 2011).

While gambling participation in New Zealand decreased during the past 15 years or so and problem gambling and related harm has probably plateaued, there remain substantial differences between some demographic groups, both with respect to participation and harm (Abbott et al., 2014b). Many of these differences were also evident 25 years ago (Abbott & Volberg, 1991; 1992; 1996). Māori continue to have high rates of both gambling participation and harm. Pacific people experience similarly high levels of harm but differ from Māori in that their overall gambling participation rate is relatively low. Young adults and some religious groups have a similar pattern to Pacific people. While proportionately more people in these groups do not gamble, those who do include a substantial number who gamble intensively and are at high risk. These groups are probably vulnerable for a variety of reasons including recent introduction to EGMs and other high-risk gambling activities, and residence in more deprived communities with high densities of EGMs and Totalisator Agency Boards (TABs). Lack of formal education and unemployment were further risk factors, as was recently experiencing a variety of major life events, deprivation and low quality of life (Abbott et al., 2014b). Additionally, problem gamblers and, to a somewhat lower degree, moderate- and low-risk gamblers, had high rates of hazardous drinking, tobacco and other drug use, self-rated poor health and high levels of psychological distress.

These and other findings from the NGS baseline survey are generally consistent with previous research. They indicate that problem gambling and other gambling-related harm constitute a significant public health issue, predominantly impacting on Māori and Pacific people as well as on people from some other groups that are vulnerable for a variety of reasons. As indicated, gambling problems are strongly associated with a diversity of financial, social and health problems. It is highly probable that they contribute to these problems and increase existing social and health inequalities. Abbott et al. (2014b) concluded that further research is required to identify barriers to further reductions in gambling-related harm including the substantial disparities between major ethnic and some other groups. Given the persistence of these differences and the stabilisation of overall rates of harm despite continued reductions in gambling participation, it appears that whole of population approaches to harm reduction, aimed at reducing gambling availability and participation, will need to be augmented by interventions focused on at-risk populations and the various factors that contribute to their vulnerability.

It is evident from the NGS that most adults approve of gambling to raise money for worthy causes but oppose gambling as a business enterprise or way to increase government revenue (Abbott, Bellringer, Garrett & Mundy-McPherson, 2015). These attitudes have strengthened during the past 25 years. There are also high levels of public awareness that gambling is associated with harm and that some activities are substantially more harmful than others. This awareness and concern has increased over time. A majority of adults believe that there are too many non-casino EGMs. Large majorities believe problems have increased and that both gambling providers and government should do more to help. While these findings apply across all gambling participation and demographic groups there is some variation. This variation partly reflects different degrees of gambling involvement including experience and/or knowledge of gambling-related harm. Problem gamblers and demographic groups that

experience greater harm generally indicated heightened concern and wanted more to be done to reduce gambling availability, especially non-casino EGMs, and to assist people who gamble excessively. Some other groups that experienced high levels of harm, while having similar concerns, appeared to be concerned more because of moral and religious objections to gambling generally, rather than reflecting their knowledge of harm associated with different activities. These findings suggest that public attitudes have become less, rather than more, accepting of gambling in recent decades and that knowledge of different types of gambling and their impacts has increased. There appears to be little appetite for the addition of new forms of gambling and widespread support for measures that will reduce gambling-related harm.

NGS objectives include providing detailed information on changes in gambling participation, providing epidemiological information on problem gambling and informing on risk and resiliency factors for problem gambling. These objectives were all addressed, to varying degrees, in the NGS baseline survey. A further baseline survey objective was to act as a sample frame for a 12 month follow-up re-assessment of approximately 3,000 participants. The main reason for limiting the second phase of the study to 3,000 was financial. Priority was given to obtaining a high response rate, a nationally representative sample and high quality data. Building rapport to facilitate ongoing contact was a further consideration. Given these objectives the Ministry agreed to the use of nationwide face-to-face residential recruitment and interviewing. Subsequently, while the 12 month interviews were in progress, additional funding became available that enabled a further 745 participants to be included. This addition increased statistical power. It enables more robust estimates of general population incidence to be determined as well as the detection of differences between major population groups of interest and examination of changes over time in gambling, other behaviours and health outcomes. Given inevitable attrition, increasing the 12 month follow-up sample also enhanced the viability of the study should additional assessment waves be added. A decision has since been made to conduct 24 and 36 month waves.

The first three NGS reports primarily involve the examination of cross-sectional relationships. Cross-sectional studies, including this phase of the NGS and previous New Zealand studies, have provided a great deal of information about gambling and gambling-related harm. They have found that problem gambling is a fairly robust phenomenon across a variety of adolescent and adult populations. Where surveys of this type have been repeated on more than one occasion, it has sometimes been possible to estimate changes over time in general populations and in different population sectors. However, studies of this type provide only limited information about change at the individual level because it is obtained by asking people about past experiences. Their responses are distorted by recall deficiencies and other factors. Prospective studies, where the same people are re-assessed on a number of occasions, greatly reduce distortion and bias.

Cross-sectional studies can identify associations between factors of interest such as demographic group membership, gambling participation, attitudes and gambling-related harm of various kinds. A great deal is known from studies of this type about correlates of problem gambling and comorbidities (Abbott et al., 2014b). They have been productive in identifying potential risk and protective factors and testing hypotheses. However, owing to their cross-sectional nature, the temporal sequence of these associations is often uncertain. For example, an association between alcohol misuse and problem gambling could arise because problem gambling leads to alcohol misuse, or because alcohol misuse leads to problem gambling. Alternatively, they could be associated because they share common, underlying causes. These

possibilities are not mutually exclusive. They may or may not all apply in some circumstances or in some groups.

Prevalence studies allow the estimation of the number of people who are currently at risk for, or are currently experiencing, a gambling problem. A 12 month frame is typically used. Studies sometimes also estimate life-time prevalence by asking people whether they have had particular experiences at any time during their lives. The 1990 national survey (Abbott & Volberg, 1991; 1992; 1996) used the South Oaks Gambling Screen-Revised (SOGS-R). This new measure was developed for the 1990 study. It involved adaptation of the South Oaks Gambling Screen (SOGS), the then most widely used problem gambling measure. The SOGS is a lifetime measure. It was designed this way because, in contrast to most mental disorders, the signs and symptoms for pathological gambling were not required to occur together during a specified timeframe (Abbott & Volberg, 1996; 2006). They could have occurred at any time in the past. Neither was there provision for an 'in remission' diagnosis. Both the SOGS lifetime frame and omission of an 'in remission' classification reflected the conceptualisation of serious problem gambling (pathological gambling) as an enduring, progressive mental disorder. The SOGS-R involved the addition of a past six months frame to the original lifetime format, thus providing both a current and lifetime measure. Since 1991 the SOGS-R became the most widely used measure in the majority of problem gambling research contexts (Abbott & Volberg, 2006). Most studies have used a 12 months format and, during the past decade, many have removed the lifetime frame. In recent years a number of other screens, including the Problem Gambling Severity Index (PGSI), have been introduced and have replaced the SOGS-R in some parts of the world.

In the 1990 national survey, and subsequent surveys conducted in New Zealand and elsewhere that used both current and lifetime frames, current rates have typically been approximately half lifetime rates. Interestingly, however, over time this difference has increased somewhat, a consequence of past year rates decreasing more quickly than lifetime rates (Williams, Volberg & Stevens, 2011). The difference between current and lifetime rates is generally regarded as providing an indication of the extent of natural recovery and remission (Abbott & Volberg, 1991; 1992; Slutske, 2006). It contradicts the conceptualisation of pathological gambling as a chronic, lifelong disorder and suggests gambling problems are much more fluid than was originally thought. However, there are other possible interpretations. To be classified as a past year (current) probable pathological or problem gambler, specified numbers of criteria are required to be met during the past 12 months. In determining classification as a lifetime probable pathological or problem gambler, the relevant signs and symptoms could have occurred at any time in the past. There is no requirement for a certain number to have ever occurred during a particular 12 month period. An unknown, but possibly large proportion of 'lifetime' probable pathological and problem gamblers, may never have had sufficient co-occurrence of symptoms to warrant classification had they been administered a current screen. This gives rise to uncertainty about what the difference between current and lifetime measures mean, including the degree to which study findings assess change in problems over time. The actual changes may be much less than they appear. However, there are also reasons why 'lifetime' rates could be underestimated. When questions are phrased in the lifetime format, people are reflecting on experiences extending over many years, more so the older they are. It is likely that recall will be less reliable for more distant experiences and that lifetime problems will, as a consequence, be under-stated. Past year accounts, on the other hand, are more likely to be accurate. Knowing how fluid gambling behaviour is generally, as well as knowing the extent to which high risk and problem gambling of varying severity fluctuates over time is important, both in advancing understanding of these phenomena and in developing gambling

policy and services. While there are ways to ask questions about past behaviour that can increase its accuracy, such retrospective inquiry will at best remain a poor proxy for prospective research.

The first prospective study of gambling and problem gambling in an adult general population was a seven year follow-up of selected sub-groups from the 1990 New Zealand survey (Abbott, Williams & Volberg, 1999; 2004). This study found that substantial numbers of lifetime probable pathological and problem gamblers assessed in 1990 did not report having experienced past problems when they were re-assessed in 1998. It was expected that some people classified as currently having problems may no longer have current problems when re-assessed subsequently. This was indeed the case, especially for those who had less severe problems in 1990, as well as for people who did not have co-morbid alcohol problems and favoured gambling activities other than betting on horse and dog races. However, people who had problems should also report having had problems in the past when they are asked about them on future occasions. This study demonstrated that so-called lifetime rates derived this way significantly understate past problem gambling.

Although cross-sectional surveys can provide conservative indications of lifetime prevalence and more accurate estimates of current behaviours and conditions, they do not provide accurate indications of changes over time including problem recovery, remission and relapse. Neither can they accurately assess incidence - the onset of high risk and problem gambling. Prospective studies are required to determine incidence and recovery rates and examine other transitions in gambling behaviour. Prevalence provides a measure of stock; the number of people with a particular attribute or condition. Incidence provides a measure of inflow, the number of people who develop an attribute or condition during a particular period of time. In psychiatric epidemiology, this period is also typically 12 months. Remission or recovery is a measure of outflow. Estimating the incidence of, and remission from, moderate-risk and problem gambling for the New Zealand adult population is a major purpose of this phase of the NGS.

As mentioned, in addition to prevalence, cross-sectional surveys identify potential risk and protective factors. However, the temporal sequence is uncertain and this compromises understanding of study findings. With respect to current problem gamblers, identified cases include people who recently developed problems, as well as people with long-term conditions. The circumstances under which problems first arose could well be quite different from those associated with current problems. This is obscured in cross-sectional studies. Prospective studies are required not only to generate reliable estimates of the onset of problems and other behaviours of interest, they are also necessary to determine temporal sequence and to identify particular risk factors for their initial onset. Additionally, they can help identify risk and protective factors for other transitions including recovery, remission and relapse. Studies of this type can also examine how people change in other ways when their gambling problems increase or diminish. This includes consideration of what recovery from problem gambling means in terms of mental health and other outcomes and to what extent there is 'symptom substitution' where gambling problems are replaced by another form of addiction.

Literature review

The importance of prospective studies to advance understanding of the epidemiology of addictions and other mental disorders is increasingly recognised and noted. However, representative general population studies with sufficiently large samples to accurately estimate

incidence rates, examine other transitions and identify risk and protective factors are uncommon (De Graaf, ten Have & van Dorsselaer, 2010; Wittchen, Carter, Pfister, Montgomery & Kessler, 2000). This is especially the case with relatively rare disorders of which serious disordered gambling is one. In large part, this is a consequence of the substantial sample size required to 'capture' disorder onset and cessation. Conducting high quality studies involving thousands of participants over a number of years is expensive and challenging.

Until recently there have been only a modest number of prospective gambling studies and most have employed small, atypical samples. Others have added gambling questions to existing general health or other surveys. In New Zealand the latter include gambling 'add-ons' to the Dunedin Multidisciplinary Health and Development Study (Slutske, Caspi, Moffitt, & Poulton, 2005) and the Pacific Islands Families (PIF) Study (Bellringer et al., 2008; 2012; Perese, Bellringer, Williams, & Abbott, 2009; Schluter, Abbott & Bellringer, 2007). Studies of the latter type are less expensive for gambling researchers because the major study infrastructure costs have been met from other sources. However, given that they were developed for other purposes there is typically little, if any, information on gambling from earlier years and space to add questions subsequently is limited given competition from other topics that are often seen to have higher priority than gambling.

Two reviews of prospective gambling studies were published in 2007 (Abbott & Clarke, 2007; Slutske, 2007). Both focused on studies that examined gambling and problem gambling in non-clinical samples. Abbott and Clarke (2007) identified ten studies; Slutske (2007) eight. Both identified the New Zealand seven year prospective study mentioned earlier (Abbott, Williams & Volberg, 1999; 2004), a USA casino employees study (Shaffer & Hall, 2002), a Minnesota (USA) youth study (Winters et al., 2002), a Missouri (USA) college study (Slutske, Jackson, & Sher, 2003) and a Montreal (Canada) adolescent boys study (Vitaro, Wanner, Ladouceur, Brendgen, & Tremblay, 2004). Additionally, the Abbott and Clarke (2007) review included a study of USA illicit drug users (Cunningham-Williams, Cottler, Compton, & Spitznagel, 1998), a Nova Scotia (Canada) study of Video Lottery terminal (VLT) players (Schrans, & Schellinck, 2000), an Australian study of regular EGM gamblers (Dickerson, Haw & Shepherd, 2003), an Ontario (Canada) adult study (Wiebe, Cox, & Falkowski-Ham, 2003a; Wiebe, Single, & Falkowski-Ham, 2003b; Wiebe, Single, Falkowski-Ham, & Mun, 2004) and a Swedish adolescent study (Svensson, 2005). Additional studies included in the Slutske (2007) review were a Quebec study of boys aged 10 to 13 years (Vitaro, Ladouceur & Bujold, 1996), a Buffalo, New York (USA) study (Barnes, Welte & Hoffman, 1999; 2002; 2005) and the Dunedin study referred to previously (Slutske et al., 2005). As noted by Slutske (2007), these studies can be classified into two types. One type is intended to examine prospective associations between predictors of later gambling behaviour. The other involves repeated assessments of gambling behaviour focused on examining the stability or otherwise of gambling behaviour over time. These types overlap to some extent. For example the Abbott et al. (1999; 2004) study assessed participant changes in gambling and problem gambling over time, as well as predictors of some of these changes.

LaPlante, Nelson, LaBrie and Shaffer (2008) also reviewed prospective studies. This review had tighter inclusion criteria than the earlier reviews, requiring studies to have been reported in peer-reviewed journals and to include measures of problem gambling that were repeated on one or more occasions. This study included four of the five studies identified in the 2007 reviews, namely Abbott, Williams and Volberg (2004); Shaffer and Hall (2002); Slutske, Jackson and Sher (2003); and Winters et al. (2002). Additionally, it included a fifth study of Dutch adult scratch-card participants who were experiencing gambling problems (De-Fuentes-Merillas,

Koeter, Schippers, & van den Brink, 2004). All five studies involved adults with sample sizes ranging from 134 to 639. Many of the studies identified in the previous reviews are confined to adolescents and young adults. While they are of interest, given the focus of the NGS on adults, consideration hereon rests more heavily on studies involving participants aged 18 years and older. el-Guebaly et al. (2008), in an article on their longitudinal study, also reviewed the relevant literature. They used much looser selection criteria and identified 17 studies. Those not included in previous reviews included Jacques, Ladouceur and Ferland (2000); Jacques and Ladouceur (2006); Hodgins and el-Guebaly (2004); Hodgins, Peden and Cassidy (2005); Vander Bilt, Dodge, Pandav, Shaffer and Ganguli (2004); Xian et al. (2007); Ladouceur, Sylvain and Gosselin (2007); and LaBrie et al. (2007).

Abbott and Clarke (2007) noted that prospective research can be differentiated on the basis of whether the focus is on proximal or distal factors. Proximal factors are present shortly before, and influence behaviour currently. They include internal physiological, cognitive and emotional factors as well as external factors, for example a particular gambling setting. Distal factors are distant in time, for example childhood experiences, past gambling history, or occur in other non-gambling settings. Distal factors are usually more difficult to measure and their influence on current behaviour is mediated by complex intervening processes. A comprehensive understanding of behaviour and behaviour change involves identification of factors that have occurred at different times in the past, occur in different contexts and are present recently or currently. It also involves understanding interactions between these factors. While many forms of investigation contribute, prospective and, where possible, experimental studies play a particularly important role in advancing understanding of the determinants of gambling and disordered gambling.

The large majority of longitudinal studies have investigated gambling and/or problem gambling over longer time periods, typically a year to a number of years. Dickerson, Haw and Sheppard (2003) provide one of the few exceptions that included examination of more proximal factors. This study included six repeat assessments over a 25 week period. There were 360 participants at the start of the study but only 53% completed all assessments. This study of regular EGM participants found that most lost control (feelings of loss of control, inability to limit expenditure and chasing losses) at least some of the time during gambling sessions and that depression measured at the start of the study subsequently predicted impaired control. Problem avoidance, self-blame and other non-productive coping methods also predicted subsequent loss of control. However, methods including facing up to problems and devising and initiating ways to deal with them, such as setting strict time or expenditure limits or avoiding gambling venues, was associated with increased future control over gambling. Other factors identified in cross-sectional studies as significant predictors of gambling problems including alcohol misuse, excitement seeking and impulsivity were also considered. When examined together in multivariate analyses with depression, non-productive coping and social support, only depression, non-productive coping and impulsivity contributed significantly to the prediction of impaired control.

A strength of Dickerson et al.'s study is that it was theory driven, designed to assess a model that predicted transition from regular non-problem gambling to problem gambling (Dickerson & Baron, 2000). However, while these three factors had moderately strong links to impaired control, most of the outcome variance was unexplained. While other factors, both distal and proximal, that were not included in the study may have accounted for much of this unexplained variance, the study authors concluded that impaired control and subsequent problem gambling development is a natural outcome of regular, high intensity EGM involvement rather than

something confined to a small number of constitutionally or mentally predisposed pathological gamblers. The study also found that even when participants used positive coping strategies to stay with within intended time and expenditure limits, around a half still lost control at least some of the time. Although Abbott and Clarke (2007) considered this to be a "landmark study", they noted a number of methodological shortcomings including high attrition and failure to specify whether the sample included problem gamblers at the outset of the study.

Abbott et al. (1999; 2004), in addition to assessing transitions over time, examined distal factors assessed at baseline in relation to aspects of gambling behaviour seven years later. Two-thirds of the initial sample was retained in the study. Incidence rates or predictors of problem onset could not be determined because very few non-problem gamblers developed any degree of problem gambling. A few problem gamblers did, however, progress to more serious probable pathological gambling. These low proportions were expected given the small sample size of 143. The sample comprised probable pathological gamblers, problem gamblers and regular non-problem gamblers. The majority of probable pathological and problem gamblers either had less severe or no gambling problems when they were re-assessed. This meant that it was possible to examine predictors of problem reduction, cessation and chronicity. As performance on a number of the measures at baseline was interrelated, multivariate analyses were conducted. Preference for gambling activities other than track betting, lower problem severity and absence of hazardous alcohol use all predicted better problem gambling outcomes seven years later. Although female gender and European ethnicity also predicted better outcomes in some analyses, this was not the case when they were included in the multivariate analyses. With regard to gambling participation among probable pathological gamblers identified at baseline, there was no significant reduction in regular track betting over time. In marked contrast, there was a substantial reduction in regular EGM participation. Previous cross-sectional studies, as well as the prospective Dickerson et al. (2003) research, suggested that EGM-related problems may often have a quite rapid onset. Abbott and colleagues concluded that while regular EGM involvement is a high risk activity that appears to lead to rapid problem development, these problems may often be less persistent than problems associated with track betting and perhaps some other continuous forms of gambling. They noted that this required independent replication and that further prospective research was required to assess whether such differences are consequences of engaging in particular gambling activities rather than characteristics of individuals who prefer different forms.

Wiebe et al. (2003a, b) used a similar design to Abbott et al. (1991; 2004). A somewhat larger adult sample (448) was recruited from a general population prevalence study and re-assessed 12 months later. While the gap between assessments was much shorter in this study, again most people who had problems no longer had them or had less serious problems. However, in contrast to the New Zealand study, while a substantial minority of people with the most severe problems moved into non- or lower-problem groups, more continued to experience problems 12 months later. Given the larger sample it was possible to estimate incidence and the proportions of people moving between the different PGSI categories. Unfortunately, although stress, loneliness and social support were found to be associated with problem gambling at the 12 month follow-up, they were only assessed at the follow-up and not at baseline. In this respect, the study was cross-sectional rather than prospective. The authors noted a number of methodological shortcomings and recommended replication using fully prospective designs, larger samples and multiple assessment points. Schrans, Schellinck and Walsh (2000) also followed up adults recruited from a general population survey, in this case regular VLT participants with and without problems at baseline. Between the baseline and 24 month follow-

up, high rates of transition were again evident. Like the previous Canadian study, correlate measures were not assessed prospectively.

The two other adult studies identified in the Abbott and Clarke (2007) review involved specialised populations which preclude generalisation of their findings to the wider adult population. The first (Cunningham-Williams et al., 1998) involved illicit drug users drawn from a general adult population psychiatric prevalence survey. As in the previous studies, transition was evident. However, modest sample size precluded identification of antecedent predictors. The second study (Shaffer & Hall, 2002) involved 1,176 casino employees. Additional to having a larger sample, this study differed from previous studies in that it had three assessment points (baseline, 12 and 24 months) and, in contrast to the two Canadian surveys, measured a number of relevant factors at baseline. During the course of the study, around 23% of participants experienced positive changes (less disordered gambling) and 12% experienced negative changes (more disordered gambling). Additionally, it was found that many more people who moved to a more positive state maintained it at follow-up than was found for those who moved to a more negative state. Similar results were found for alcohol. Alcohol and gambling problems tended to change together over time, suggesting that they might share some common underlying determinants. Given the larger sample size, this study was able to assess incidence and factors that predicted problem development. Although a wide range of factors was considered, none differentiated people who developed problems from those who did not. Interestingly, while depression and dissatisfaction with personal life did not predict problem development, they did predict both gambling and alcohol reductions in subsequent waves.

Abbott and Clarke (2007) commented that the finding that many factors found to be correlates of problem gambling in cross-sectional studies did not predict future problem onset raises the possibility that some or most of them may be consequences of, rather than contributors to, problem gambling. Others may develop concurrently, in association with the genesis of problem gambling. While the Shaffer and Hall (2002) findings are of considerable interest, caution is required in their interpretation and generalisation. Attrition was very high and selective. Only 12% of eligible participants and 19% of actual participants completed assessments at baseline, 12 months and 24 months. The follow-up and non-follow-up groups appear to have differed on measures known to be linked to problem gambling. These two issues, high and non-random attrition, are common and are major threats to the integrity of prospective research. It appears that the study also used the lifetime version of the SOGS. Interestingly the 'lifetime' reductions found over two years are similar to those found by Abbott et al. (1999; 2004) over seven years. If the current frame of the SOGS-R had been used, it is likely that even higher degrees of transition between gambling states would have been found.

LaPlante et al. (2008) identified an additional adult study. This Dutch study (DeFuentes-Merillas et al., 2004) involved a small sample of 134 scratchcard participants who were already experiencing some degree of problem gambling at baseline. They were re-assessed once, at 24 months. As with the previous studies, there were substantial reductions in problem gambling over time. Sample size precluded meaningful examination of predictors of problem reduction and remission, and as non-problem gamblers were not included at the time of recruitment incidence could not be assessed.

As mentioned, all three of the preceding reviews referred to studies by Slutske et al. (2003) and Winters et al. (2002; 2005). These studies commenced when participants were adolescents and terminated during early adulthood. As with the previous studies, they involved fairly small

samples (468 and 702 respectively). In both cases, attrition was moderate to high (final wave samples of 388 and 305 respectively). The former study involved university students selected on the basis of having relatives with alcohol problems. They were assessed on five occasions over 11 years (only four times regarding gambling). The latter involved adolescents recruited from the general population. They were interviewed on three occasions over eight years.

The Slutske et al. (2003) study assessed the incidence of 'problem' gambling during early adulthood and assessed changes in gambling behaviour during adolescence. Only one or two symptoms, a very low threshold, were required for classification as a problem gambler and, during the course of the entire study, only four people met the criteria for serious problem or pathological gambling. It was found that past 12 month prevalence stayed the same throughout the study (from 2% to 3%) but that they were generally different people at each assessment. In other words, low level problems were highly transient. Prevalence stayed much the same because new cases (inflow) matched remission (outflow). Similar results were obtained irrespective of whether the criterion was one or two symptoms. It was concluded that gambling problems within this range are transitory and episodic, and that adolescents and young adults typically 'mature out' of their problems. Only males had problems during the early years of the study, reflecting their higher degree of involvement in unregulated gambling activities. Gender differences reduced somewhat as males and females became more involved in legal activities.

The Slutske et al. (2003) study included lifetime as well as current assessment frames for problem gambling. As participants were assessed a number of times, it was possible to get an indication of how reliable 'lifetime' assessments are. The findings replicated those of Abbott et al. (1999; 2004), indicating that lifetime measures are highly conservative among adolescents and young adults as well as in a general adult population. Although this study has a number of strengths including long follow-up, multiple assessments and modest attrition, Abbott and Clarke (2007) outlined some shortcomings. They included a highly selected sample, non-random attrition, changes to assessment criteria and increased reliance on telephone rather than face-to-face interviews over time. These features call for some caution in interpreting the findings, including generalisation to young people.

In contrast to the Slutske et al. (2003) study that involved university students, Winters et al. (1995; 2002; 2005) recruited a more representative state-wide sample of mid-adolescents. For the sample as a whole they found that infrequent, regular and problem gambling rates did not change across the three data points but that at-risk rates increased significantly from the second to third assessment. While overall participation rates did not change, over time legal forms of gambling increasingly replaced non-regulated, informal gambling. During the study period, gambling availability increased substantially and it was expected that participation would increase. The finding that participation did not increase was inconsistent with this expectation. Although a large amount of information was gathered about gambling participation and problem gambling, this study did not assess individual trajectories including the extent to which participants changed gambling and problem gambling status throughout the course of the study.

Although they did not consider individual transitions, Winters et al. (1995; 2002; 2005) examined prospective predictors of problem gambling outcome. They included a variety of potential predictors that had been shown to be associated with problem gambling in previous cross-sectional studies. Predictors included male gender, early onset of gambling, previous gambling problems, parental gambling history, delinquency, poor school performance and regular substance use. Psychological distress was not associated with future problems. As a

number of the predictors were inter-related, multivariate analyses were conducted. Only two factors emerged as significant predictors of problem gambling; reported parental problem gambling and male gender. Two factors, namely male gender and prior at-risk gambling, also predicted at-risk gambling. These findings contrast with those of Shaffer and Hall that failed to find prospective predictors of gambling problems. They are consistent with previous findings from cross-sectional and retrospective studies (Abbott et al., 2014b) suggesting that familial factors and early gambling involvement contribute to the development of at-risk and problem gambling.

Some of the Winters et al. findings are also consistent with previous studies, suggesting that some risk factors for youth and early adult problem gambling, 'externalising' disorders and substance use/misuse are shared. The study authors were of the view that there may be two developmental pathways with somewhat different contributing factors. One they believed is associated with early gambling onset and delinquency, with gambling difficulties being secondary to an underlying pathway towards more general antisocial behaviour. The other, thought to be primary and leading more directly to problem gambling, was associated with parental problem gambling and poor school performance. These are interesting hypotheses that are consistent with the view of Blaszczynski and Nower (2002), among others, that there are a number of different, albeit somewhat overlapping, pathways into problem gambling.

Svensson (2005) re-assessed 96 adolescents who had been assessed two years previously as part of a Swedish general adult population prevalence study (Volberg, Abbott, Rönnberg, & Munck, 2001). The sub-sample included problem and probable pathological gamblers and 'controls' who did not have problems and were matched on some demographic variables. Two-thirds of the 32 problem gamblers at baseline did not have problems two years later. Four developed more serious problems (probable pathological gamblers). Of the nine probable pathological gamblers at baseline, five remained in this category and four moved into the problem gambling group. While the total number of probable pathological gamblers stayed the same at the two assessment points, just under half were different people. This finding again shows the importance of considering both aggregate prevalence data as well as individual trajectories. The study did not quantitatively examine predictors of problem onset or cessation. Instead it included in-depth interviews and qualitative analysis to generate hypotheses about these transitions that could be assessed in future prospective studies. Such studies are now in progress in Sweden (Romild, Volberg & Abbott, 2014).

Vitaro et al. (2004) also assessed adolescents, in this instance 903 French-speaking Canadian boys between the ages of 11 to 17 years. Recruitment was from a more general longitudinal study that commenced during early childhood. Gambling measures were repeated on a number of occasions, and attrition was low and random. Both self and teacher assessments were used. Three distinct trajectories of gambling development were identified, each with somewhat different predictors. One group, the majority, had minimal gambling participation throughout the course of the study. A second group was gambling at age 11 and maintained or increased their participation over time. A third group did not begin gambling until age 13 but rapidly increased their involvement over time to match the second group at age 17. At that time, only four percent of teenagers in the first groups were identified as problem gamblers, compared to 20% and 15% respectively in the second and third groups. Vitaro et al. (2004) concluded that different theoretical models are required to account for these different trajectories, a conclusion consistent with the Blaszczynski, Steel and McConaghy (1997) pathways model. The second group was characterised by impulse control deficits, low inhibition and risk taking. It was considered likely that these dispositions drove participants towards risky gambling and

probably other risk taking and delinquent behaviours. Participants in the third group scored between the other two groups on measures of impulse control, inhibition and risk taking. While these factors may play some role in the development of problem gambling in this group it was considered likely that family and/or peer-related factors are more important.

Vitaro and colleagues (Vitaro, Ladouceur & Bujold, 1996), as in the previous study, added gambling measures to an ongoing longitudinal survey of boys. Participants were recruited from schools throughout Quebec, Canada. At age 13, 631 boys provided self-report accounts of past year gambling behaviour. Problem gambling was not assessed. For 441 of these participants, information was available from age 10 and 11 on hyperactivity, impulsivity, aggression and anxiety/withdrawal. Gambling measures were not repeated so gambling trajectories could not be examined. Some of the attributes assessed at ages 10 and 11 predicted future gambling. Boys who gambled more frequently also more often reported substance use and delinquent behaviours.

Barnes el al. (1999; 2002; 2005) also added gambling measures into later waves (waves 5 and 6) of an existing longitudinal study, in this case a study of the development of alcohol misuse. The study, conducted in Buffalo, New York, USA commenced when participants were aged 13 to 16 years. Gambling was assessed at ages 17 to 21 years (n = 699) and 18 to 22 years (n = 522). A second study (Barnes et al., 2005) involved 625 young men aged 16 to 19 years when they were first assessed. Two further waves of assessment took place approximately 18 months apart. The major focus of this study was on relationships between substance abuse and criminal offending. In the first study, for young women, lower maternal education and peer delinquency predicted subsequent gambling behaviour. No significant predictors were identified for young men. In the second study, moral disengagement was a prospective predictor of gambling participation. As in the previous study, impulsivity was not a significant predictor. Neither was moral disengagement, replicating the finding for males in the previous study. In these studies gambling, at the final assessment point, was not as strongly linked to alcohol misuse and drug use as the latter were to each other. These studies, like a number of the prospective youth studies, did not include measures of problem gambling.

As mentioned previously, Slutske et al. (2005) added gambling questions to the ongoing Dunedin Multidisciplinary Health and Development Study. This study involves a birth cohort established when the children were three years old (n = 1,037). Gambling participation and problem measures were administered when participants were aged 21 years (n = 939). Personality traits assessed at age 18 were used to predict gambling and problem gambling three years later. Predictors included negative emotionality (e.g. nervousness or worry, anger, feeling mistreated and victimised) and low behavioural constraint (e.g. risk-taking, impulsivity and rebelliousness). These characteristics were also associated with cannabis, alcohol and tobacco dependence, and nearly two-thirds of problem gamblers had another addictive disorder at age 21. Gambling measures were not repeated. In addition to not being able to examine changes in gambling and problem gambling over time, it also meant that problem gambling might have occurred at earlier ages and influenced some personality measurements.

Jacques et al. (2000) conducted a cross-sectional community telephone survey of adult French speaking Canadians before the introduction of a new casino and re-assessed participants on three subsequent occasions (Jacques & Ladouceur, 2006). This study had an experimental design as some participants lived near the casino (n = 475) and others (n = 423) did not. Initially, 12 months after the casino opened, experimental group participants gambled more

frequently and lost more money. However, these differences were not sustained in subsequent assessment waves two and four years after the opening of the casino.

Hodgins and el-Guebaly (2004) followed up a small sample (n = 101 at baseline; 80 at 12 months) of adults who had gambling problems and had recently stopped gambling. The study is included in this review as participants were recruited from the general population via the mass media rather than from a clinical setting or trial. It was found that relapses most often occurred in the evening when people were thinking about their finances. Thoughts about winning and the need to make money were mentioned most often as the main reason for relapse. Unstructured time or boredom, giving into urges, habit or opportunity and dealing with negative situations or emotions were mentioned somewhat less often. Males more often mentioned a need to make money and boredom; women to dealing with negative situations and emotions and giving in to urges, habit or opportunity. Hodgins et al. (2005) also examined, using the same sample, relationships between mood and alcohol and other drug disorders and gambling relapse. Only reports of having a lifetime mood disorder were significantly associated with outcome, increasing the time to achieve stable abstinence. Lifetime gambling severity, past alcohol and other drug disorders and past treatment involvement did not predict outcome.

Ladouceur et al. (2007) conducted an evaluation of outcomes for people who had self-excluded themselves from casinos. Participants were assessed on a number of occasions over two years. This study did not examine individual trajectories or predictors of transitions or outcomes. Outcome studies of this type, while prospective, and having some relevance, are not reviewed in this report. They have been reviewed recently in Abbott et al. (2013). Clinical trials, which are also prospective, are reviewed in Abbott et al. (2012). Like most other outcome studies or clinical trials, Ladouceur et al. (2007) found that substantial numbers of participants stopped or reduced their gambling over time and that, for many, these changes were sustained. Also like many studies of this type, high attrition (n = 161 at baseline; n = 53 at 24 months) necessitates caution in interpretation of the findings.

LaBrie et al. (2007) tracked aspects of the online gambling behaviour of 40,499 internet sports gambling service subscribers. Daily total bets made, money bet and money won were assessed over an eight month period. It was found that subscribers generally moderated their level of gambling involvement in response to their wins and losses. More specifically, winning encouraged continuing participation and losing discouraged it.

Vander Bilt et al. (2004) added a single gambling question (whether they left their home to gamble or play bingo) to an existing prospective community study of dementia in older people. The study commenced with 1,681 participants. Follow-up assessments were conducted approximately biennially. The gambling question was included in waves four (n = 970) and six (n = 618). At wave four the mean age was 79 years. At the time of the study, available gambling activities included the state lottery, betting at race tracks and charitable bingo. Casino gambling and EGMs were not available. Prospective predictors of gambling participation four years later included male gender, younger age (70-79 years), more social support, alcohol use and previous gambling activity. While there was high attrition, this was largely due to death and serious illness and was not associated with gambling. Given that gambling was linked with both current and future social support, the study authors concluded that in some forms and contexts, gambling can have benefits. While there was no association with measures of depression or other measures of health or wellbeing, this study shows the importance of examining both potential benefits and harm in relation to patterns of gambling participation in

different population sectors. Reliance on just one gambling question at two time points is a weakness of this study.

Xian et al. (2007) reassessed pathological gambling symptoms in 1,675 individual twin males ten years following their baseline assessment. Just over half of those who met the criteria for one or more DSM pathological gambling symptoms in the past year at follow-up also met the criteria for one or more lifetime DSM symptoms at baseline. The use of different timeframes precluded examination of transitions. The main purpose of this study was to assess the genetic and environmental contributions to pathological gambling symptoms at two time periods. At baseline, approximately half of the total variance in lifetime symptoms was due to genetic factors and half to environmental factors. At follow-up, somewhat more of the variance in past year symptoms was due to genetic factors. It was concluded that the genetic contribution to pathological gambling symptoms may be fairly stable throughout adulthood. For the remaining variance in past year symptoms, 30% was attributable to unique environmental influences and 13% to unique environmental factors that were common with baseline symptoms. The study authors concluded that around a quarter to a third of variance in current problem gambling may be attributable to environmental changes including the increased gambling availability during the ten years of the study.

Subsequent to the four 2007 to 2008 literature reviews, there has been a substantial increase in the number of publications reporting on prospective gambling studies. Some have provided results from further phases of earlier studies. Some of these more recent studies are mentioned below. The final National Gambling Study report, that will include results from all study waves, will also include a systematic review of all relevant research published from 2009 onwards. By that time, the results of some large-scale, jurisdiction-wide studies will have been published in peer-reviewed reports and journals. The latter studies, particularly the Swedish (Abbott et al., 2014; Romild et al., 2014) and Victorian studies (Billi et al., 2014a; 2014b), are of particular relevance as similar to the NGS they involve large, jurisdiction-wide samples and were partly designed to facilitate comparison of their findings with the NGS.

Hodgins and el-Guebaly (2009) followed up just over half of the participants in their 2004 study five years after their initial assessments. As in the earlier study, lifetime history of mood disorder predicted a longer time to reach a period of stable abstinence. In contrast to the 12 month findings, when considered over the longer follow-up period, it was found that participants with a lifetime drug disorder were less likely to experience a minimum three months period of abstinence. Additionally, those with more serious gambling problems and those who received gambling treatment attained periods of abstinence earlier than their counterparts who had less serious problems and did not receive treatment. However, while treatment was associated with achieving abstinence more quickly, people who received treatment were more likely than others to experience a period of relapse. Having an alcohol misuse diagnosis during the course of the study also predicted relapse. Overall, it was found that although comorbid mental health disorders had some impact on shorter term gambling outcomes, they did not predict longer term outcomes. These findings are interesting and generally consistent with those from other studies which indicate that gambling participation and problems fluctuate over time. However, while average problem gambling scores reduced considerably during the course of the study, very few participants reported not gambling at all, even during the first 12 month follow-up period. Given that all participants had expressed a desire to stop gambling at the outset of the study, and had abstained from gambling for two weeks or more prior to being admitted into the study, these findings further suggest that it is very difficult for problem gamblers to stop gambling totally. The study authors cautioned that

their study had high and non-random attrition and that this could have affected the results. Some of the data were also collected retrospectively, albeit that the use of time-line follow-back interviewing may have increased its reliability.

Wanner, Vitaro, Carbonneau and Tremblay (2009) examined linkages between gambling, gambling problems, substance use, theft and violence from the mid-teens to young adulthood, and whether behavioural disinhibition, deviant peers and parental supervision explain or moderate these links. Data were drawn from two Canadian longitudinal studies with male samples of 502 and 663. They were pre-existing prospective studies that had recruited participants when they were pre-schoolers. At commencement, the sample sizes were 1,037 and 1,001 respectively. In this study, questions covering gambling and the other areas of interest were included in two assessment waves of the ongoing studies. In both cases these waves were seven years apart.

Wanner et al. (2009) found a degree of stability in both gambling participation and problem gambling from the mid-teens to young adulthood. However, while gambling problems during the mid-teens predicted gambling behaviour seven years later, mid-teens' gambling behaviour did not predict subsequent problem gambling. Disinhibition was found to moderate the stability of gambling problems. For participants who were high on disinhibition, gambling problems were moderately stable. Conversely, for participants who were low on disinhibition, gambling problems were unstable. Only for the group high on disinhibition did the stability of gambling problems resemble the moderate stabilities found for substance use, theft and violence. Adolescent substance use and antisocial behaviours did not predict subsequent gambling participation or problems, and adolescent gambling and problem gambling did not predict future substance use or antisocial behaviours. While adolescent problem gambling was not linked to subsequent antisocial behaviour, problem gamblers who had deviant peers were significantly more likely to engage in theft during early adulthood. This was not the case for problem gamblers without deviant peers or non-problem gamblers. In contrast to gambling, substance use predicted future theft and violence as well as continued substance use. Although parental supervision moderated current teenage substance use and antisocial behaviour this was not found for current gambling. Parental supervision during the mid-teens was not associated with any of the adult outcome measures including gambling and problem gambling.

Delfabbro, Winefield and Anderson (2009) assessed the gambling behaviour of 578 Australian mid to late adolescents. Participants were selected from a larger study sample and assessed on four occasions between the ages of 15 and 18 years. It was found that gambling participation, for the sample as a whole, was very stable from age 15 to 16 years. Participation rates subsequently increased at age 17 and 18 years. No gender differences were found in overall participation rates or preferences at age 15 years. However, over time males increasingly favoured sports betting and card games whilst females increasingly favoured scratch tickets. In contrast to Winters et al. (2005), this study also examined individual trajectories. It found that only around a quarter reported having gambled in all four years, 13% never gambled at all, 18% gambled in one year only and 24% did so in three years. It also found that relatively few people who reported gambling on a particular activity continued to do so in future years. However, gambling patterns at age 16 and 17 years were a better predictor of participation at age 18 years than patterns at age 15 years. These findings illustrate the importance of prospective research and the examination of individual level changes. Previous cross-sectional studies, and longitudinal studies that did not examine individual trajectories, found high stability in participation rates over time. These findings are somewhat misleading. While providing

adequate information about prevalence in the wider population, they mask the considerable variability in individual participation over time.

The foregoing study suggests that gambling participation during adolescence, especially early adolescence, has little relationship to gambling in later adolescence. However a subgroup continued to gamble throughout the four years of the study. A problem gambling measure was not included so it is not known to what extent the different patterns of gambling related to problem gambling or how stable problem gambling was in this adolescent sample. The study stopped at age 18 years so it not known what implications adolescent participation has for adult gambling and problem gambling. As with many of the previous studies, attrition was high (52%) and may have been selective. This could have influenced the findings.

Delfabbro, King and Griffiths (2013) conducted a similar study to that published in 2009, to assess the validity of the initial findings. Both of these studies were conducted in Australia. In contrast to the initial school-based sample, this study recruited from residential addresses. As in the earlier study, participants were assessed on four occasions, in this case at two, three and four years after the baseline assessments. The sample was selected to enable the transition from adolescence to adulthood to be examined. At baseline, participants were aged 16 to 19 years and at the completion of the study were aged 20 to 23 years. Both gambling participation and problem gambling were assessed in this study. Participation increased markedly between the baseline to two year assessment (when participants were aged from 16 to 19 years to 18 to 21 years) and was fairly stable subsequently. As in the previous study, there were some gender differences in preferred activities. Again as in the previous study, at the individual rather than aggregate group level, there was little stability over time. Few people indicated taking part in the same gambling activities across all four assessments and gambling during the mid-teens was generally not associated with gambling during early adulthood. The authors concluded that while there was an association between early gambling involvement and subsequent gambling problems, there was little support for the view that gambling during mid-adolescence is a risk factor for subsequent problems. However, there were very small numbers of people who met the criteria for problem or at-risk gambling and the initial sample of 684 had reduced to 256 at the final assessment. It was not possible to provide a reliable indication of changes over time in problem and at-risk gambling.

Another recent Australian study (Scholes-Balog, Hemphill, Dowling, & Toumbourou, 2014) used an existing longitudinal data set to identity adolescent risk and protective factors for gambling problems during young adulthood. Compared to most previous studies of this type, a wide range of factors was included from community, family, school, peer group and individual domains. Participants (n = 2,884) were originally recruited in three cohorts (students from grades 5, 7 and 9) and re-assessed on a number of subsequent occasions. The current study used data from these cohorts when participants were in grade nine (aged 14 to 16 years). Thirty-one factors were assessed at this time. Problem gambling was measured when participants (2,328 retained) were aged 18 to 25 years. A number of risk and protective factors were identified including gender, family conflict, family history of antisocial behaviour, family rewards for prosocial involvement, academic failure, low school commitment, rebelliousness, interaction with antisocial peers, friends, drug use, antisocial behaviour, peers' rewards for antisocial behaviour, belief in the moral order, current tobacco use and current alcohol use. However, when considered together in multivariate analyses, only three of these factors remained significant, namely female gender and family rewards for prosocial involvement (both protective factors) and adolescent alcohol use (a risk factor). Additionally, an interaction term between the two latter factors was also significant.

The interaction between adolescent alcohol use and family rewards for prosocial involvement is of interest. While adolescent alcohol use remains a risk factor in the multivariate model, the presence of this interaction indicates that family rewards for prosocial involvement is protective in that it moderates the impact of adolescent drinking on adult problem gambling. When these rewards were low, alcohol drinkers were much more likely than non-drinkers to subsequently develop gambling problems. However, when they were high, alcohol drinkers were no more likely than non-drinkers to develop gambling problems. Additionally, family rewards for prosocial involvement remained a predictor of problem gambling in its own right, additional to its effect by moderating the influence of adolescent gambling. These findings are potentially important as they point to modifiable risk and protective factors that could be addressed in health promotion and prevention programmes.

A number of other studies have also found a marked reduction in the number of independent predictors of gambling problems when they are considered together in multivariate analyses. Many of the independent predictors in the Scholes-Balog et al. study have also been shown to be predictors of other problem behaviours including drug, alcohol and tobacco use. The study authors concluded that their association with gambling problems in the present study was a reflection of their more proximal relationship to alcohol use rather than gambling problems. Clearly relationships between these and other problem behaviours are complex and they probably share a number of common risk and protective factors.

While having some notable strengths such as a large sample, good retention and inclusion of a wide range of factors including some not previously included in gambling studies, this study also had shortcomings. As is often the case with 'add-on' studies, where gambling questions are included in an existing study that was not set up to examine gambling, gambling measures are often not included in earlier assessment waves and it is often possible to add only a few gambling questions. In the present study, gambling questions were confined to the second assessment wave. This means that adolescent gambling could not be considered in relation to early adult gambling problems and analyses could not control for those participants who already had problems in adolescence. Additionally, 'problem gambling' was assessed by two questions of uncertain validity.

Goudriaan et al. (2009) examined patterns of gambling participation in a university sample over a four year period. Gambling questions were included in the second, third, fourth and fifth waves of a longitudinal health study. Average age at the time of recruitment was 18 years. Of the 3,720 participants 2,250 (60.5%) were retained in the final assessment. Latent class analysis identified four distinct gambling patterns. Most were people who did not gamble or gambled infrequently. The next largest group took part predominantly in card games, sports betting, games of skill and lotteries. A small proportion of people took part mainly in slot machine and casino gambling at the outset of the study. This group increased in size in the final two years of the study. Students in the smallest group (ranged from 1.4% to 5.0% of participants throughout the study) took part in all or most gambling activities. Stability over the four years of the study was very high for the group that did not gamble or gambled infrequently as well as for the group that took part in many activities. The group that took part predominantly in card games and a few other activities (extensive gambling group) was moderately stable during the first two years but less so later when substantial numbers moved into the slot/casino gambling group. This uptake of participation in slot machines and casino gambling corresponded with participants reaching the legal age to take part. The slot/casino group was the least stable of the four from the initial to final assessments. This is largely due to very low stability from

years one to two. In subsequent years, this group became almost as stable as the group that took part in most or all activities.

Goudriaan et al. found that membership in both the slots/casino and extensive gambling groups was strongly associated with higher scores on alcohol/drug use, novelty seeking and self-identified gambling problems. The extensive group, relative to the others, had higher levels of self-identified problem gambling, psychological distress, heavy alcohol use, heavy drug use, conduct disorder and novelty seeking. This study also found that female students increased their gambling frequency less over time than was the case for males. As in the previously mentioned study, a validated measure of problem gambling was not included. While included at all assessment points, in the present study gambling problems were assessed by a single item phrased in a lifetime rather than past year format. This means that it is not possible to reach conclusions about the onset or course of problem gambling, or risk and protective factors. Nevertheless it is likely that the extensive gambling group included a moderate to high proportion of people who either had at the outset or developed problems during the course of the study. The authors suggest that regular participation in many different gambling activities may be a better indicator of stable patterns of problem gambling than standard symptom scales. This is an interesting possibility. In the NGS, participation in multiple activities was a strong risk factor for problem gambling, even when included in multivariate analyses alongside measures of participation and preferences for separate gambling activities. Prospective examination of relationships between these and others as aspects of gambling participation in relation to gambling-related harm will enable this suggestion to be assessed.

Methodological considerations

From the articles reviewed it is apparent that longitudinal research has significantly advanced understanding, particularly with regard to the stability of gambling and problem gambling, and the identification of factors that predict future changes in participation and problems. It is also evident that most, if not all studies, have methodological deficiencies, often serious, that reduce their value, and that the full potential of prospective designs has only been partially realised. Few studies have been theoretically driven, testing hypotheses derived from developmental and other relevant theoretical frameworks. Many studies have been opportunistic, using atypical samples of convenience or adding a few gambling questions to an ongoing study on another topic. 'Add-on' studies have rarely enabled individual gambling trajectories to be assessed over time and provide limited gambling information. Most studies have used small samples with very small numbers of problem gamblers. As a consequence, investigators have often used very low thresholds to boost the number of 'problem' gamblers. This is not unreasonable in that people with subclinical gambling problems are of interest in their own right and their combination with people with more serious problems increases statistical power. However, it cannot be assumed that similar findings would be obtained with more serious problem gamblers. The majority of studies also had moderate to high non-random attrition. Among other things these deficiencies reduce the confidence that can be placed in study findings. They also substantially limit the generalisation of findings to wider populations.

Additional to the foregoing, it is evident that most studies have relatively short follow-up periods and only two, or a few, assessment points. They also often do not take full advantage of their prospective designs. Typically, only a relatively small number of potential risk or protective factors were included and in some instances factors were not assessed prospectively. In other cases, researchers considered aggregate changes over time and omitted to examine

individual changes and trajectories. Many studies focused on either problem gambling or gambling, not both. This meant that relationships between gambling participation and problem gambling could not be assessed. Abbott and Clarke (2007) also noted variation across studies in the adequacy of measurements used and the cut scores to define problem gambling. Additionally, they noted a general failure to make use of sophisticated software that has been developed specifically for longitudinal research. These, along with other shortcomings, make it more difficult to make meaningful comparisons of findings across studies. Slutske (2007), in her review, also referred to this issue, in particular the need to use more advanced statistical techniques such as growth modelling that enable change over time at group and individual levels be assessed simultaneously. She also called for more sophisticated methods to deal with missing data including multiple imputation and full information maximum likelihood estimation.

Major findings and conclusions

Studies that examined individual level change over time generally found fluidity in gambling patterns, both short and long-term. Fluidity varied across different gambling groups. It was relatively more stable for non-problem gamblers and unstable for people with at-risk or low problem levels. Problem gamblers generally were found to be intermediate between these groups. While a proportion of problem gamblers relapse, many do not return to problem levels during follow-up assessments.

A number of factors have been identified that are predictive of future gambling patterns, including problem gambling. More studies have examined factors that predict or co-vary with problem gambling than have focused on predicting non-problem gambling patterns. From these studies it appears that some factors (e.g. male gender, impulsivity and alcohol use) predict both non-problem gambling involvement and problem gambling development. A number of studies found the following to be predictors of problem gambling: alcohol problems, depression, tobacco use, lower education, antisocial behaviour, prior level of gambling engagement and prior problem gambling. However, some studies obtained contrary results.

While a number of studies have provided an indication of incidence (the proportion of people who develop a problem during the past 12 months), the selective or non-representative nature of the study samples mean that it is not possible to estimate incidence rates for general populations and population sectors. Small sample size and low numbers of people developing problems, particularly serious problems, during the course of these studies also reduces confidence in their findings. Similar limitations often apply to the examination of other transitions. Studies using large, representative samples are required to produce reliable jurisdiction-wide estimates of incidence, relapse and other transitions of interest. Studies of this type are also required to more adequately identify and examine risk and protective factors for problem gambling onset as well as other transitions, and build explanatory models that can give greater direction to future research and better inform policy and practice.

The next generation of gambling population research

There are four large general population prospective gambling research studies, additional to the NGS, that have either been completed (The Leisure Lifestyle Lifecycle Project (LLLP); Quinte Longitudinal Study (QLS); Victorian Gambling Study (VGS)) or almost completed (The

Swedish Longitudinal Study (SWELOGS)). In significant part they were designed to address shortcomings identified in previous studies. The LLLP and QLS are Canadian studies. Overview reports have recently been published (el-Guebaly et al., 2015; Williams et al., 2015). The VGS overview report was published last year (Billi et al., 2014a). Although the SWELOGS is still in progress, reports have been published on the baseline survey and the first and second follow-up waves. These reports are in Swedish. Journal articles based on the VGS and SWELOGS have also been recently published.

The two Canadian studies (LLLP and QLS) were designed as longitudinal cohort studies to investigate change over time in gambling and problem gambling and factors predictive of this change. They included a wide variety of potential biopsychosocial predictors and had the objective of developing etiological models of problem gambling. The Victorian and Swedish studies, like the NGS, were designed as jurisdiction-wide prevalence and incidence studies. In the SWELOGS and NGS, weights were applied to allow generalisation of the study findings, respectively, to the Swedish and New Zealand adult populations. This was also the case for the baseline prevalence phase of the VGS. Incidence data were also weighted to facilitate generalisation to the total adult population of the state of Victoria, Australia. However, weights were not applied to other data from the second and subsequent study waves. The Swedish, Victorian and New Zealand studies were also designed to examine transitions additional to problem onset as well as factors that predict transitions. They did not, however, include as many potential predictors as the Canadian studies. In large part, this was because it was expected that study recruitment would be severely compromised if potential participants were presented at the outset with a lengthy questionnaire. It was also considered that this would compromise retention in subsequent phases.

The Swedish Longitudinal Gambling Study (SWELOGS)

The SWELOGS commenced in 2008/2009. A random stratified sample of 8,165 adults from the Swedish population register was assessed, predominantly by telephone. A smaller number who could not be reached by telephone completed postal questionnaires. The response rate was 54%. The major findings from this first phase of the study are summarised and discussed in Abbott, Romild and Volberg (2014). Participants were re-assessed in 2009/ 2010 (n = 6,021) and 2012 (n = 4,188), with a retention rate of 74% at 12 months and 51% at 36 months. The overall study design for this part of SWELOGS, the epidemiological track, is outlined in Romild, Volberg and Abbott (2014). Although the questionnaire was relatively brief, additional register information was subsequently added. A further and final wave of interviewing is currently underway. In addition 1,700 participants were interviewed in much greater detail in 2011 and 2013. This in-depth part of the SWELOGS is a case control study whereby each PGSI problem and moderate risk gambler is matched demographically with three other participants. Additionally, 578 participants in an earlier 1997/1998 Swedish national gambling study (Abbott, Volberg & Ronnberg, 2004; Ronnberg et al., 1999; Volberg et al., 2001) have been followed up. This is also a case control study.

SWELOGS findings will be presented in more detail in the final NGS report, by which time it is expected that the various components of this study will have been completed, some study reports will have been translated into English and a substantial number of related journal articles will have been published. Given their relevance to the present NGS report, consideration here is largely confined to the epidemiological track 12 month follow-up results (Statens Folkhälsoinstitut, 2012).

Although retention (74%) at 12 months compared favourably with that of most previous studies, attrition was differential, with the following categories under-represented at follow-up: females, single, born outside Sweden, living in major cities, lower education, low socioeconomic status, financial problems, poor mental health, daily smokers, risky alcohol use and problem gamblers. The data were weighted to adjust for attrition and enable the study findings to be generalised to the total adult population.

At the aggregate level, past year gambling participation increased slightly, from 70% to 73%. This was found in most demographic groups other than in migrants from outside Europe. The PGSI problem gambling[1] prevalence rate remained unchanged (2%) and the low-risk rate decreased slightly (from 5% to 4%). Sixty percent of participants gambled at both baseline and the 12 month follow-up. Although the proportion of problem gamblers was unchanged, three-quarters of the previous problem gamblers were replaced by new problem gamblers. 'New' problem gamblers were defined as problem and moderate-risk gamblers at 12 months who were not in these categories at baseline. While most of these new problem gamblers did not report having had a gambling problem in the past (prior to the 12 month period preceding their baseline interview), a fifth had experienced gambling problems earlier in their lives. In other words they were relapsing.

The problem gambling incidence rate (combined problem and moderate-risk categories) was 1.4%. Male and female proportions of new problem gamblers (as defined above) were similar. Younger adults (less than 25 years), older adults (45-64 years; predominantly females), and people born outside Sweden were also over-represented. For males, problem gambling incidence was similar across educational groups whereas for females, it was highest for those with low levels of education and lowest for those with high-school education. The great majority of the 20% of new problem gamblers who had gambling problems in the more distant past were male. In comparison to new problem gamblers who had not had prior problems, very few had a university education and they more often gambled on horse races, slot machines, poker and casino games.

In addition to age and immigrant status, especially from other parts of Europe, the following factors, assessed at baseline, predicted the onset of problem gambling: starting to gamble at work or school, playing video or computer games, regular participation in high risk gambling activities, risky drinking and impaired mental health (both especially for males), and good general health (only for females). Developing risky drinking habits during the year prior to the 12 month follow-up assessment was also associated with problem gambling onset. Experiencing the death of a close relative, increased arguments with a partner/close relatives, worsening finances, major changes in work conditions, and deteriorating mental health or general mental health during this period also predicted problem gambling onset. As these variables and problem gambling were assessed during the same timeframe, not prospectively, with the likely exception of the death of a close relative, it is not known whether these changes contributed to the development of problem gambling or arose from it, or both. Interestingly, substantial improvements in financial situation were also linked to problem development, as were marked positive changes in work conditions.

As mentioned, around a quarter of problem gamblers at the 12 month follow-up were also problem gamblers at baseline. Relative to females, proportionately more males had persisting

[1] In SWELOGS this category usually incudes problem gamblers and moderate-risk gamblers combined.

gambling problems. Additional to male gender, higher problem gambling severity and risky alcohol consumption at baseline also predicted persisting problems. The following factors, assessed at the 12 month follow-up, were also associated with problem chronicity: deteriorating general health, divorce or separation and increased arguments with a close relative.

Problem gamblers (PGSI problem and moderate-risk) and low-risk gamblers both had high rates of instability with 25% each remaining in their baseline-assessed category when re-assessed 12 months later. For problem gamblers, just less than a quarter moved into the low-risk category, somewhat less than a half moved into the gambling without problems category and the remainder became non-gamblers. Eight percent of low-risk gamblers became problem gamblers. Approximately 60% became gamblers without problems and a small number became non-gamblers. People who gambled without any degree of risk or problems were most stable, with 83% remaining in that category at 12 months. Nearly 13% stopped gambling, three percent became low-risk gamblers and one percent became problem gamblers. Non-gamblers at baseline were the second most stable group with approximately 60% remaining non-gamblers and 40% becoming gamblers. Slightly more than one percent became gamblers with low risk and less than one percent became problem gamblers.

The Victorian Gambling Study (VGS)

The VGS commenced in 2008 with an initial sample of 15,000 Victorian adults. The first phase was a prevalence study. Areas with high EGM expenditure were oversampled. Recruitment and interviewing were conducted via land-line telephone. The initial response rate was 43.5%. The second phase was a prospective cohort study of Wave 1 participants who agreed to take part in further research. Three subsequent waves of interviews were completed, approximately a year apart, in 2009/10, 2010/11 and 2011/12. In the first follow-up wave 5,003 participated. Participation in the second and third waves was respectively 5,620 and 3,701. The final wave retention from the baseline survey was 25%. Of the 3,701 final wave participants, the great majority (3,686) completed all four waves. A qualitative study involving 44 participants was also conducted in 2011 (Billi et al., 2014a; 2014b).

Some population groups were under-represented in the baseline survey, including males and young adults. The baseline sample was adjusted to take account of under-representation and some other aspects of the study design, to be representative of the Victorian adult population. There was some differential attrition during subsequent assessment waves. Over time attrition was higher for younger adults, recent migrants, people who spoke a language other than English at home, people living in households with low income, people not in the workforce and non-gamblers. Apart from the calculation of 12 month incidence from the first follow-up wave, other data from this and subsequent waves of the cohort study were not weighted to take account of non-representativeness or differential attrition.

The PGSI problem gambling incidence rate was 0.36% (95% CI 0.21-0.57). This estimate contrasts with the SWELOGS estimate which is for the combined problem and moderate risk categories. Approximately two-thirds (0.24%) were people who had a previous history of problem or probable pathological gambling as measured by the NODS Clip2 at baseline. 'Zero risk gamblers' (combined PGSI non-gamblers and non-problem gamblers) were the most stable group throughout the study with 93% of baseline zero risk gamblers remaining in this category at the final assessment. Problem gamblers were the next most stable with 55% remaining in this category after four years. Low-risk and moderate-risk risk gamblers were less stable (27%

and 35% respectively). Across the four years of the study, people who met the criteria for problem gambling at any assessment point spent, on average, 59% of their time in the study as problem gamblers. Markov transition probabilities confirmed this relatively high level of stability with most problem gamblers (71%) likely to remain problem gamblers. There was no gender difference in this regard. Approximately 22% decreased to moderate-risk state.

As gambling risk increased, so too did the likelihood of becoming a problem gambler. By the final wave, three percent of low-risk gamblers and 14% of moderate-risk gamblers became problem gamblers. Lifetime gambling risk (measured by the NODS Clip2 at baseline) was the strongest predictor of the onset of problem, 'high-risk' (PGSI problem and moderate-risk categories combined) and 'at-risk' (combined problem, moderate-risk and low-risk combined) gambling. It was also the strongest predictor of persistent high-risk gambling across the assessment waves. Other predictors of high-risk gambling (referred to as 'problem gambling' in SWELOGS) included low-risk and moderate-risk gambling, anxiety, growing up in a one-parent family, the presence of any health condition and smoking. Progression from non-problem gambling to 'at-risk gambling' was predicted by speaking a language other than English at home, lower education, alcohol problems, anxiety and obesity. Female gender was protective in that females were less likely than males to progress during the study from non-problem gambling to one of the risk or problem gambling categories.

Gambling participation was also examined in relation to increased gambling risk and problem gambling. High-risk gamblers engaged significantly more often in all forms of gambling other than lotteries and sweepstakes than was the case for people in other PGSI categories. When adjustments were made for other predictors of high-risk gambling including lifetime NODS Clip2 score and psychological distress, high-risk gambling was predicted by participation in four activities: EGMs, table games, informal betting and race betting. Further analyses found that the more frequently EGMs were used, the higher the PGSI score over time. While this applied both to people with previous lifetime problem or pathological gambling and to people without previous problems, the association was markedly strong for the former group. Frequency of track betting was also associated with higher PGSI scores over time, again especially for people with previous gambling problems. In contrast to EGM participation, rather than a monotonic progression, there appeared to be a threshold pattern. Lower levels of participation did not lead to higher PGSI scores and beyond a particular participation level (monthly) further increases did not lead to higher PGSI scores.

The Leisure, Lifestyle and Lifecycle Project (LLLP)

The LLLP study began in 2006 when 1,808 Albertians were recruited by random digit landline calling. Initial baseline assessments were conducted by telephone, face-to-face and on-line. On average these combined interviews took around three hours. The response rate was five percent. People with high gambling frequencies and expenditure were over-sampled. A multiple cohort design was used with approximately equal numbers of participants in five age groups including two adolescent groups (13-15 years; 18-20 years). Three subsequent assessment waves occurred with intervals of 17 to 22 months. These assessments were conducted online or by paper questionnaires. The final assessments took place in 2011. At that time 1,030 adults (76% retention of baseline participants) and 313 adolescents (72%) remained in the study. Around two-thirds (68%) of adults and somewhat fewer (60%) adolescents completed all four assessments. A substantial number of participants (970) were subsequently

re-recruited for a fifth assessment that was competed in 2014 (54% retention from baseline). Genetic material was collected from 670 participants (el-Guebaly et al., 2008; 2015)

It is unclear to what extent the initial baseline sample resembled the population from which it was drawn. Subsequently there was some differential attrition. Adults who dropped out or had sporadic completion rates were more likely to be males, non-Caucasian, young, single, have less education, engage in more types of gambling and spend more time gambling, have a higher PGSI score and live in areas other than Calgary and Edmonton. However, while statistically significant, collectively these relationships explained only a modest amount of total variance.

The Quinte Longitudinal Study (QLS)

Like the LLLP the QLS study also commenced in 2006. Participants were recruited via random digit dialling of landline numbers with telephone codes estimated to be within 70 kilometres of the Ontario city of Belleville. A very large number of eligible numbers (115,331) was phoned. Contact was made with 87,976 people who were asked to take part in a four minute telephone survey. Over a third (34,453) agreed and 19,333 of these people, aged 18 years and older, were subsequently asked to take part in the QLS cohort. There was also oversampling of people whose gambling or gambling intentions were deemed to have a higher risk of developing gambling problems in future. Twenty-one percent (4,121) of those who were asked to participate subsequently agreed and completed the baseline assessment. These and subsequent follow-up assessments (four, 12 months apart) were either conducted online or in the Belleville QLS office where they were also completed online (Williams et al., 2015).

The study was originally designed, in significant part, to assess the socioeconomic impacts of the establishment of a new gambling venue. At that time having a representative sample was important. When the venue was not built, the exclusive purpose of the study was to assess the natural stability of gambling and problem gambling over time and to develop a generalisable etiological model of problem gambling. While still desirable to resemble the population from which it is drawn, this is less of an issue than would have been the case if this had partly remained an impact study, or if it had intended to provide general population estimates of problem gambling incidence and other transitions of interest. The QLS sample is somewhat similar to that of Canadian adults generally, albeit with under-representation of younger and older adults, single people, immigrants, visible ethnic minorities and people lacking post-secondary school education.

The great majority (94%) of participants who completed the baseline assessment remained in the study and completed the final assessment five years later. A substantial majority (89%) completed all five assessments. Given this very high level of retention, non-random attrition was unlikely. Although it was found that three variables significantly predicted study non-completion, namely single status, poorer physical health rating and male gender, the variance accounted for was minor.

Major LLLP and QLS findings

The published report on the adult LLLP sample also provides and compares results from the QLS study. The QLS report does likewise with respect to the LLLP. Parallel analyses were

conducted on both data sets to identify findings that were robustly supported in both studies. Some of the major findings from these studies are presented here.

As with the Victorian and Swedish studies, among others reviewed previously, considerable stability in people's gambling and problem gambling was found for the sample as a whole. However, at an individual level, there was a large amount of change. Again, as in a number of earlier studies the non-problem and, to a somewhat lesser extent, non-gambler groups were the most stable over time. Only a very small percentage of non-gamblers or non-problem gamblers subsequently became problem gamblers. At-risk gamblers were highly unstable with only a minority remaining in this category from one assessment to the next. The great majority transitioned back into non-problem gambling. However, a significant minority became problem gamblers at some time during the study. Problem gamblers, while more stable than at-risk gamblers, also evidenced relatively high instability. In both studies, about a half of people who met the criteria for problem gambling at some time during the study were problem gamblers in only a single year. Two years was the second most common duration. Around 80 percent of problem gamblers had at least one year of remission. Of those who recovered, around a third relapsed in the remaining study time period. Probability of relapse increased with longer prior duration of problems and with increased time.

It was found that more and less severe forms of problem gambling had similar patterns of duration, chronicity, recovery and relapse when stable was defined as people remaining in the most severe category. However, when recovery was defined as not having either problem gambling or severe problem gambling, people with more severe problems evidenced more stability and chronicity.

Being an at-risk or problem gambler was the strongest predictor of being a problem gambler at a subsequent assessment. Overall gambling intensity was the next strongest predictor, as measured by frequency, time spent gambling, expenditure and total number of activities engaged in. High frequency of involvement in continuous gambling activities, particularly EGMs and casino table games, was the third strongest predictor. A number of other gambling-related predictors were also significant including experiencing a big win in the past year, gambling being a top leisure activity, having family members and/or friends who are regular gamblers, gambling to win money or escape, dissociating while gambling and having more gambling fallacies.

A large number of other factors also predicted future problem gambling including the following personality factors: impulsivity, vulnerability to stress, lower agreeableness and lower conscientiousness. Mental health predictors were also identified, the strongest being depression, followed by anxiety-related disorders, substance abuse, having a behavioural addiction and having a lifetime addiction to alcohol or drugs or mental health problems. Some other variables were also implicated but had a weaker relationship. These variables included a greater number of stressful events in the past year, lower intelligence, lower educational attainment, lower happiness, higher stress, a history of child abuse, antisocial traits, having a physical disability and/or lower general health rating.

Multivariate analyses accounted for the majority of variance at each assessment period, indicating that the results provide a fairly comprehensive account of factors contributing to the future onset of problem gambling. A number of the univariate predictors were no longer significant in the multivariate models owing to overlapping predictive power. As in the univariate analyses, being an at-risk or problem gambler was the strongest predictor followed

by a number of the other gambling related variables including increased frequency of EGM and/or casino table game participation. The only other variables adding significantly to multivariate prediction were impulsivity, having a behavioural addiction, lifetime history of addiction to alcohol or drugs and a family history of mental health problems.

The analyses summarised to this point do not differentiate between factors that predict the first onset of problem gambling rather than relapse following recovery or continued problem gambling from a previous assessment. Further analyses were conducted to see if there are differences. Almost all of the gambling-related predictors were found to predict first onset of gambling. There were a few exceptions. Being in the problem gambling or at-risk category and proximity to EGM venues were more strongly predictive of relapse and problem continuation than they were of first onset of problem gambling. While also predictive of problem continuity and relapse, some factors were significantly stronger predictors of first problem gambling onset than other factors. Intensive gambling involvement was the strongest predictor, followed by having a big win in the past year and gambling being a favourite leisure activity. Impulsivity and major depressive disorder were also strong predictors. A number of other factors also predicted first onset; however, most were even stronger predictors of continuity and relapse. Williams et al. (2015) concluded "most predictors appear to create enduring risk for problem gambling at all future time periods, rather than some creating imminent risk and others creating risk that takes years to manifest itself" (p.8).

While there is overlap, some differences were found between factors that predicted higher involvement in gambling and those that predicted problem gambling. For example, being less intelligent and less religious, having greater excitement seeking and having grown up with parents and friends who gamble predicted greater gambling involvement but were not directly related to higher levels of problem gambling. Male gender also predicted higher gambling involvement in both studies. It also predicted gambling problems in the LLLP but not in the QLS. Antisocial personality disorder was another factor that was associated with greater involvement in both studies and that also predicted problem gambling in one (LLLP). Other factors such as experiencing an early big win or loss and gambling to escape were directly associated with, and predictive of, both increased gambling and problem gambling. Some factors, notably internalising mental disorders including depression, anxiety and obsessive compulsive traits, were not predictive of increased gambling but did predict the development of problem gambling. This was also the case for drug abuse. There was inconsistency between the studies with respect to alcohol use disorder and tobacco smoking. The former was unrelated to gambling involvement in both studies and unrelated to problem gambling in the LLLP. However, in the QLS, alcohol use disorder predicted a reduced likelihood of developing a gambling problem. In this study, people with this disorder were no more likely to gamble in future. They were, however, more likely to develop a gambling disorder. In the case of tobacco use, the QLS found a relationship with gambling participation but no relationship with gambling problems. In contrast, in the LLLP, the situation was reversed. Tobacco use did not predict increased gambling but predicted increased problem gambling.

Conclusion

It is apparent that the four large prospective studies that have recently been completed or are still in progress have partly replicated previous findings from much smaller, less representative and often methodologically compromised studies. They have substantially increased our knowledge about, and understanding of, problem gambling incidence, other gambling

transitions and factors that predict these transitions. Over the next few years it is anticipated that much more information will be available from these studies as additional analyses are conducted, Swedish reports are translated into English and papers based on the studies are published in peer reviewed journals. These findings will be considered further in relation to the discussion section of this report and in future NGS reports.

2. PROJECT PROCESSES

2.1 Ethics approval

Ethical approval for the conduct of the project (Wave 1 and Wave 2) was granted by the Northern Y Regional Ethics Committee of the Health and Disability Ethics Committees on 26 May 2011 (Reference: NTY/11/04/040). An amendment to the process which pertained to the Wave 2 participants receiving a $20 koha (gift for recognition of time given to the survey) and information about the baseline prevalence phase of the study was granted by the Health and Disability Ethics Committees on 9 July 2013 (Reference: NTY/11/04/040/AM02).

During the research the following measures were taken to protect the identity of the participants:

- All participants were allocated a code by the research team to protect their identities
- No personal identifying information has been reported.

Additionally, participants were informed that participation in the research was voluntary and that they could withdraw at any time, prior to data reporting.

2.2 Reference Group

A Reference Group was established specifically for this project to provide advice and recommendations throughout the project. Reference group members comprised academics and others knowledgeable in the conduct and interpretation of large-scale national studies, statisticians, problem gambling clinicians, Government representatives (Department of Internal Affairs and Ministry of Health), gambling industry representatives, and Māori, Pacific and Asian problem gambling treatment sector representatives.

3. RESEARCH METHODS

Research methods are fully described in Report Number 1 of the National Gambling Study (Abbott et al., 2014a). A brief summary of the research methods is presented in this chapter.

3.1 Survey instrument

The survey instrument[2] for the National Gambling Study 12-month follow-up assessment (Wave 2) was extensive and covered 11 key areas:

1. Leisure activities and gambling participation

2. Past gambling and recent gambling behaviour change

3. Problem gambling
    - Problem Gambling Severity Index
      The nine-item Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001) was used to measure severity of gambling problems in a past 12 month time frame.
    - Help-seeking behaviours (from formal and informal sources) and gambling readiness to change
      The Gambling Readiness to Change Scale was based on the Alcohol Readiness to Change questionnaire (Rollnick, Heather, Gold, & Hall, 1992) and is a nine-item scale with three items each measuring the three stages of pre-contemplation, contemplation and action from Prochaska and DiClemete's (1986) stages of change model.
    - Gambling in households

4. Life events and on-going hassles

5. Mental health
    - General psychological distress
      The Kessler-10 (K-10) questionnaire was included to provide a continuous measure of general psychological distress that is responsive to change over time. The K-10 has been well validated internationally. Its brevity and simple response format are attractive features. It also produces a summary measure indicating probability of currently experiencing an anxiety or depressive disorder (Kessler & Mroczek, 1994).
    - Quality of life
      Quality of life was assessed by the WHOQoL-8, an eight item version of a widely used measure. This short form has been used in a number of countries, is robust psychometrically, and overall performance is strongly correlated with

[2] Available from the Gambling and Addictions Research Centre, Auckland University of Technology website: www.aut-grc.ac.nz

scores from the original WHOQoL instrument (Schmidt, Muhlan & Power, 2005).

6. Alcohol use/misuse
   To identify hazardous alcohol consumption or active alcohol use disorders (including alcohol abuse or dependence) a brief version (AUDIT-C, three-item scale) of the Alcohol Use Disorders Identification Test (AUDIT) (Saunders et al., 1993) was administered.

7. Substance use/misuse
   - Tobacco
   - Other drugs

8. Health conditions

9. Social connectedness
   Questions around social connectedness were based on those used in the Victorian Gambling Study (Victorian Responsible Gambling Foundation, 2011, 2012).

10. New Zealand Individual Deprivation Index (NZiDep)
    The New Zealand Index of socio-economic deprivation for individuals was used (eight item index). The index data were created and validated from analysis of representative survey data including Māori, Pacific and non-Māori/non-Pacific adults (Salmond, Crampton, King, & Waldegrave, 2006).

11. Demographics

3.2 Overview of the survey methodology

3.2.1 Baseline (Wave 1) assessment

Key aspects of the survey methodology were as follows:

- The survey sampling was at three levels: First, meshblocks (small areas) were selected, then dwellings were selected within each meshblock and finally an eligible respondent was selected for an interview within each dwelling.
- Random selection procedures were used at all three of these sampling levels in order to minimise sampling bias. These procedures were used to ensure known, non-zero probabilities of selection for all final respondents.
- Interviews were conducted face-to-face with respondents in their homes (dwellings).
- Interviews were conducted using Computer-Assisted Personal Interviewing (CAPI) software; that is, interviewers used laptop computers to administer the interview.
- The survey had nationwide coverage.
- All adults were eligible; that is, gamblers and non-gamblers. The survey was representative of the New Zealand adult population. 'Adults' for the National Gambling Study were defined as people aged 18 years or older.
- The interview length varied depending on the respondent's level of involvement with gambling activities.

- The household call pattern, call backs to households, and the interviewers' approach was designed to achieve an expected response rate of 65%. Up to seven calls were made to a household to contact the eligible respondent. Household calls were made on different days (week days and weekend days) and at different times of the day, in order to maximise the chance of contacting people.
- There was no inducement or coercion of respondents. To this end, a consent form was signed or approved by respondents before the interview began.
- There were 'core' (non-screened) and 'screened' households within each meshblock. Interviews conducted in screened households boosted the number of interviews conducted with Māori, Asian and Pacific respondents.
- Interviewers were trained on the specifics of the National Gambling Study.

3.2.2 12-month (Wave 2) follow-up assessment

Interviews for the Wave 2 follow-up assessment were conducted 12 months after the original interview date, or as near to this date as practically possible. Contacting and interviewing participants followed the process described for the Wave 1 assessment with the following differences:

- Interviewers re-contacted participants face-to-face (i.e. door-to-door), at the residential address of the participant that was recorded at the Wave 1 assessment. The exception to this was for a small proportion of participants where significant travel was involved to the participant's address (usually a rural address). In those cases, interviewers were permitted, at the discretion of their supervisor, to first telephone the participant to attempt to arrange an interview appointment.
- Interviewers made up to five calls in total (i.e. four call-backs) door-to-door. As for the Wave 1 assessment, these call-backs were made on different days of the week, in particular by varying week days and weekend days, and at different times of the day, to maximise the chance of contacting the participant.
- A $20 koha was given to participants on completion of the follow-up assessment, as reciprocity in recognition for respondents' time.
- For participants who had changed address, interviewers initially recorded that the participant had moved. Where possible, interviewers established whether the respondent had moved within New Zealand or had moved overseas, and their new address in New Zealand, if this was known.
- Additionally, when an interviewer was given a new address for a participant that was within their interviewing area (i.e. typically this was when a participant had moved within a city or town), the interviewer then contacted the participant at their new address.

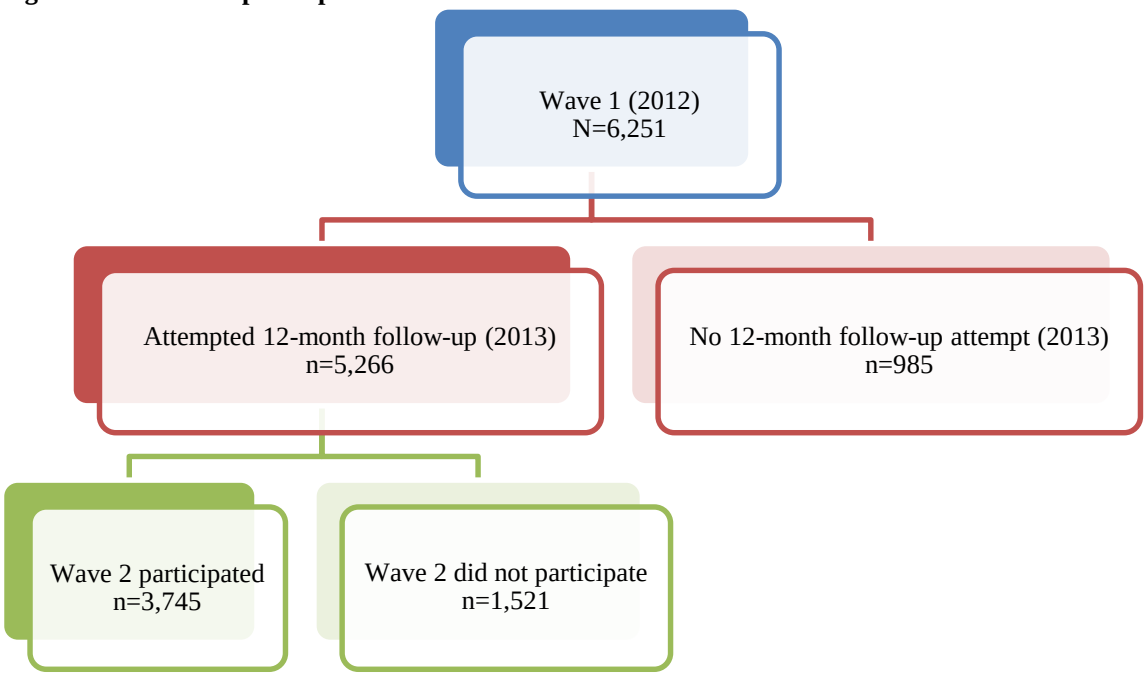
3.3 Survey population

3.3.1 Sample size

A randomly selected national sample of 6,251 people aged 18 years and older living in private households was interviewed face-to-face from March to October 2012 (Wave 1). The response rate was 64% and the sample was weighted to enable generalisation of the survey findings to

the general adult population. One year later from March to November 2013 (Wave 2), 3,745 participants were re-contacted and re-interviewed. Due to budgetary constraints, attempts were only made to re-contact 5,266 of the original 6,251 participants (Figure 1). Therefore, a 71% response rate was achieved in 2013 (60% of the total original sample).

Figure 1: Number of participants interviewed in Wave 1 and Wave 2



3.3.2 Composition of the Wave 2 sample for gender and age groups

Just over half (57%) of the participants assessed in Wave 2 were female and two-fifths (40%) were aged 40 to 59 years (Table 1).

Table 1: Gender and age of participants in Wave 2

Sub-sample category	N	(%)
Gender		
Male	1,607	(42.9)
Female	2,138	(57.1)
Total	*3,745*	*(100.0)*
Age groups[†]		
18 - 39 years	1,187	(31.7)
40 - 59 years	1,502	(40.1)
60+ years	1,055	(28.2)
Total	*3,744*[#]	*(100.0)*

[†] Age recorded at the 2012 baseline assessment
[#] One respondent refused all three age questions: date of birth, age at last birthday and age group

3.3.3 Composition of the Wave 2 sample for ethnic groups

Table 2 shows un-prioritised frequencies for ethnicity; that is, some respondents identified with more than one of the four broad ethnic groups and have been included in each group they identified with. Māori, Pacific and Asian participants were oversampled at the Wave 1 assessment.

Table 2: Ethnicity of participants in Wave 2

Ethnic group	N	(%)
European/Other	2,261	(60.4)
Māori	651	(17.4)
Pacific	473	(12.6)
Asian	416	(11.1)
Total	*3,801*	*(101.5)*

3.4 Weighting

3.4.1 Generalities

The purpose of weighting is to maintain the representativeness of the sample with respect to a given population. The general principle underlying the analysis of the present study was the pursuit of results representative of the Wave 1 population, rather than the population of Wave 2 or any subsequent Wave. In this way, inference regarding gambling and other trajectories, particularly inference regarding transitions, was pursued from the sample as originally constructed. Population-inference can be obtained by considering shifting composition of the population.

To achieve this with the planned analyses Wave 1 weights, in order to be representative of the New Zealand population, were based on age group, gender and ethnicity. Wave 2 weights incorporated Wave 1 weights but also took into consideration differential attrition in the same categories.

An assumption was made that the bulk of the information concerning differential attrition was contained in the age-gender-ethnicity triad. This information was tempered with an investigation of outcome-based attrition, which determined whether there was a need to further adjust the weights based on PGSI risk categories or aggregated categories.

3.4.2 Census benchmark

Factor weights for Wave 2 analyses were based on the 2013 Census; however, the Wave 1 analyses were based on the 2006 Census. In order to be able to compare results from Wave 1 to Wave 2, the adjustments made needed to be based on comparable Census data. Therefore, Wave 1 results by PGSI risk category were recalculated using 2013 Census data. Table 3 demonstrates that the use of 2006 vs. 2013 Census-based weights did not appreciably change the results.

Table 3: 2006 vs. 2013 Census weighting

		Prevalence %			
Problem gambling level (PGSI)	**Census year[#]**	**Total adults**	**(95% CI)**	**Past year gamblers**	**(95% CI)**
No gambling in last year	2006	19.6	(18.4 - 20.9)	-	-
	2013	20.2	(18.9 - 21.4)	-	-
Non-problem gambler	2006	73.0	(71.6 - 74.4)	90.8	(89.7 - 91.9)
	2013	72.5	(71.2 - 73.9)	90.9	(89.8 - 91.9)
Low-risk gambler	2006	5.0	(4.2 - 5.7)	6.2	(5.3 - 7.1)
	2013	4.9	(4.2 - 5.6)	6.2	(5.3 - 7.0)
Moderate-risk gambler	2006	1.8	(1.4 - 2.1)	2.2	(1.7 - 2.7)
	2013	1.7	(1.3 - 2.1)	2.2	(1.7 - 2.6)
Problem gambler	2006	0.7	(0.4 - 0.9)	0.8	(0.5 - 1.1)
	2013	0.6	(0.4 - 0.9)	0.8	(0.5 - 1.1)
Moderate-risk/Problem gambler combined	2006	2.4	(2.0 - 2.9)	3.0	(2.4 - 3.6)
	2013	2.4	(1.9 - 2.8)	3.0	(2.4 - 3.5)

[#] Year of the Census from which weights were derived

3.4.3 Attrition-specific weights

The participants in Wave 2 (n=3,745) represented 60% of the participants in Wave 1 (n=6,251). This reduction is succinctly described by the word 'attrition' in the present report, although the mechanisms by which Wave 2 was reduced from Wave 1 do not all fall under non-response.

The application of age, gender and ethnicity-based weights to Wave 2 data causes an underestimation of the estimated proportions in the moderate-risk and problem gambling categories. However, small numbers in some of the cells of the four-way table would cause the variance inflation factor to reach unacceptable values. For this reason, raking (gender-age-ethnicity in one margin, PGSI risk category in the other) was used to produce the final weights. Raking presents the advantage of preserving the marginal weights (Deming & Stephan, 1940).

Raking was applied to the Wave 2 sample to match the weighted marginal frequencies of the Wave 1 sample, in an effort to allay any gambling outcome-based differential attrition.

3.5 Data analysis

3.5.1 Attrition analyses

Attrition effects are displayed using tables indicating the unweighted frequency and proportion in each category (including a category for missing value) in Wave 1 participants, Wave 2 participants and Wave 2 non-participants. All characteristics are taken from Wave 1. The p-values testing independence between Wave 2 participants and non-participants are displayed in each case. The categorical variables concerned are presented in Appendix 1.

3.5.2 Descriptive statistics

Wave 2 prevalence statistics

Census+attrition-weighted proportions in the Wave 2 sample are presented for all categorical variables presented in Appendix 2. Population prevalence and 95% confidence intervals based on the census+attrition weights are also presented.

Confidence intervals

As many of the subpopulation estimates of proportions (e.g. preferred gambling activity by problem gambling status) either had small sample sizes or small estimates, the method of constructing confidence intervals using the normal approximation leads to intervals whose coverage is not close to the nominal level, for example a 95% confidence interval may have an actual coverage of 90%. So, as in earlier New Zealand gambling surveys, the method proposed by Korn and Graubard, and assessed in the New Zealand context by Gray, Haslett and Kuzmicich (2004), was used with two modifications.

The method Korn and Graubard suggest is to use an "exact method" of constructing a confidence interval for binomial variables. Their suggestion is the well-known Clopper-Pearson approach. However, rather than use the actual sample size in the Clopper-Pearson formula, they suggest using the "effective" sample size, which is the actual sample size divided by the design effect[3] of the complex survey. As they were dealing with situations where the number of PSUs minus the number of strata (M-L, for example) was small, they also modified the effective sample size by a ratio of t-values squared; the numerator having n-1 degrees of freedom, where n is the final number of respondents; the denominator having M-L degrees of freedom.

The first modification was to use a different exact method, the equal-tailed Jeffreys prior interval because it has better coverage properties than the Clopper-Pearson interval (Brown, Cai, & DasGupta, 2001). The second modification was to dispense with the t-value adjustment since both n and M-L were generally over 30, at which point a t-value is very close to a z-value and hence the ratio is very close to 1.

Transition descriptive statistics

Tables describing key PGSI risk category transitions between Wave 1 and Wave 2 display census+attrition-weighted frequencies, along with transition incidence proportions and 95% confidence intervals based on the latter.

Similar transition descriptive tables have been presented on a fully weighted basis, for:

- Gambling participation (frequency, number and pattern of activities)
- Readiness to change
- Psychological distress (Kessler-10; likely well, likely mild, likely moderate, likely severe)

[3] The design effect is the ratio of the variance of the estimator under the complex sample design to the same estimator under a simple random sample design of the same size. It is an inflation/deflation factor for the variance due to using a design different from a simple random sample.

- Quality of life (WHOQol-8)
- Alcohol (AUDIT-C) and other drug use

3.5.3 Inferential statistics

Inference on transitions

Inferential statistics have focused on explaining the transitions. Table 4 details transitions in PGSI risk category from Wave 1 to Wave 2.

Table 4: List of transitions for inferential analyses

Wave 1 State	Wave 2 State	n
Incidence of moderate-risk/problem gambler		
Non-problem/low-risk →	Moderate-risk/problem gambler	45
	Non-problem/low-risk	2,543
Persistence of moderate-risk/problem gambler		
Moderate-risk/problem gambler →	Moderate-risk/problem gambler	29
	Non-problem/low-risk	38
Incidence of risk		
No risk →	Low-risk/moderate-risk/problem gambler	155
	No risk	2,267
Persistence of risk		
Low-risk/moderate-risk/problem gambler →	Low-risk/moderate-risk/problem gambler	113
	No risk	119
Re-initiation of gambling (at 12 months)		
Ever gambled + no gambling →	Non-problem/low-risk/moderate-risk/problem gambler	99
	No gambling	131
Initiation of gambling (ever)		
Never gambled + no gambling →	Non-problem/low-risk/moderate-risk/problem gambler	165
	Never gambled	354

Note: No gambling relates to no gambling in last 12 months
n values adjusted for 2013 Census data and attrition

Table 5 details transitions using the South Oaks Gambling Screen (SOGS) lifetime measures to identify gamblers who have relapsed vs. new cases of at-risk/problem gambling (using PGSI).

Table 5: List of transitions using SOGS lifetime measures for inferential analyses

Wave 1 State		Wave 2 State	
SOGS	**PGSI**	**PGSI**	**n**
Incidence of new moderate risk/problem gambler			
SOGS non-problem	Ever gambled + no gambling/non-problem/low risk →	Moderate-risk/problem gambler	34
		Non-problem/low risk	2,724
Incidence of relapsed (SOGS 3+) moderate-risk/problem gambler			
SOGS 3+ (problem gambler)	Ever gambled + no gambling/non-problem/low risk →	Moderate-risk/problem gambler	12
		Non-problem/low risk	78
Incidence of relapsed (SOGS 5+) moderate-risk/problem gambler			
SOGS 5+ (probable pathological gambler)	Ever gambled + no gambling/non-problem/low risk →	Moderate-risk/problem gambler	0.6
		Non-problem/low risk	29

Note:
1) No gambling relates to no gambling in last 12 months
2) Incidence of problem gambler, persistence of problem gambler, and cessation of gambling from problem gambler are all small numbers and as such have only been presented descriptively. They will not be inferentially analysed until later waves of data have been collected and the cumulative numbers are sufficient for robust analysis.
3) n values adjusted for 2013 Census data and attrition

The transitions were examined in turn using weighted logistic regression, using the census+attrition weights. For each transition, the potential explanatory covariates listed in Appendix 2 were considered for possible inclusion in an explanatory model.

Model selection generally proceeded through several steps. The first step was to identify candidate variables in bivariate analyses with the outcome variable that have a p-value < 0.2. Models were then developed for each of the major data domains (e.g. demographics, participation, co-existing conditions) using the candidate variables, in order to identify the best subset of variables from that data domain. Then all of the results from the separate domains were considered for an overall model. Each of the model building procedures followed a stepwise selection method tempered by consideration of information criteria. Parsimonious models were favoured, and competing models with similar fit but markedly different compositions have all been reported.

The base odds and odds ratio of potential explanatory covariates are reported as point estimates and 95% confidence intervals, accompanied by a p-value for the covariate.

4. RESULTS

This chapter details the results of data analyses focusing on:

- Attrition (section 4.1)
- Descriptive statistics including socio-demographic variables, gambling participation, problem gambling and health status (section 4.2)
- Transitions, incidence and relapse (section 4.3)
- Associations with transitions (section 4.4)

4.1 Attrition analyses

Attrition analyses were conducted to assess whether the participants who remained in the study in Wave 2 differed to a significant extent from the original participant cohort at baseline (Wave 1).

The analyses indicated statistical differences between the samples based on demographics (age, ethnicity and region of residence), problem gambling severity, gambling participation, help-seeking behaviour (from formal and informal sources) and co-existing issues.

As detailed in Appendix 3, there was *greater attrition* (less people retained in the study) amongst: the youngest age group (18-24 years); Asian people; those who had not gambled in the past year; people who had experienced five or more major life events in the past year; and those whose quality of life was below the median score, and/or who had higher levels of psychological distress. There was *greater retention* (more people stayed in the study) amongst: people living in Wellington or Christchurch, non-problem gamblers, and people who had not sought help (from formal or informal sources) in the past year.

Due to the significant differential attrition between the two Waves, subsequent data analyses have been adjusted to account for attrition effects.

4.2 Descriptive statistics

This section contains descriptive analyses of socio-demographic characteristics which could have changed in the past year; gambling participation; problem gambling including methods to stop gambling too much and help-seeking behaviour; and health status with a focus on major life events, quality of life, psychological distress and substance use/misuse.

4.2.1. Socio-demographic variables

In Wave 2, participants were re-asked about socio-demographic characteristics which could have changed in the past year. These included labour force status, household size, annual personal income, annual household income and individual level of deprivation (NZiDep). There were no major differences in the percentage of participants for the various demographic characteristics between Wave 1 and Wave 2 apart from individual level of deprivation (Appendix 4). A slightly greater proportion of people who did not report any deprivation

characteristics participated in Wave 2 in relation to Wave 1 (61% vs. 57%) whilst a slightly lesser proportion who reported 4 deprivation characteristics participated in Wave 2 in comparison with Wave 1 (2.0% vs. 3.2%) (Table 6).

Table 6: Prevalence and 95% confidence intervals for deprivation in Wave 1 and Wave 2

	Wave 1			Wave 2		
NZiDep	**n**	**%**	**(95% CI)**	**n**	**%**	**(95% CI)**
0	3540	56.6	(55.2 - 58.1)	2275	60.8	(58.9 - 62.6)
1	1348	21.6	(20.3 - 22.8)	752	20.1	(18.5 - 21.7)
2	683	10.9	(10.0 - 11.9)	336	9.0	(7.9 - 10.1)
3	271	4.3	(3.8 - 4.9)	184	4.9	(4.1 - 5.8)
4	201	3.2	(2.7 - 3.7)	74	2.0	(1.5 - 2.4)
5	106	1.7	(1.4 - 2.0)	75	2.0	(1.3 - 2.7)
6	61	1.0	(0.7 - 1.2)	35	0.9	(0.6 - 1.2)
7	30	0.5	(0.3 - 0.6)	9	0.3	(0.1 - 0.4)
8	9	0.1	(0.1 - 0.2)	3	0.1	(0.0 - 0.2)
Missing	1	-	-	1	-	-

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)
Baseline N = 6,251; Wave 2 N = 3,745

4.2.2. Gambling participation

Past year and past month gambling

Gambling participation was assessed in terms of gambling on a particular activity at least once in the past year or at least once in the past month. Data are presented in Appendix 5.

Past year gambling

For past year gambling participation, the profile was slightly different in Wave 2 compared with Wave 1 for some gambling activities. In Wave 2, a lower percentage had gambled at least once in the past year on:

- Bets with friends or workmates (12.2% vs. 14.6%)
- Sports betting (2.7% vs. 4.6%)
- Casino gambling (table games and EGMs) in New Zealand (7.2% vs. 9.4%)
- Casino EGMs (6.1% vs. 8.3%)
- Pub EGMs (8.9% vs. 11.5%)
- EGMs overall (14.1% vs. 17.6%).

In Wave 2, the most popular gambling activity for past year participation was Lotto (60%), followed by raffles or lotteries (48%), Instant Kiwi or other scratch tickets (30%), EGMs overall (14%), bets with friends or workmates (12%), and horse and dog race betting (10.5%). All other gambling activities were participated in by less than 10% of the participants.

Past month gambling

When past month gambling participation was assessed, Wave 2 findings were similar to Wave 1 with one exception. A lower proportion of participants had gambled in the past month on EGMs overall in comparison to Wave 1 (3.4% vs. 4.9%).

In Wave 2, the most popular gambling activity for past month participation was Lotto (33%), followed by raffles or lotteries (11%), and Instant Kiwi or other scratch tickets (11%). All other gambling activities were participated in by less than three percent of the participants.

Gambling behaviour

In Waves 1 and 2, there were no major differences in relation to pattern of gambling participation (infrequent gambler, regular non-continuous gambler or regular continuous gambler), frequency of gambling, expenditure on gambling, most preferred activity, who they gambled with, and knowing other people with a gambling problem (Appendix 6). However, a slightly lower percentage of participants who gambled on seven to nine activities was noted in Wave 2 in comparison with Wave 1 (2.0% vs. 3.3%) (Table 7).

Table 7: Prevalence and 95% confidence intervals for number of gambling activities participated in Wave 1 and Wave 2

Number of gambling activities participated in	Wave 1			Wave 2		
	n	%	(95% CI)	n	%	(95% CI)
0	1261	20.2	(19.0 - 21.4)	828	22.1	(20.5 - 23.7)
1	1376	22.0	(20.8 - 23.2)	805	21.5	(19.9 - 23.0)
2	1318	21.1	(19.9 - 22.7)	828	22.1	(20.5 - 23.7)
3	964	15.4	(14.4 - 16.5)	627	16.7	(15.3 - 18.2)
4 - 6	1097	17.6	(16.4 - 18.7)	580	15.5	(14.1 - 16.9)
7 - 9	206	3.3	(2.8 - 3.8)	73	2.0	(1.4 - 2.5)
10+	28	0.4	(0.2 - 0.7)	5	0.1	(0.0 - 0.3)

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)
Baseline N = 6,251; Wave 2 N = 3,745

In Wave 2, just over one-fifth (22%) of participants had not gambled and another one-fifth each had participated in only one or two activities (21.5% and 22% respectively). Over half (57%) of the participants were infrequent gamblers. Just over one-quarter (29%) had gambled at least once in the past six months and one-fifth had gambled either at least weekly or monthly (both 21%). The greatest proportions spent between $1 to $10 or $11 to $20 on gambling in a typical month (17.5% and 16% respectively). The most preferred gambling activity was Lotto (16%). Half of the participants usually gambled alone (51%) and one third (31%) reported that they knew someone with a gambling problem (Appendix 6).

EGM gambling

Time spent gambling on EGMs in an average day was assessed in Waves 1 and 2 by casino, pub and club venue. There were no major differences between the Waves. In Wave 2, a greater proportion of participants gambled for more than an hour in a typical session on casino EGMs (36.5%) than on pub or club EGMs (both 12%). Less casino participants gambled on EGMs

for up to 15 minutes in a typical session (19%) in comparison with those gambling on EGMs in pubs (36%) or clubs (38%) (Appendix 7).

4.2.3. Problem gambling

Problem gambling risk

Problem gambling risk category, assessed via the Problem Gambling Severity Index (PGSI), was similar in Waves 1 and 2. In Wave 2, 0.5% of the total adult population was classified as a problem gambler, 1.5% as a moderate-risk gambler, 5.6% as a low risk gambler and 70.3% as a non-problem gambler (Table 8).

Table 8: Prevalence and 95% confidence intervals for problem gambling risk category (PGSI) in Wave 1 and Wave 2

	Wave 1			Wave 2		
PGSI	**n**	**%**	**(95% CI)**	**n**	**%**	**(95% CI)**
Non-problem gambler	4535	72.5	(71.2 - 73.9)	2633	70.3	(68.6 - 72.0)
Low-risk gambler	307	4.9	(4.3 - 5.6)	210	5.6	(4.8 - 6.5)
Moderate-risk gambler	108	1.7	(1.4 - 2.1)	57	1.5	(1.1 - 1.9)
Problem gambler	40	0.6	(0.4 - 0.9)	18	0.5	(0.3 - 0.7)
No gambling in past year	1261	20.2	(19.0 - 21.4)	828	22.1	(20.5 - 23.7)

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)
Baseline N = 6,251; Wave 2 N = 3,745

When examined by ethnicity, problem gambling risk category remained similar between Wave 1 and Wave 2, and Māori and Pacific people continued to have a higher prevalence of moderate-risk and problem gambling combined than European/Other (Table 9).

Table 9: Prevalence and 95% confidence intervals for problem gambling risk category (PGSI) in Wave 1 and Wave 2 by ethnicity

Ethnic group	PGSI	Wave 1			Wave 2		
		n	**%**	**(95% CI)**	**n**	**%**	**(95% CI)**
Māori	Non-problem gambler	466	71.57	(68.64 - 74.51)	254	65.72	(61.33 - 70.12)
	Low-risk gambler	51	7.80	(6.02 - 9.58)	46	11.92	(8.95 - 14.88)
	Moderate-risk gambler	24	3.71	(2.52 - 4.89)	17	4.42	(2.37 - 6.47)
	Problem gambler	15	2.29	(1.29 - 3.29)	6	1.62	(0.72 - 2.51)
	No gambling in past year	95	14.63	(12.31 - 16.95)	63	16.33	(12.82 - 19.84)
	Moderate-risk/problem gambler combined		6.00	(4.47 - 7.53)		6.03	(3.82 - 8.25)
Pacific	Non-problem gambler	178	57.54	(53.39 - 61.69)	103	55.40	(49.97 - 60.83)
	Low-risk gambler	29	9.37	(6.88 - 11.87)	17	8.99	(6.10 - 11.89)
	Moderate-risk gambler	18	5.90	(3.49 - 8.31)	12	6.26	(3.79 - 8.74)
	Problem gambler	5	1.51	(0.66 - 2.36)	1	0.63	(0.00 - 1.31)
	No gambling in past year	79	25.68	(22.07 - 29.29)	53	28.72	(23.6 - 33.83)
	Moderate-risk/problem gambler combined		7.41	(4.90 - 9.93)		6.89	(4.33 - 9.45)

Ethnic group	PGSI	Wave 1 n	Wave 1 %	Wave 1 (95% CI)	Wave 2 n	Wave 2 %	Wave 2 (95% CI)
Asian	Non-problem gambler	329	51.59	(47.69 - 55.49)	182	49.36	(43.97 - 54.76)
	Low-risk gambler	37	5.81	(3.80 - 7.82)	19	5.11	(2.80 - 7.42)
	Moderate-risk gambler	14	2.15	(0.91 - 3.39)	5	1.30	(0.19 - 2.41)
	Problem gambler	4	0.65	(0.01 - 1.29)	1	0.37	(0.00 - 1.08)
	No gambling in past year	254	39.80	(35.95 - 43.64)	162	43.86	(38.37 - 49.35)
	Moderate-risk/problem gambler combined		2.80	(1.41 - 4.19)		1.66	(0.34 - 2.99)
European/ Other	Non-problem gambler	3499	76.70	(75.11 - 78.29)	2062	74.55	(72.46 - 76.65)
	Low-risk gambler	189	4.13	(3.33 - 4.93)	129	4.65	(3.65 - 5.64)
	Moderate-risk gambler	51	1.13	(0.73 - 1.53)	23	0.85	(0.41 - 1.28)
	Problem gambler	17	0.36	(0.13 - 0.59)	9	0.32	(0.07 - 0.58)
	No gambling in past year	806	17.68	(16.25 - 19.10)	543	19.63	(17.71 - 21.55)
	Moderate-risk/problem gambler combined		1.49	(1.03 - 1.95)		1.17	(0.67 - 1.68)

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)

Methods used to stop gambling too much and help-seeking behaviour

Participants were asked if they use any methods to stop gambling too much. Percentages were similar in Waves 1 and 2 for a trusted person managing the money, leaving Automated Teller Machine (ATM)/credit cards at home, setting a time limit for gambling, and avoiding betting/gambling places. However, a lower percentage of participants reported setting a money limit for gambling in Wave 2 in comparison with Wave 1 (13% vs.16%), or separating betting money and stopping gambling when it is used (2% vs. 3.5%).

There was no difference between the Waves for the percentage of participants who had sought help (from formal and informal sources) in the past year (Wave 2, 0.4%; Wave 1, 0.3%).

Data are presented in Table 10.

Table 10: Prevalence and 95% confidence intervals for methods used to stop gambling too much and help-seeking behaviour in Wave 1 and Wave 2

Variable	Wave 1 n	Wave 1 %	Wave 1 (95% CI)	Wave 2 n	Wave 2 %	Wave 2 (95% CI)
Methods used to stop gambling too much						
Set a money limit	992	16.0	(14.8 - 17.1)	497	13.4	(12.0 - 14.7)
Trusted person manages the money	33	0.5	(0.3 - 0.7)	17	0.4	(0.2 - 0.7)
Separate betting money and stopping when used	215	3.5	(2.9 - 4.0)	83	2.2	(1.7 - 2.8)
Leave ATM/credit cards at home	72	1.2	(0.8 - 1.5)	42	1.1	(0.7 - 1.5)
Set a time limit	93	1.5	(1.1 - 1.9)	46	1.2	(0.8 - 1.7)
Avoid betting/gambling places	116	1.9	(1.5 - 2.2)	57	1.5	(1.1 - 2.0)
Sought help (from formal and informal sources) in past year						
Yes	17	0.3	(0.2 - 0.5)	14	0.4	(0.2 - 0.6)

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)

4.2.4. Health status

In Wave 2, participants were re-asked about issues which could affect their health. These included occurrence of major life events in the past year, quality of life in the past two weeks, psychological distress in the past four weeks, hazardous alcohol consumption and other drug use in the past year, and tobacco use. Data are presented in Appendix 8.

Significant life events

In Wave 2, a greater proportion of participants had experienced one major life event in the past year, compared with Wave 1 (30% vs. 26%). A lower percentage of participants in Wave 2 had experienced four, or five or more major life events in comparison with Wave 1 (6%, 5% vs. 8%, 9% respectively).

One-third (29%) of participants in Wave 2 had not experienced any major life events in the past year. Another third (30%) had experienced one life event. Eleven percent of participants experienced four or more events.

Data are presented in Table 11.

Table 11: Prevalence and 95% confidence intervals for major life events at baseline and Wave 2

	Wave 1			Wave 2		
Number of significant life events	**n**	**%**	**(95% CI)**	**n**	**%**	**(95% CI)**
0	1711	27.4	(26.1 -28.6)	1081	28.9	(27.2 - 30.5)
1	1645	26.3	(25.0 - 27.6)	1125	30.0	(28.2 - 31.8)
2	1151	18.4	(17.3 - 19.6)	701	18.7	(17.2 - 20.2)
3	727	11.6	(10.7 - 12.6)	433	11.6	(10.3 - 12.8)
4	479	7.7	(6.8 - 8.5)	215	5.7	(4.8 - 6.6)
5+	536	8.6	(7.7 - 9.4)	190	5.1	(4.2 - 5.9)
Missing	2	-	-	-	-	-

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)
Baseline N = 6,251; Wave 2 N = 3,745

Quality of life

The quality of life experienced by participants was similar in Waves 1 and 2. Ten percent of the participants in Wave 2 scored the median; Just less than half (49%) were above the median level, and two-fifths (41%) had a quality of life below the median (Appendix 8).

Psychological distress

The level of general psychological distress reported by participants was similar in Waves 1 and 2. Three-quarters (76%) of the participants in Wave 2 had a low level of distress and just less than one-fifth (18%) reported a low-moderate level. Only one percent of participants scored in the highest level of psychological distress (Appendix 8).

Hazardous alcohol consumption

The percentage of participants reporting levels of hazardous alcohol consumption was similar in Waves 1 and 2 with just over a third of the respondents meeting the criteria in each Wave (37% and 35% respectively) (Appendix 8).

Tobacco use

Tobacco use by participants was similar in Waves 1 and 2. Slightly more than half (55%) of the participants in Wave 2 had never smoked and slightly more than one-quarter (27%) had quit smoking. Fifteen percent of participants currently smoked at least once a day. Two-thirds of participants had ever smoked in their lifetime (65%) and two-fifths (42%) had ever smoked daily (Appendix 8).

Other drug use

In Wave 2, a lower proportion of participants had used recreational drugs (excluding alcohol and tobacco) or illegal drugs in the past year, compared with Wave 1 (11% vs. 15%). This was mainly due to a lower percentage using cannabis (9% vs. 12%). A majority (89%) of participants in Wave 2 had not used any drugs in the past year (Table 12).

Table 12: Prevalence and 95% confidence intervals for other drug use in Wave 1 and Wave 2

	Baseline			Wave 2		
Other drug use	**n**	**%**	**(95% CI)**	**n**	**%**	**(95% CI)**
Yes	916	14.7	(13.5 - 15.8)	427	11.4	(10.0 - 12.8)
No	5334	85.3	(84.2 - 86.5)	3319	88.6	(87.2 - 90.0)
Cannabis	757	12.1	(11.1 - 13.2)	342	9.1	(7.8 - 10.4)

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)
Baseline N = 6,251; Wave 2 N = 3,745

4.3 Transitions, incidence and relapse

This section details transitions, incidence and relapse.

Transitions relates to movements into and out of the different PGSI categories in Wave 2 compared to Wave 1. Increased risk status indicates movement into a higher PGSI category in Wave 2 compared to Wave 1, whilst decreased risk status indicates movement into a lower PGSI category in Wave 2 compared to Wave 1. Stability relates to maintaining risk category in both Waves (section 4.3.1).

Incidence refers to the number of new cases of problem gambling occurring in a population in a given time period. This is different from *prevalence* which refers to the percentage of the population with problem gambling at any given point in time (section 4.3.2).

Relapse relates to participants who at some time in the past had problematic gambling, who were non-gamblers, non-problem gamblers or low-risk gamblers in Wave 1 and who then became moderate-risk or problem gamblers in Wave 2 (section 4.3.2).

4.3.1. Transitions

Current (past 12 month) problem gambling status was measured using the PGSI in Wave 1 and again in Wave 2. Table 13 shows transitions between the groups over time. *As the sample size is very small for some cells, the following data should be interpreted with caution and should be considered to be indicative rather than absolute.*

Table 13: Transitions between PGSI groups from Wave 1 to Wave 2

	Wave 2										
	Non-gambler		Non-problem gambler		Low-risk gambler		Moderate-risk gambler		Problem gambler		
Wave 1	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	***Total***
Non-gambler	485	64.7	247	33.0	16	2.1	1	0.1	<1	0.1	*748*
Non-problem gambler	327	11.9	2267	82.5	133	4.8	19	0.7	3	0.1	*2749*
Low-risk gambler	13	7.2	97	54.6	46	25.7	21	11.7	1	0.8	*178*
Moderate-risk gambler	4	6.9	16	30.7	14	25.3	15	27.5	5	9.6	*53*
Problem gambler	0	0.0	6	32.6	2	13.6	2	9.7	7	44.1	*17*
Total	*828*	*22.1*	*2633*	*70.3*	*210*	*5.6*	*57*	*1.5*	*18*	*0.5*	*3746*

Data weighted for 2013 Census data and attrition
Totals do not always add up due to rounding

Table key
- No change
- Transition to a higher risk level
- Transition to a lower risk level

Stability

Non-gamblers and non-problem gamblers were the most stable groups with a majority remaining in those categories from Wave 1 to Wave 2 (65% and 82.5% respectively). Problem gamblers were the next most stable group with 44% staying in that category. Participants in the low-risk and moderate-risk gambling groups were the least stable with only 26% and 27.5% respectively staying in those groups in Wave 2.

Transition to increased risk status

One-third (33%) of non-gamblers from Wave 1 commenced gambling and were non-problem gamblers in Wave 2. A very small percentage (2%) gambled in a risky manner and 0.1% transitioned into the problem gambler category.

A small proportion (about 5%) of Wave 1 non-problem gamblers transitioned to risky gambling and, as for the non-gambler category, 0.1% transitioned into the problem gambler category.

Twelve percent of Wave 1 low-risk gamblers were moderate-risk gamblers in Wave 2 and 0.8% had transitioned to problem gambler.

Ten percent of Wave 1 moderate-risk gamblers were problem gamblers in Wave 2.

Transition to decreased risk status

Of those who were problem gamblers in 2012, 55.9% (CI 35.0 - 76.8), approximately 7,261 people (CI 4,546 - 9,976), were no longer problem gamblers in 2013; 9.7% became moderate-risk gamblers and 46.2% became low-risk or non-problem gamblers. One-third (33%) of problem gamblers from Wave 1 had moved into the non-problem gambler category in Wave 2. None of the Wave 1 problem gamblers stopped gambling.

Of those who were moderate-risk gamblers in 2012, 62.9% (CI 49.3 - 76.5), approximately 25,782 people (CI 20,207 - 31,356) were no longer moderate-risk or problem gamblers in 2013. Overall, over half (56%) of Wave 1 moderate-risk gamblers had transitioned into the low-risk (25%) or non-problem gambler (31%) categories in Wave 2; seven percent stopped gambling.

Over half (55%) of Wave 1 low-risk gamblers had transitioned into the non-problem gambler category in Wave 2; seven percent stopped gambling.

Twelve percent of Wave 1 non-problem gamblers stopped gambling in Wave 2.

4.3.2. Incidence and relapse

In the 12 months from Wave 1 to Wave 2, the number of participants who became problem gamblers was 10 (adjusted data) which is an incidence rate of 0.28%. As this study is nationally representative, **the estimated incidence rate** for the New Zealand population becoming a problem gambler is, therefore, 0.28% (CI 0.10 - 0.45); approximately 8,046 people (CI 2,874 - 12,931).

Past (lifetime) gambling status was measured in Wave 1 using the SOGS-R which classified participants as non-problem gambler, problem gambler or probable pathological gambler. Current (past 12 month) gambling status was assessed in Waves 1 and 2 using the PGSI.

Of those who developed problems between 2012 and 2013, 51.6% (CI 14.5 - 88.7) were new problem gamblers and 48.4% were people who, while not problem gamblers during the 12 months prior to 2012, were assessed as having previously been a problem or probable pathological gambler.

It is estimated that 1.1% (CI 0.7 - 1.5), approximately 31,158 people (CI 19,828 - 42,488), became moderate-risk gamblers in 2013, who were not moderate-risk or problem gamblers in 2012.

Of those who became moderate-risk gamblers in 2013, 71.1% (CI 54.2 - 87.9) were people who were not past problem or probable pathological gamblers prior to 2012, and 28.9% were people who had previously been problem or probable pathological gamblers.

Overall, 74% of 2013 'new' problem and moderate-risk gamblers were assessed as not having been a problem or probable pathological gambler prior to 2012. Twenty-six percent of moderate-risk/problem gambler participants in Wave 2 (adjusted data) were classified as past problem gambler or probable pathological gambler and current non-gambler, non-problem gambler or low-risk gambler in Wave 1. Thus, 26% of the Wave 2 moderate-risk/problem gamblers had **relapsed from past problematic gambling** (Table 14).

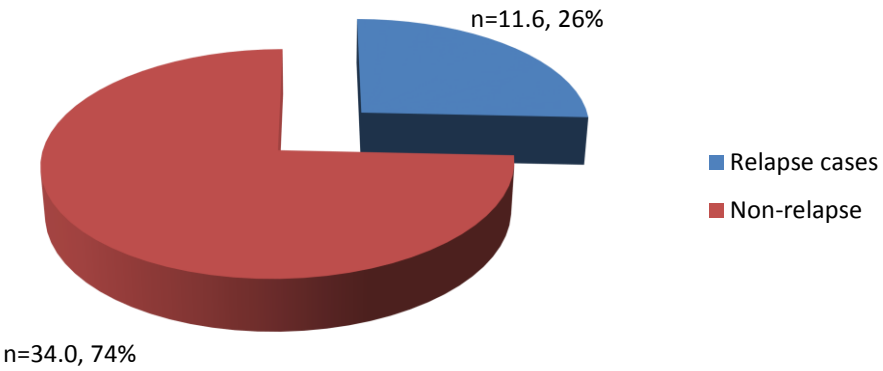
Table 14: Wave 2 moderate-risk/problem gambling among participants who were Wave 1 non-gambler/non-problem gambler/low-risk gambler

Wave 1 non-gambler/non-problem gambler/low-risk gambler	Wave 2 moderate-risk/problem gambler		
	n	%	(95% CI)
Non-problem gambler (by SOGS-R)	34	74.3	(58.9 - 89.7)
Past problem gambler (by SOGS-R)	11	24.5	(9.2 - 39.7)
Past probable pathological gambler (by SOGS-R)	0.6	1.2	(0.0 - 3.7)

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)

Figure 2 shows a graphical representation of the data presented in Table 14 .

Figure 2: Relapse to moderate-risk/problem gambling



4.4 Associations with transitions

This section details associations with transitions from lower to higher risk problem gambling status and persistence of risk status (i.e. where it has stayed the same) from Wave 1 to Wave 2. It also details re-initiation of gambling in Wave 2 of participants who in Wave 1 had not gambled in the past year but who had previously gambled at some time, and initiation of gambling in Wave 2 of participants who in Wave 1 had not gambled in the past year or who had never gambled.

4.4.1. Transition to moderate-risk/problem gambler

In Wave 2, 45 participants (adjusted data) transitioned into the moderate-risk gambler and problem gambler categories from being non-problem/low-risk gamblers in Wave 1. A further 2,543 participants stayed as non-problem/low-risk gamblers.

Bivariate associations

Bivariate associations examined using logistic regression indicated that ethnicity, country of birth and household income were the demographic variables significantly associated with the transition to moderate-risk gambler or problem gambler. Being of Māori or Asian ethnicity was associated with more than three times the risk of transitioning to moderate-risk or problem gambler than for European/Other. Pacific ethnicity was a greater risk factor at more than seven times the risk. Migrants had almost twice the risk compared with people born in New Zealand. People in the mid-range annual household income brackets of $40,001 to $60,000 and $60,001 to $80,000 were about three times at risk compared with people in the lowest income bracket.

Gambling-related factors significantly associated with the transition were the number of activities gambled on, pattern of gambling, gambling expenditure, gambling on casino table games (annually) or EGMs (annually or monthly), annual and monthly gambling on non-casino (pub and club) EGMs, monthly gambling on Instant Kiwi or other scratch tickets, time spent gambling in a typical session (casino table games and EGMs, non-casino EGMs), and who the participant usually gambled with.

People who had participated in seven to nine, or 10 or more gambling activities in the previous 12 months were 4.59 and 16.02 times at greater risk of transitioning to moderate-risk or problem gambler than people who had only participated in one gambling activity. People whose typical monthly gambling expenditure was between $101 and $500 had four times the risk of those who gambled $10 or less.

People who regularly gambled on continuous forms had almost three times the risk than people who were infrequent gamblers. This was evident in the increased risk noted for the previously mentioned forms of gambling participated in annually or monthly, with the greatest risk noted for monthly gambling on casino EGMs (11.47 times) and club EGMs (14.13 times). The risk level for monthly pub EGM gambling was 6.10 times. Similarly, increased risk was noted with increased time spent gambling on EGMs in an average day. People who played casino EGMs for more than 15 minutes were at four to six times the risk compared with people who did not gamble on casino EGMs. For club EGM gamblers, the risk increased to nearly nine times. For pub EGM gamblers, the highest risk was for those gambling between 31 to 60 minutes (8.89 times); gambling for more than 60 minutes was four times more risky, compared to non-pub EGM gambling.

Significantly *less* risk was noted for people who gambled with at least one other person (approximately 0.3 times) in comparison with gambling alone. Behaviour-related variables significantly associated with the transitions were setting a dollar limit for gambling before leaving home and sticking to it (three times higher), avoiding places that have betting or gambling (five times higher), and seeking help (from formal and informal sources) in the past

year (26 times higher). These findings probably reflect the fact that the highest risk gamblers are those who are likely to have exhibited these particular behaviours.

Psychological distress was the only health-related variable significantly associated with the transition to moderate-risk gambler or problem gambler. People who scored in the mid-high range of psychological distress (score 12-19) had five times the risk compared with people who had the lowest level of psychological distress.

Statistically significant associations are presented in Table 15; all associations (including non-statistically significant) are presented in Appendix 9.

Table 15: Bivariate associations for transition from non-problem/low risk gambler in Wave 1 to moderate-risk/problem gambler in Wave 2

Variable	%	Odds Ratio	(95% CI)	p-value
Ethnic group (prioritised)				
Māori	3.8	3.73	(1.59 - 8.75)	
Pacific	7.0	7.09	(3.41 - 14.74)	
Asian	3.3	3.20	(1.13 - 9.04)	
European/Other	1.0	1.00		<.0001
Country of birth				
NZ	1.4	1.00		
Other	2.7	1.94	(1.01 - 3.74)	0.05
Household income				
<$20,000	1.3	1.00		
$20,001 - $40,000	1.8	1.41	(0.49 - 4.07)	
$40,001 - $60,000	3.4	2.70	(1.00 - 7.30)	
$60,001 - $80,000	4.0	3.27	(1.20 - 8.95)	
$80,001 - $100,000	1.2	0.92	(0.25 - 3.47)	
>$100,000	0.5	0.37	(0.10 - 1.35)	
Not reported	1.3	1.02	(0.25 - 4.15)	<0.0001
Number of gambling activities participated in				
1	1.1	1.00		
2	1.4	1.26	(0.40 - 3.95)	
3	2.0	1.79	(0.60 - 5.33)	
4-6	1.7	1.49	(0.53 - 4.17)	
7-9	4.9	4.59	(1.34 - 15.67)	
10+	15.3	16.02	(1.67 - 153.66)	0.05
Pattern of participation				
Infrequent gambler	1.6	1.00		
Regular non-continuous gambler	1.4	0.91	(0.42 - 2.00)	
Regular continuous gambler	4.1	2.72	(1.22 - 6.11)	0.03
Typical monthly gambling expenditure				
$1 - $10	1.9	1.00		
$11 - $20	0.5	0.35	(0.09 - 1.31)	
$21 - $30	0.3	0.22	(0.05 - 1.07)	
$31 - $50	0.8	0.57	(0.15 - 2.17)	
$51 - $100	2.9	2.30	(0.71 - 7.46)	
$101 - $500	5.1	4.08	(1.26 - 13.15)	
>$500	2.4	1.84	(0.36 - 9.31)	<0.0001
Casino table games or EGMs (overseas) - annual				
No	1.5	1.00		
Yes	7.2	5.18	(1.75 - 15.34)	0.003
Casino table games or EGMs (NZ) - annual				
No	1.2	1.00		
Yes	6.3	5.74	(2.82 - 11.67)	<0.0001
Casino table games (NZ) - annual				
No	1.5	1.00		
Yes	6.2	4.31	(1.36 - 13.60)	0.01

Variable	%	Odds Ratio	(95% CI)	p-value
Casino EGMs (NZ) - annual				
No	1.3	1.00		
Yes	5.5	4.41	(2.14 - 9.08)	<0.0001
Pub EGMs - annual				
No	1.4	1.00		
Yes	3.7	2.64	(1.28 - 5.42)	0.01
Club EGM - annual				
No	1.3	1.00		
Yes	7.7	6.39	(3.00 - 13.60)	<0.0001
EGMs overall - annual				
No	1.2	1.00		
Yes	3.5	2.85	(1.46 - 5.57)	0.002
Instant Kiwi/other scratch tickets - monthly				
No	1.5	1.00		
Yes	3.0	2.08	(1.01 - 4.31)	0.05
Casino EGMs (NZ) - monthly				
No	1.6	1.00		
Yes	15.9	11.47	(2.41 - 54.50)	0.002
Pub EGMs - monthly				
No	1.5	1.00		
Yes	8.5	6.10	(2.46 - 15.16)	<0.0001
Club EGMs - monthly				
No	1.4	1.00		
Yes	17.1	14.13	(5.13 - 38.88)	<0.0001
EGMs overall - monthly				
No	1.3	1.00		
Yes	9.8	8.15	(3.79 - 17.50)	<0.0001
Time spent playing EGMs in an average day (casino)				
No time	1.3	1.00		
Up to 15 minutes	2.2	1.66	(0.22 - 12.65)	
16 to 30 minutes	5.1	4.03	(1.02 - 15.94)	
31 to 60 minutes	7.8	6.33	(1.90 - 21.03)	
>60 minutes	7.4	6.00	(2.23 - 16.10)	0.0003
Time spent playing EGMs in an average day (pub)				
No time	1.4	1.00		
Up to 15 minutes	1.0	0.70	(0.09 - 5.27)	
16 to 30 minutes	1.6	1.15	(0.28 - 4.70)	
31 to 60 minutes	11.3	8.89	(3.39 - 23.31)	
>60 minutes	5.9	4.39	(1.34 - 14.41)	<0.0001
Time spent playing EGMs in an average day (club)				
No time	1.3	1.00		
Up to 15 minutes	2.8	2.25	(0.29 - 17.13)	
16 to 30 minutes	10.2	8.75	(3.10 - 24.73)	
31 to 60 minutes	10.6	8.77	(2.80 - 27.46)	
>60 minutes	3.7	2.91	(0.37 - 23.08)	<0.0001
Who spent time with on most enjoyed activity				
Alone	3.1	1.00		
With one person	0.9	0.27	(0.09 - 0.85)	
With several people/a group	1.0	0.31	(0.13 - 0.73)	
Not reported	0.7	0.22	(0.07 - 0.73)	0.003
Methods - Setting a dollar figure before leaving home				
No	1.2	1.00		
Yes	3.6	3.02	(1.54 - 5.94)	0.001
Methods - Avoiding places that have betting or gambling				
No	1.6	1.00		
Yes	7.8	5.21	(1.76 - 15.47)	0.003
Sought help (from formal and informal sources) in last year				
No	1.7	1.00		
Yes	31.1	25.95	(1.59 - 423.46)	0.02

Variable	%	Odds Ratio	(95% CI)	p-value
Psychological distress (Kessler-10)				
Score 0 - 5	1.3	1.00		
Score 6 - 11	2.5	1.97	(0.82 - 4.75)	
Score 12 - 19	6.2	5.10	(2.02 - 12.87)	
Score 20 - 40	2.5	1.99	(0.53 - 7.51)	0.005

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)

Multiple logistic regression

Multiple logistic regression analyses showed that ethnicity and annual household income remained significantly associated with the transition to moderate-risk gambler or problem gambler. Being Māori or Asian was associated with more than three times the risk of transitioning to moderate-risk or problem gambler than for European/Other. Pacific people were at the greatest risk at almost six times more than European/Other. Although the data were not as conclusive[4] in regard to annual household income, the indication is that people in the mid-range annual household income brackets of $40,001 to $60,000 and $60,001 to $80,000 had about twice the risk compared with people in the lowest income bracket.

People who participated annually in casino gambling (table games and EGMs) remained at higher risk than people who did not participate in casino gambling, with the risk being four or five times greater for overseas or New Zealand casino gambling respectively.

Significantly *less* risk was noted for people who gambled with at least one other person (approximately 0.2 times) in comparison with gambling alone, when confounding factors were controlled for.

The only behaviour-related variable which remained significantly associated with the transitions was avoiding places that have betting or gambling (four times higher).

Psychological distress also remained significantly associated with the transition to moderate-risk gambler or problem gambler. People who scored in the mid-high range of psychological distress (score 12-19) had four times the risk compared with people who had the lowest level of psychological distress.

Data are presented in Table 16.

[4] The confidence intervals overlap 1.00. This is likely due to small sample size and where this occurs, the results should be treated as indicative only.

Table 16: Multivariate logistic regression for transition from non-problem/low risk gambler in Wave 1 to moderate-risk/problem gambler in Wave 2

Variable	%	Odds Ratio	(95% CI)	p-value
Ethnic group (prioritised)				
Māori	3.8	3.48	(1.35 - 8.98)	
Pacific	7.0	5.96	(2.59 - 13.68)	
Asian	3.3	3.17	(1.14 - 8.84)	
European/Other	1.1	1.00		0.0003
Household income				
<$20,000	1.3	1.00		
$20,001 - $40,000	1.8	1.02	(0.32 - 3.25)	
$40,001 - $60,000	3.4	2.30	(0.72 - 7.31)	
$60,001 - $80,000	4.0	2.47	(0.84 - 7.33)	
$80,001 - $100,000	1.2	0.76	(0.23 - 2.51)	
>$100,000	0.5	0.37	(0.09 - 1.42)	
Not reported	1.3	0.79	(0.18 - 3.37)	0.03
Casino table games or EGMs (overseas) - annual				
No	1.5	1.00		
Yes	7.2	3.92	(1.47 - 10.44)	0.006
Casino table games or EGMs (NZ) - annual				
No	1.2	1.00		
Yes	6.3	5.19	(2.64 - 10.21)	<0.0001
Who spent time with on most enjoyed activity				
Alone	3.1	1.00		
With one person	0.9	0.20	(0.07 - 0.61)	
With several people/a group	1.0	0.26	(0.10 - 0.64)	
Not reported	0.7	0.33	(0.09 - 1.22)	0.002
Methods - Avoiding places that have betting or gambling				
No	1.6	1.00		
Yes	7.8	4.07	(1.03 - 16.00)	0.04
Psychological distress (Kessler-10)				
Score 0 - 5	1.3	1.00		
Score 6 - 11	2.5	1.75	(0.70 - 4.36)	
Score 12 - 19	6.2	4.38	(1.72 - 11.15)	
Score 20 - 40	2.5	3.18	(0.77 - 13.18)	0.01

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)

4.4.2. Staying as moderate-risk/problem gambler

In Wave 2, 29 participants (adjusted data) stayed in the moderate-risk/problem gambler categories. A further 38 participants decreased their risk level by moving from the moderate-risk/problem gambler categories in Wave 1 to the non-problem/low-risk gambler categories in Wave 2.

Bivariate associations

Bivariate associations examined by logistic regression indicated that age and country of birth were the demographic variables significantly associated with staying as a moderate-risk gambler or problem gambler in Wave 2 compared with Wave 1. Although the data were not conclusive (probably due to small sample sizes), it appeared that people aged 55 years and older

had a higher risk (7.54 times greater) of staying as a moderate-risk or problem gambler compared with people in the lowest age group (18-24 years). Migrants had a *lower* risk (0.24 times) compared with people born in New Zealand.

Gambling-related factors significantly associated with staying as a moderate-risk gambler or problem gambler were pattern of gambling, frequency of gambling, and time spent gambling on EGMs in clubs. People who regularly gambled on continuous forms had almost six times the risk compared with people who were infrequent gamblers. This was evident in the increased risk noted for people who gambled at least weekly and also for people who played club EGMs for between 31 and 60 minutes, although the data were not conclusive due to small sample sizes. *These results, therefore, indicate a relationship but should be treated with caution.*

Significantly *less* risk of staying as a moderate-risk gambler or problem gambler was noted for people who left ATM and credit cards at home when gambling (approximately 0.2 times) in comparison with people who did not use this strategy.

People who had sought help (from formal and informal sources) in the past year had five times the risk of remaining moderate-risk or problem gamblers than people who had not sought help, although due to small sample size, the results are not conclusive. This finding probably reflects the fact that the highest risk gamblers are those who are likely to seek help (from formal and informal sources).

People who smoked tobacco at least once a week had almost ten times the risk of staying as a moderate-risk gambler or problem gambler compared with people who never smoked. *Again, however, due to small sample size the results are not conclusive and should be treated with caution.*

Statistically significant associations are presented in Table 17; all associations (including non-statistically significant) are presented in Appendix 10.

Table 17: Bivariate associations for staying as a moderate-risk/problem gambler in Wave 2

Variable	%	Odds Ratio	(95% CI)	p-value
Age group (years)				
18 - 24	31.2	1.00		
25 - 34	39.0	1.41	(0.25 - 8.10)	
35 - 44	40.7	1.52	(0.26 - 8.79)	
45 - 54	34.6	1.17	(0.20 - 6.83)	
55+	77.3	7.54	(0.74 - 77.13)	<0.0001
Country of birth				
NZ	50.4	1.00		
Other	19.6	0.24	(0.07 - 0.85)	0.03
Pattern of participation				
Infrequent gambler	23.4	1.00		
Regular non-continuous gambler	45.5	2.73	(0.71 - 10.52)	
Regular continuous gambler	63.2	5.61	(1.40 - 22.45)	0.05
Gambling frequency				
At least weekly	58.6	4.53	(0.57 - 36.25)	
At least monthly	16.4	0.63	(0.07 - 5.76)	
At least once in past year	23.8	1.00		0.01
Time spent playing EGMs in an average day (club)				
No time	40.8	1.00		
Up to 15 minutes	24.8	0.48	(0.08 - 2.75)	
16 to 30 minutes	52.6	1.61	(0.25 - 10.21)	
31 to 60 minutes	69.4	3.29	(0.64 - 19.95)	<0.0001
Methods - Leaving ATM and credit cards at home				
No	47.5	1.00		
Yes	13.3	0.17	(0.05 - 0.62)	0.01
Sought help (from formal and informal sources) in last year				
No	40.9	1.00		
Yes	78.1	5.15	(0.85 - 31.33)	0.08
Current tobacco use				
Does not smoke now	43.2	1.61	(0.36 - 7.10)	
Smokes at least once a day	52.4	2.33	(0.65 - 8.40)	
Smokes at least once a week	82.2	9.79	(0.77 - 122.04)	
Smokes at least once a month	55.3	2.62	(0.16 - 43.68)	
Never smoked	32.1	1.00		<0.0001

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)

Multiple logistic regression

Frequency of gambling was the only variable which retained a level of statistical significance in the multiple logistic regression analyses. People who gambled at least weekly were at 4.53 times the risk of staying as moderate-risk or problem gamblers compared with people who gambled less frequently than monthly (at least once in the past year). Again, the data were not conclusive due to small sample sizes (Table 18).

Table 18: Multiple logistic regression for staying as a moderate-risk/problem gambler in Wave 2

Variable	%	Odds Ratio	(95% CI)	p-value
Gambling frequency				
At least weekly	58.62	4.53	(0.57 - 36.25)	
At least monthly	16.39	0.63	(0.07 - 5.76)	
At least once in past year	23.84	1.00		0.01

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)

4.4.3. Transition to low-risk/moderate-risk/problem gambler

In Wave 2, 155 participants (adjusted data) transitioned into the low-risk/moderate-risk/ problem gambler categories from being non-problem gamblers in Wave 1. A further 2,267 participants stayed as non-problem gamblers.

Bivariate associations

Bivariate associations examined by logistic regression indicated that ethnicity, age, religion and area of residence were the demographic variables[5] significantly associated with the transition to low-risk gambler, moderate-risk gambler or problem gambler. Being of Māori, Pacific or Asian ethnicity was associated with 3.21, 4.07 and 2.58 times the risk of transitioning to low-risk, moderate-risk or problem gambler compared with European/Other. People of Other Christian and Other religions had twice the risk of people with no religion.

People in the older age groups (55 years and older) were at *lower* risk of transitioning to low-risk, moderate-risk or problem gambler status than people in the youngest age group (18-24 years). People residing in Wellington and Christchurch were also at lower risk than people residing in Auckland.

Gambling-related factors significantly associated with the transition were the number of activities gambled on, pattern and frequency of gambling, gambling expenditure, participating in most forms of gambling either annually or monthly, time spent gambling in a typical session (casino table games and EGMs, non-casino EGMs), and knowing people with gambling problems.

People who had participated in four to six, seven to nine or 10 or more gambling activities in the previous 12 months were two to three times at greater risk of transitioning to low-risk, moderate-risk or problem gambler than people who had only participated in one gambling activity. Interestingly, people who had gambled on two activities were also at slightly greater risk (1.25 times). People whose typical monthly gambling expenditure was $51 or greater had three to five times the risk of those who gambled $10 or less.

[5] Although a level of statistical significance was also attained for educational status, the odds ratios are close to 1.00 and the confidence intervals overlap 1.00. This finding is considered likely to be an artefact of small sample sizes and of little relevance.

People who regularly gambled on continuous forms had four times the risk compared with people who were infrequent gamblers, with an increased risk (about three times greater) noted for people who gambled at least weekly or at least monthly compared with people who had gambled at least once in the past year. This was also evident in the increased risk noted for the most forms of gambling participated in annually or monthly, with the greatest risk noted for monthly gambling on casino EGMs (14.70 times), pub EGMS (10.05 times), club EGMs (8.22 times) and housie/bingo (9.41 times). Similarly, increased risk was noted with increased time spent gambling on EGMs in an average day. People who played casino EGMs for more than 30 minutes had about four times the risk compared with people who did not gamble on casino EGMs. For pub and club EGM gamblers, the risk increased to nearly 10 or 11 times higher respectively, for people gambling for more than 60 minutes. With pub EGM gambling, even gambling for up to 15 minutes was associated with almost three times the risk compared with people who did not gamble on pub EGMs.

A slightly increased risk (1.84 times) of transitioning to low-risk, moderate-risk or problem gambler status was noted for people who knew other people with gambling problems.

Behaviour-related variables significantly associated with the transitions were setting a dollar limit for gambling before leaving home and sticking to it (twice as high), separating money from gambling from other money and stopping gambling when the money is used (over three times as high), and setting a time limit for gambling and sticking to it (four times higher). These findings are likely to reflect the fact that the at-risk gamblers are those who are likely to have exhibited these particular behaviours.

People who had experienced one, two or three major life events in the past 12 months had about twice the risk for transitioning to low-risk, moderate-risk or problem gambler compared with people who had not experienced any major life events. People who experienced five or more life events had almost four times the risk. Similarly, people whose quality of life was below or at the median score were twice at risk compared to people whose quality of life was above the median.

Health-related variables significantly associated with the transition to low-risk, moderate-risk or problem gambler included psychological distress, drug use and tobacco use. People who scored in the mid-high and high ranges of psychological distress (score 12-19 and 20-40) had almost three and five times the risk respectively, compared with people who had the lowest level of psychological distress. People who used cannabis had almost three times the risk compared with people who did not use cannabis; similarly people who did not use any drugs were at *lower* risk (0.37 times) than people who did use drugs. Daily smokers of tobacco were at twice the risk compared with people who never smoked.

Statistically significant associations are presented in Table 19; all associations (including non-statistically significant) are presented in Appendix 11.

Table 19: Bivariate associations for transition from non-problem gambler in Wave 1 to low-risk/ moderate-risk/problem gambler in Wave 2

Variable	%	Odds Ratio	(95% CI)	p-value
Age group (years)				
18 - 24	8.9	1.00		
25 - 34	11.7	1.35	(0.63 - 2.89)	
35 - 44	7.0	0.77	(0.36 - 1.63)	
45 - 54	5.6	0.60	(0.28 - 1.31)	
55 - 64	3.7	0.39	(0.17 - 0.90)	
65+	4.2	0.44	(0.20 - 0.99)	0.0004
Ethnic group (prioritised)				
Māori	13.6	3.21	(2.10 - 4.91)	
Pacific	16.7	4.07	(2.57 - 6.47)	
Asian	11.2	2.58	(1.46 - 4.56)	
European/Other	4.7	1.00		<0.0001
Religion				
No religion	5.1	1.00		
Anglican	4.3	0.83	(0.47 - 1.48)	
Catholic	7.3	1.47	(0.83 - 2.61)	
Presbyterian	6.9	1.37	(0.75 - 2.51)	
Other Christian	10.4	2.15	(1.27 - 3.63)	
Other religion	10.5	2.17	(1.10 - 4.30)	0.01
Highest qualification				
No formal qualification	6.3	1.00		
Secondary school qualification	8.8	1.44	(0.82 - 2.53)	
Vocational or Trade qualification	7.2	1.16	(0.66 - 2.05)	
University degree or higher	4.5	0.70	(0.40 - 1.23)	0.03
Area of residence				
Auckland	8.4	1.00		
Wellington	4.4	0.50	(0.27 - 0.95)	
Christchurch	2.5	0.29	(0.11 - 0.73)	
Rest of NZ	6.4	0.75	(0.50 - 1.12)	0.02
Number of gambling activities participated in				
1	2.9	1.00		
2	6.4	2.27	(1.25 - 4.13)	
3	4.4	1.56	(0.82 - 2.99)	
4-6	9.7	3.62	(2.08 - 6.29)	
7-9	17.4	7.05	(2.98 - 16.70)	
10+	33.7	17.07	(3.03 - 96.02)	<0.0001
Pattern of participation				
Infrequent gambler	5.4	1.00		
Regular non-continuous gambler	6.0	1.11	(0.72 - 1.71)	
Regular continuous gambler	18.7	4.01	(2.43 - 6.61)	<0.0001
Gambling frequency				
At least weekly	9.0	2.94	(1.82 - 4.74)	
At least monthly	8.3	2.69	(1.64 - 4.43)	
At least once in past year	3.3	1.00		<0.0001
Typical monthly gambling expenditure				
$1 - $10	3.1	1.00		
$11 - $20	3.2	1.05	(0.44 - 2.51)	
$21 - $30	3.9	1.26	(0.50 - 3.17)	
$31 - $50	5.3	1.75	(0.75 - 4.12)	
$51 - $100	9.9	3.42	(1.55 - 7.55)	
$101 - $500	14.8	5.45	(2.45 - 12.05)	
>$500	13.7	4.96	(1.28 - 19.23)	<0.0001
Text game or competition - annual				
No	6.6	1.00		
Yes	1.7	0.24	(0.07 - 0.82)	0.02

Variable	%	Odds Ratio	(95% CI)	p-value
Keno overall - annual				
No	6.1	1.00		
Yes	15.1	2.73	(1.45 - 5.17)	0.002
Instant Kiwi/other scratch tickets - annual				
No	5.3	1.00		
Yes	8.0	1.56	(1.09 - 2.24)	0.01
Housie or bingo - annual				
No	6.3	1.00		
Yes	15.4	2.73	(1.22 - 6.11)	0.01
Horse/dog race betting - annual				
No	6.0	1.00		
Yes	12.8	2.31	(1.31 - 4.09)	0.004
Sports betting - annual				
No	6.1	1.00		
Yes	12.4	2.17	(1.08 - 4.37)	0.03
Casino table games or EGMs (NZ) - annual				
No	5.7	1.00		
Yes	12.8	2.42	(1.48 - 3.95)	0.0004
Casino table games (NZ) - annual				
No	6.1	1.00		
Yes	14.1	2.52	(1.22 - 5.22)	0.01
Casino EGMs (NZ) - annual				
No	5.8	1.00		
Yes	13.1	2.47	(1.47 - 4.13)	0.001
Pub EGMs - annual				
No	4.9	1.00		
Yes	16.8	3.89	(2.54 - 5.96)	<0.0001
Club EGM - annual				
No	5.7	1.00		
Yes	16.2	3.18	(1.88 - 5.37)	<0.0001
EGMs overall - annual				
No	5.6	1.00		
Yes	18.3	3.76	(2.23 - 6.35)	<0.0001
Short-term speculative investments - annual				
No	4.6	1.00		
Yes	13.9	3.37	(2.30 - 4.95)	<0.0001
Card games - monthly				
No	6.3	1.00		
Yes	18.3	3.35	(1.22 - 9.26)	0.02
Bets with friends/workmates - monthly				
No	6.2	1.00		
Yes	17.2	3.11	(1.17 - 8.25)	0.02
Raffle/lottery (NZ/overseas) - monthly				
No	5.9	1.00		
Yes	9.5	1.68	(1.09 - 2.58)	0.02
Lotto - monthly				
No	4.7	1.00		
Yes	8.3	1.82	(1.25 - 2.64)	0.002
Instant Kiwi/other scratch tickets - monthly				
No	5.5	1.00		
Yes	11.5	2.21	(1.45 - 3.38)	0.0002
Housie or bingo - monthly				
No	6.3	1.00		
Yes	38.7	9.41	(3.24 - 27.30)	<0.0001
Horse/dog race betting - monthly				
No	6.1	1.00		
Yes	24.3	4.94	(2.01 - 12.15)	0.001
Casino table games or EGMs (NZ) - monthly				
No	6.3	1.00		
Yes	31.2	6.77	(1.63 - 28.22)	0.01

Variable	%	Odds Ratio	(95% CI)	p-value
Casino EGMs (NZ) - monthly				
No	6.2	1.00		
Yes	49.4	14.70	(3.38 - 63.99)	0.0003
Pub EGMs - monthly				
No	5.6	1.00		
Yes	37.1	10.05	(5.36 - 18.84)	<0.0001
Club EGMs - monthly				
No	6.0	1.00		
Yes	34.4	8.22	(3.60 - 18.79)	<0.0001
EGMs overall - monthly				
No	5.2	1.00		
Yes	36.6	10.62	(6.28 - 17.97)	<0.0001
Time spent playing EGMs in an average day (casino)				
No time	5.8	1.00		
Up to 15 minutes	5.0	0.86	(0.22 - 3.36)	
16 to 30 minutes	11.5	2.13	(0.79 - 5.76)	
31 to 60 minutes	17.9	3.56	(1.42 - 8.93)	
>60 minutes	19.3	3.90	(1.69 - 8.99)	0.001
Time spent playing EGMs in an average day (pub)				
No time	4.9	1.00		
Up to 15 minutes	12.3	2.71	(1.21 - 6.05)	
16 to 30 minutes	14.1	3.16	(1.56 - 6.41)	
31 to 60 minutes	23.6	5.94	(2.89 - 12.22)	
>60 minutes	33.6	9.73	(3.90 - 24.27	<0.0001
Time spent playing EGMs in an average day (club)				
No time	5.7	1.00		
Up to 15 minutes	1.9	0.32	(0.07 - 1.42)	
16 to 30 minutes	16.4	3.22	(1.47 - 7.06)	
31 to 60 minutes	26.7	5.97	(2.54 - 14.02)	
>60 minutes	39.9	10.92	(2.71 - 43.95)	<0.0001
Know people with gambling problems				
No	5.0	1.00		
Yes	8.9	1.84	(1.29 - 2.64)	0.001
Methods - Setting a dollar figure before leaving home				
No	5.6	1.00		
Yes	10.1	1.92	(1.29 - 2.86)	0.001
Methods - Separating money for betting from other money and stopping				
No	6.0	1.00		
Yes	17.7	3.35	(1.66 - 6.74)	0.001
Methods - Setting a time limit				
No	6.3	1.00		
Yes	20.8	3.93	(1.53 - 10.12)	0.005
Number of significant life events				
0	3.3	1.00		
1	7.6	2.41	(1.38 - 4.24)	
2	6.5	2.03	(1.12 - 3.71)	
3	7.5	2.37	(1.19 - 4.72)	
4	6.0	1.89	(0.84 - 4.27)	
5+	11.4	3.79	(1.85 - 7.76)	0.01
Quality of life (WHOQoL-8)				
Below median (Score 0 - 24)	8.6	2.11	(1.43 - 3.10)	
Median score (Score 25)	8.0	1.95	(1.03 - 3.70)	
Above median (Score 26 - 32)	4.3	1.00		0.001
Psychological distress (Kessler-10)				
Score 0 - 5	5.5	1.00		
Score 6 - 11	7.5	1.37	(0.88 - 2.15)	
Score 12 - 19	13.1	2.56	(1.33 - 4.94)	
Score 20 - 40	22.9	5.06	(1.46 - 17.51)	0.003

Variable	%	Odds Ratio	(95% CI)	p-value
Does not use drugs				
No	13.3	1.00		
Yes	5.4	0.37	(0.23 - 0.59)	<0.0001
Cannabis				
No	5.5	1.00		
Yes	13.9	2.77	(1.68 - 4.58)	<0.0001
Current tobacco use				
Does not smoke now	4.9	0.83	(0.53 - 1.31)	
Smokes at least once a day	11.9	2.17	(1.39 - 3.39)	
Smokes at least once a week	5.8	0.99	(0.20 - 4.92)	
Smokes at least once a month	1.7	0.28	(0.04 - 2.19)	
Never smoked	5.9	1.00		<0.0001

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)

Multiple logistic regression

Multiple logistic regression analyses showed that ethnicity remained significantly associated with the transition to low-risk gambler, moderate-risk gambler or problem gambler in Wave 2 from non-problem gambler in Wave 1. Compared with European/Other, Māori were associated with 2.62 times the risk and Asian people at 3.88 times. Pacific people had the greatest risk at almost five times more than European/Other.

People whose typical monthly gambling expenditure was $51 or more had three or more times the risk compared with people whose expenditure was $10 or less. The only form of gambling which retained statistical significance in the multivariate analyses was monthly gambling on EGMs (casino, pub and club) where the risk was 7.61 times greater than for people who did not gamble monthly on EGMs.

People who had experienced one, two or three major life events in the past 12 months remained at two to three times the risk for transitioning to low-risk gambler, moderate-risk gambler or problem gambler compared with people who had not experienced any major life events. People who experienced five or more life events were at just greater than three times the risk.

Psychological distress also remained significantly associated with the transition to low-risk gambler, moderate-risk gambler or problem gambler. People who scored in the mid-high and high ranges of psychological distress (score 12-19 and 20-40) had 2.36 and 7.40 times the risk respectively, compared with people who had the lowest level of psychological distress. People who used cannabis also remained at greater risk in the multivariate analyses (2.08 times) compared with people who did not use cannabis.

Data are presented in Table 20.

Table 20: Multiple logistic regression for transition from non-problem gambler at Wave 1 to low-risk/moderate-risk/problem gambler at Wave 2

Variable	%	Odds Ratio	(95% CI)	p-value
Ethnic group (prioritised)				
Māori	13.6	2.62	(1.60 - 4.29)	
Pacific	16.7	4.96	(2.89 - 8.51)	
Asian	11.2	3.88	(2.12 - 7.09)	
European/Other	4.7	1.00		<0.0001
Typical monthly gambling expenditure				
$1 - $10	3.1	1.00		
$11 - $20	3.2	1.07	(0.49 - 2.36)	
$21 - $30	3.9	1.04	(0.43 - 2.52)	
$31 - $50	5.3	1.54	(0.69 - 3.41)	
$51 - $100	9.9	2.92	(1.41 - 6.04)	
$101 - $500	14.8	3.20	(1.49 - 6.89)	
>$500	13.7	4.62	(1.37 - 15.61)	0.0002
EGMs overall - monthly				
No	5.2	1.00		
Yes	36.6	7.61	(4.12 - 14.06)	<0.0001
Number of significant life events				
0	3.3	1.00		
1	7.6	2.84	(1.58 - 5.08)	
2	6.5	2.10	(1.11 - 3.96)	
3	7.5	2.96	(1.43 - 6.13)	
4	6.0	1.54	(0.66 - 3.56)	
5+	11.4	3.35	(1.55 - 7.25)	0.004
Psychological distress (Kessler-10)				
Score 0 - 5	5.5	1.00		
Score 6 - 11	7.5	1.28	(0.79 - 2.06)	
Score 12 - 19	13.1	2.36	(1.14 - 4.90)	
Score 20 - 40	22.9	7.43	(2.35 - 23.49)	0.0008
Cannabis				
No	5.5	1.00		
Yes	13.9	2.08	(1.21 - 3.57)	0.008

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)

4.4.4. Staying as low-risk/moderate-risk/problem gambler

In Wave 2, 113 participants (adjusted data) stayed in the low-risk/moderate-risk/problem gambler categories. A further 119 participants decreased their risk level by moving from the low-risk/moderate-risk/problem gambler categories in Wave 1 to the non-problem gambler category in Wave 2.

Bivariate associations

Bivariate associations examined by logistic regression indicated that ethnicity, educational level and personal income were the demographic variables significantly associated with staying as a low-risk gambler, moderate-risk gambler or problem gambler in Wave 2 compared with Wave 1. Māori had almost three times the risk compared to European/Other. People in the

$80,001 to $100,000 personal income bracket had more than seven times the risk compared to people in the lowest income bracket ($20,000 or less). People whose highest qualification was at secondary school level had a *lower* risk (0.28 times) compared with people without formal qualifications.

Gambling-related factors significantly associated with staying as a low-risk gambler, moderate-risk gambler or problem gambler were pattern of gambling, frequency of gambling, monthly gambling expenditure, annual gambling on housie or bingo, monthly gambling on Lotto, annual or monthly EGM gambling, and time spent gambling on EGMs.

People who regularly gambled on continuous forms had more than three times the risk compared with people who were infrequent gamblers. This was also evident in the increased risk noted for people who gambled at least weekly (6.13 times) or monthly (3.36 times) and for people whose typical monthly gambling expenditure was $500 or more (6.85 times).

People who gambled annually on housie/bingo, or monthly on card games or Lotto had 4.55, 4.30 and 2.08 times the risk respectively, compared with people who did not gamble on those forms annually or monthly. Both annual and monthly gambling on EGMS was associated with four to five times the risk of staying as a low-risk/moderate-risk/problem gambler in Wave 2. For annual EGM gambling, only club EGMs reached a level of statistical significance with over five times the risk. However, increased risk was noted with monthly gambling on all EGM forms (pub: 3.82 times, casino: 4.36 times, club: 5.86 times). Additionally, people who gambled for longer periods on EGMs were also at greater risk. For casino EGM gambling, the increased risk was noted for people who played for longer than 60 minutes in an average day (3.42 times). A similarly increased risk was noted for people who played pub EGMs for 31 to 60 minutes (3.80 times) or longer than 60 minutes (4.76 times). People who played club EGMs for 31 to 60 minutes or longer than 60 minutes were associated with greater risk (32.74 and 7.69 times respectively) than people who did not gamble on club EGMs. *However, due to small sample size for club EGM gamblers, these results must be treated with caution.*

People who avoided places that have betting or gambling also had a greater risk (2.51 times) in comparison with people who did not use this strategy. This finding appears counterintuitive but as the association is measuring a broad range of problem gambling levels from low-risk to problem gambling, it does not reflect any change in gambling status across that range across the two Waves. For example, a problem gambler in Wave 1 could have used the strategy and reduced their risk level to moderate or low in Wave 2 but this change would not have been measured in this particular analysis of persistence of being a low-risk/ moderate-risk/problem gambler.

People who had sought help (from formal and informal sources) in the past year had more than seven times the risk compared with people who had not sought help, although due to small sample size, the results are not conclusive. This finding probably reflects the fact that gamblers at risk are those who are more likely to seek help (from formal and informal sources).

People whose quality of life was below the median level had more than twice the risk compared with people above the median. People who smoked tobacco at least once a week had 44.36 times the risk of staying as a low-risk gambler, moderate-risk gambler or problem gambler compared with people who never smoked. *Again, however, due to small sample size the results are not conclusive and should be treated with caution.*

Statistically significant associations are presented in Table 21; all associations (including non-statistically significant) are presented in Appendix 12.

Table 21: Bivariate associations for staying as a low-risk/moderate-risk/problem gambler in Wave 2

Variable	%	Odds Ratio	(95% CI)	p-value
Ethnic group (prioritised)				
Māori	68.3	2.90	(1.41 - 5.99)	
Pacific	46.8	1.19	(0.55 - 2.57)	
Asian	44.3	1.08	(0.32 - 3.61)	
European/Other	42.5	1.00		0.02
Highest qualification				
No formal qualification	65.8	1.00		
Secondary school qualification	35.0	0.28	(0.11 - 0.73)	
Vocational or Trade qualification	56.8	0.69	(0.28 - 1.70)	
University degree or higher	43.3	0.40	(0.15 - 1.02)	0.04
Personal income				
<$20,000	49.8	1.00		
$20,001 - $40,000	58.6	1.42	(0.60 - 3.38)	
$40,001 - $60,000	43.4	0.77	(0.30 - 1.98)	
$60,001 - $80,000	28.4	0.40	(0.12 - 1.29)	
$80,001 - $100,000	87.8	7.27	(1.71 - 30.98)	
>$100,000	26.6	0.37	(0.06 - 2.14)	
Not reported	43.2	0.77	(0.19 - 3.73)	0.02
Pattern of participation				
Infrequent gambler	36.8	1.00		
Regular non-continuous gambler	53.4	1.97	(0.90 - 4.32)	
Regular continuous gambler	65.9	3.32	(1.54 - 7.15)	0.01
Gambling frequency				
At least weekly	62.0	6.13	(2.34 - 16.09)	
At least monthly	47.2	3.36	(1.14 - 9.87)	
At least once in past year	21.0	1.00		0.001
Typical monthly gambling expenditure				
$1 - $10	31.2	1.00		
$11 - $20	21.9	0.62	(0.08 - 4.75)	
$21 - $30	21.0	0.58	(0.10 - 3.55)	
$31 - $50	28.8	0.89	(0.12 - 6.87)	
$51 - $100	47.1	1.96	(0.38 - 9.98)	
$101 - $500	58.5	3.10	(0.68 - 14.07)	
>$500	75.7	6.85	(1.19 - 39.47)	0.006
Housie or bingo - annual				
No	46.1	1.00		
Yes	79.6	4.55	(1.50 - 13.77)	0.01
Club EGM - annual				
No	42.6	1.00		
Yes	79.0	5.07	(2.00 - 12.83)	0.0006
Non-casino EGMs overall - annual				
No	41.7	1.00		
Yes	73.9	3.96	(1.83 - 8.58)	0.0005
Card games - monthly				
No	46.5	1.00		
Yes	78.9	4.30	(1.29 - 14.37)	0.02
Lotto - monthly				
No	39.3	1.00		
Yes	57.3	2.08	(1.08 - 3.99)	0.03
Casino EGMs (NZ) - monthly				
No	47.0	1.00		
Yes	79.4	4.36	(1.01 - 18.73)	0.05
Pub EGMs - monthly				
No	42.2	1.00		
Yes	73.6	3.82	(1.78 - 8.20)	0.0006

Variable	%	Odds Ratio	(95% CI)	p-value
Club EGMs - monthly				
No	45.6	1.00		
Yes	83.1	5.86	(1.52 - 22.52)	0.01
EGMs overall - monthly				
No	37.8	1.00		
Yes	76.4	5.32	(2.59 - 10.93)	<0.0001
Time spent playing EGMs in an average day (casino)				
No time	46.3	1.00		
Up to 15 minutes	29.9	0.50	(0.09 - 2.81)	
16 to 30 minutes	15.9	0.22	(0.04 - 1.15)	
31 to 60 minutes	62.0	1.89	(0.47 - 7.70)	
>60 minutes	74.7	3.42	(1.30 - 8.98)	0.02
Time spent playing EGMs in an average day (pub)				
No time	43.34	1.00		
Up to 15 minutes	18.2	0.29	(0.06 - 1.32)	
16 to 30 minutes	44.5	1.05	(0.31 - 3.57)	
31 to 60 minutes	74.4	3.80	(1.15 - 12.53)	
>60 minutes	78.5	4.76	(1.91 - 11.86)	0.001
Time spent playing EGMs in an average day (club)				
No time	42.9	1.00		
Up to 15 minutes	76.4	4.30	(0.45 - 41.41)	
16 to 30 minutes	56.6	1.74	(0.43 - 6.96)	
31 to 60 minutes	96.1	32.74	(3.88 - 276.24)	
>60 minutes	85.2	7.69	(1.66 - 35.55)	0.001
Methods - Avoiding places that have betting or gambling				
No	46.4	1.00		
Yes	68.5	2.51	(1.05 - 6.00)	0.04
Sought help (from formal and informal sources) in last year				
No	47.8	1.00		
Yes	87.1	7.37	(1.24 - 43.94)	0.03
Quality of life (WHOQoL-8)				
Below median (Score 0 - 24)	55.6	2.35	(1.15 - 4.82)	
Median score (Score 25)	61.2	2.96	(0.98 - 8.93)	
Above median (Score 26 - 32)	34.8	1.00		0.04
Current tobacco use				
Does not smoke now	58.0	1.99	(0.87 - 4.59)	
Smokes at least once a day	51.3	1.52	(0.72 - 3.24)	
Smokes at least once a week	96.8	44.36	(4.06 - 484.10)	
Smokes at least once a month	17.1	0.30	(0.02 - 5.07)	
Smokes less than once a month	24.0	0.46	(0.03 - 7.91)	
Never smoked	40.9	1.00		0.02

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)

Multiple logistic regression

The variables which remained associated with greater likelihood of staying as a low-risk/ moderate-risk/problem gambler in Wave 2 in the multiple logistic regression analyses were annual gambling on housie or bingo (4.54 times), and monthly gambling on card games (6.35 times) and EGMs (7.46 times). Additionally, gambling with at least one other person was associated with *less likelihood* than gambling alone (Table 22). This finding just failed to attain a level of statistical significance in the univariate analyses ($p = 0.06$) though the same trend was apparent (Appendix 12).

Table 22: Multiple logistic regression for staying as a low-risk/moderate-risk/problem gambler in Wave 2

Variable	%	Odds Ratio	(95% CI)	p-value
Housie or bingo - annual				
No	46.1	1.00		
Yes	79.6	4.54	(1.25 - 16.48)	0.02
Card games - monthly				
No	46.5	1.00		
Yes	78.9	6.35	(1.09 - 37.15)	0.04
EGMs overall - monthly				
No	37.8	1.00		
Yes	76.4	7.46	(3.51 - 15.83)	<0.0001
Who spent time with on most enjoyed activity				
Alone	61.3	1.00		
With one person	39.1	0.29	(0.11 - 0.74)	
With several people/a group	36.6	0.14	(0.05 - 0.39)	
Not reported	52.4	1.00	(0.34 - 2.01)	0.0006

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)

4.4.5. Re-initiation of gambling in Wave 2

In Wave 2, 99 participants (adjusted data) who in Wave 1 had not gambled in the past year but who had previously gambled at some time in the past, started gambling again. A further 131 participants stayed as past gamblers who did not gamble in the prior 12 months.

Bivariate associations

Bivariate associations examined by logistic regression indicated that socio-demographic variables, apart from individual level of deprivation, were not significantly associated with re-initiation of gambling in Wave 2. People who reported one or four deprivation characteristics were at greater risk of re-initiation of gambling in Wave 2 (2.43 and 7.86 times respectively) compared with people who did not report any deprivation characteristics.

Concurrent use of other substances (alcohol, other drugs and tobacco) was significantly associated with re-initiation of gambling in Wave 2. People who consumed alcohol at a hazardous level had more than twice the risk of re-initiating gambling than people who were not hazardous alcohol drinkers. People who did not use drugs had a lower risk (0.4 times) (meaning that people who used drugs had a higher risk). People who currently smoked tobacco daily had 3.74 times greater risk than non-smokers. Similarly, people who had ever smoked daily or who had ever smoked tobacco (i.e. in the past) were also at about twice the level of risk compared to people who had never smoked.

Statistically significant associations are presented in Table 23; all associations (including non-statistically significant) are presented in Appendix 13.

Table 23: Bivariate associations for re-initiation of gambling in Wave 2

Variable	%	Odds Ratio	(95% CI)	p-value
New Zealand Individual Deprivation Index				
0	35.5	1.00		
1	57.3	2.43	(1.07 - 5.55)	
2	52.0	1.97	(0.63 - 6.19)	
3	8.8	0.18	(0.02 - 1.52)	
4	81.2	7.86	(1.36 - 45.38)	
5+	64.8	3.35	(0.89 - 12.65)	0.02
Hazardous alcohol consumption (AUDIT-C)				
No	36.1	1.00		
Yes	56.6	2.31	(1.17 - 4.56)	0.02
Does not use drugs				
No	62.0	1.00		
Yes	39.3	0.40	(0.16 - 0.96)	0.04
Ever smoked tobacco				
Yes	47.5	2.09	(1.00 - 4.35)	
No	30.3	1.00		0.05
Ever smoked daily for a period of time				
Yes	52.9	1.98	(1.07 - 3.68)	
No	36.1	1.00		0.03
Current tobacco use				
Does not smoke now	41.9	1.23	(0.60 - 2.53)	
Smokes at least once a day	68.6	3.74	(1.48 - 9.45)	
Never smoked	36.9	1.00		0.02

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)

Multiple logistic regression

Multiple logistic regression analyses showed individual deprivation level was the only factor that remained statistically significant in predicting re-initiation of gambling in Wave 2. People who reported one or four deprivation characteristics remained at greater risk of re-initiation of gambling in Wave 2 (2.43 and 7.86 times respectively) compared with people who did not report any deprivation characteristics (Table 24).

Table 24: Multiple logistic regression for re-initiation of gambling in Wave 2

Variable	%	Odds Ratio	(95% CI)	p-value
New Zealand Individual Deprivation Index				
0	35.5	1.00		
1	57.3	2.43	(1.07 - 5.55)	
2	52.0	1.97	(0.63 - 6.19)	
3	8.8	0.18	(0.02 - 1.52)	
4	81.2	7.86	(1.36 - 45.38)	
5+	64.8	3.35	(0.89 - 12.65)	0.02

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)

4.4.6. Initiation of gambling in Wave 2

In Wave 2, 165 participants (adjusted data) who in Wave 1 had never gambled, started gambling. A further 354 participants (adjusted data) stayed as non-gamblers.

Bivariate associations

Bivariate associations examined by logistic regression indicated that ethnicity, date of arrival in New Zealand and religion were the socio-demographic variables significantly associated with initiation of gambling in Wave 2. Māori were at greater risk (2.61 times) of starting gambling than European/Other. Shorter-term migrants who had arrived in New Zealand after 2008 (i.e. within the past five years) had a *lower* risk of starting gambling (0.30 times) compared with New Zealand born people. Similarly, people of Presbyterian and Other Christian faith also had *lower* risk (0.32 and 0.44 times respectively) compared with people of no religion.

People with in the low-mid range of psychological distress (score 6-11) had a *lower* risk of starting gambling (0.40 times) compared with people who had the lowest level of psychological distress (score 0-5).

Concurrent use of other substances (alcohol and tobacco) was significantly associated with starting gambling in Wave 2. People who consumed alcohol at a hazardous level had 1.74 times the risk of starting gambling than people who were not hazardous alcohol drinkers. People who currently smoked tobacco daily and people who did not currently smoke (i.e. past smokers) were at greater risk than non-smokers (3.40 times and 2.21 times respectively). Similarly, people who had ever smoked daily, ever smoked more than 100 cigarettes in lifetime or who had ever smoked tobacco (i.e. in the past) were also at about twice the level of risk compared to people who had never smoked.

Statistically significant associations are presented in Table 25; all associations (including non-statistically significant) are presented in Appendix 14.

Table 25: Bivariate associations for initiation of gambling in Wave 2

Variable	%	Odds Ratio	(95% CI)	p-value
Ethnic group (prioritised)				
Māori	55.6	2.61	(1.20 - 5.68)	
Pacific	31.4	0.95	(0.52 - 1.74)	
Asian	22.5	0.60	(0.35 - 1.04)	
European/Other	32.5	1.00		0.01
Arrival in NZ				
NZ born	35.6	1.00		
before 2008	32.5	0.87	(0.55 - 1.38)	
since 2008	14.2	0.30	(0.13 - 0.71)	0.02
Religion				
No religion	40.7	1.00		
Anglican	42.3	1.07	(0.49 - 2.32)	
Catholic	48.4	1.37	(0.65 - 2.86)	
Presbyterian	36.1	0.32	(0.17 - 0.59)	
Other Christian	18.0	0.44	(0.22 - 0.88)	
Other Religion	23.1	0.82	(0.35 - 1.94)	0.0002
Psychological distress (Kessler-10)				
Score 0 - 5	33.9	1.00		
Score 6 - 11	17.0	0.40	(0.20 - 0.81)	
Score 12 - 19	52.1	2.12	(0.90 - 5.03)	
Score 20 - 40	37.8	1.19	(0.31 - 4.53)	0.01
Hazardous alcohol consumption (AUDIT-C)				
No	29.5	1.00		
Yes	42.2	1.74	(1.01 - 3.01)	0.05
Ever smoked tobacco				
Yes	39.8	1.99	(1.28 - 3.09)	
No	24.9	1.00		0.002
Ever smoked more than 100 cigarettes in lifetime				
Yes	45.6	2.45	(1.55 - 3.88)	
No	25.5	1.00		0.0001
Ever smoked daily for a period of time				
Yes	46.4	2.49	(1.56 - 3.97)	
No	25.8	1.00		0.0001
Current tobacco use				
Does not smoke now	43.1	2.21	(1.26 - 3.87)	
Smokes at least once a day	53.8	3.40	(1.77 - 6.52)	
Smokes at least once a week	3.7	0.11	(0.01 - 1.06)	
Never smoked	25.5	1.00		<0.0001

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)

Multiple logistic regression

Multiple logistic regression analyses showed that date of arrival in New Zealand, religion, psychological distress and current tobacco smoking remained significantly associated with initiation of gambling in Wave 2. Shorter-term migrants who had arrived in New Zealand after 2008 (i.e. within the past five years) remained at *lower* risk of starting gambling (0.30 times) compared with New Zealand born people. However, in regard to religion, only people of Other Christian faith continued to be at *lower* risk (0.37 times) compared with people of no religion.

People in the low-mid range of psychological distress (score 6-11) also remained at *lower* risk of starting gambling (0.36 times) compared with people who had the lowest level of psychological distress.

Daily current tobacco use remained significantly associated with starting gambling in Wave 2. People who currently smoked tobacco daily were at greater risk than non-smokers (2.83 times).

Data are presented in Table 26.

Table 26: Multiple logistic regression for initiation of gambling in Wave 2

Variable	%	Odds Ratio	(95% CI)	p-value
Arrival in NZ				
NZ born	35.6	1.00		
before 2008	32.5	0.98	(0.59 - 1.63)	
since 2008	14.2	0.30	(0.11 - 0.80)	0.05
Religion				
No religion	40.7	1.00		
Anglican	42.3	1.08	(0.47 - 2.49)	
Catholic	48.4	1.39	(0.60 - 3.22)	
Presbyterian	36.1	0.74	(0.31 - 1.77)	
Other Christian	18.0	0.37	(0.19 - 0.71)	
Other Religion	23.1	0.69	(0.31 - 1.54)	0.01
Psychological distress (Kessler-10)				
Score 0 - 5	33.9	1.00		
Score 6 - 11	17.0	0.36	(0.18 - 0.72)	
Score 12 - 19	52.1	1.82	(0.71 - 4.68)	
Score 20 - 40	37.8	0.70	(0.11 - 4.49)	0.01
Current tobacco use				
Does not smoke now	43.1	1.78	(0.98 - 3.22)	
Smokes at least once a day	53.8	2.83	(1.33 - 6.03)	
Smokes at least once a week	3.7	0.13	(0.01 - 1.25)	
Never smoked	25.5	1.00		0.004

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)

5. SUMMARY, DISCUSSION AND CONCLUSIONS

The main purpose of the present study is to assess, for the first time, the incidence of problem and at-risk gambling as well as to examine, prospectively, other transitions including problem remission. However, it also provides information that enables estimation of the national prevalence of gambling participation and problem gambling prevalence in 2013. This part of the study is cross-sectional. By comparing the results with those of the baseline survey, it is possible to identify changes at the population level from 2012 to 2013. Given that it is very unlikely that national gambling participation and problem gambling prevalence rates would change during a 12 month period, the present survey provides, in effect, a replication of the 2012 survey. This is important because there is a degree of uncertainty about the results of a single survey, especially estimates based on small numbers. Problem gambling estimates are based on very small numbers. The 2013 results assist in assessing the reliability of the 2012 survey findings. However, it should be noted that the 2013 survey does not include 18 year-olds as all participants are a year older than they were in 2012. Consequently, the estimates apply to a slightly different population. The sample size is also smaller, through attrition. Given that attrition was non-random, this could also affect the results. However, it is likely that sample weighting totally or largely corrected for this. Smaller sample size also means that confidence intervals will be larger than they were in 2012. As a result the estimates will generally be somewhat less precise.

Population-level change and stability from 2102 to 2013

As expected, there was no or minor change from 2012 to 2013 in gambling participation. Given the overlap in confidence levels it is most unlikely that there were significant changes in the prevalence of:

- Past year gambling
- Past year infrequent, regular non-continuous and regular continuous gambling
- Gambling frequency, expenditure and most preferred activity
- Person/s gambled with.

There was a slight reduction in the proportion of adults who took part in seven to nine gambling activities during the past 12 months as well as in the proportions who took part in some continuous activities including pub and casino EGMs, casino table games, sports betting and making bets with friends or workmates. Past month participation in most forms of gambling was the same or very similar in the two surveys. Past month EGM participation, when pub, club and casino EGM participation was combined, was slightly lower in 2013. While these findings suggest stability, for the most part, from 2012 to 2013, there are also indications that there was a slight reduction on some measures that are risk factors for problem and at-risk gambling. These findings also increase our confidence in the general adult population estimates derived from the 2012 survey.

The population prevalence estimates derived from the 2012 baseline survey initially used 2006 Census data (Abbott et al., 2014a, 2014b). In the present report, some baseline estimates were recalculated using the more recent 2013 Census. Very small reductions (0.1 %) were evident in the PGSI problem, moderate-risk and low-risk groups. However, the confidence intervals overlapped markedly. For the problem gambling estimate (0.7% using the 2006 Census; 0.6% using the 2013 Census) the confidence intervals remained the same (0.4% - 0.9%).

Prevalence estimates from the 2013 survey were also derived using the 2013 Census. From 2012 to 2013 there appeared to be a very small increase in the prevalence of non-gambling (0.9%) and in the prevalence of low-risk gambling (0.7%). There appeared to be small decreases in problem and moderate-risk gambling (0.1% and 0.2% respectively). However, due to the smaller sample size in 2013, confidence intervals increased meaning that the 2013 point estimates are less precise than their 2012 counterparts. As there was a substantial overlap in confidence intervals there is, therefore, no evidence that there was an actual difference in prevalence estimates from 2012 to 2013. In 2013, the prevalence estimates and accompanying confidence intervals were: problem gambling (0.5%; CI 0.3 - 0.7), moderate-risk gambling (1.5%; CI 1.1 - 1.9) and low-risk gambling (5.6%; CI 4.8 - 6.5). It will be of interest to compare these estimates with those derived from the 2014 and 2015 surveys. This information will provide a clearer indication of prevalence stability and trends over time.

Just less than a third of participants in both surveys reported that they thought they knew someone with a gambling problem. In both surveys, 0.3% of adults reported seeking help (from formal and informal sources) for a gambling problem. It is of interest that the help-seeking rate (from formal and informal sources) is 60% of the 2013 problem gambling prevalence rate. It is probable that the great majority of people who report seeking help are problem gamblers. This indicates a very high level of help-seeking (from formal and informal sources). Further investigation is required to assess this and obtain further information on the types of help sought and obtained.

Incidence and transitions from 2012 to 2013

The great majority of information gathered in the New Zealand and overseas participation and problem gambling prevalence surveys is cross-sectional. This means that the temporal direction of relationships (chicken or egg) is unknown or uncertain. While some of the New Zealand surveys asked participants about changes in their gambling participation over time (notably Abbott, 2001; Abbott & Volberg, 1992, 2000; Abbott et al., 2014a, 2014b), this information was obtained retrospectively, by asking people about things they did and experienced in the past. Sometimes these questions concerned quite distant events. Although providing some indication of change over time at an individual level, information gathered in this way is subject to recall bias and a variety of other distortions. Prospective studies are required to assess this type of change over time.

Earlier it was mentioned that the SOGS was adapted for the 1990 New Zealand national survey. The original SOGS was a lifetime measure, with questions asking if people had ever engaged in particular behaviours and experienced adverse gambling-related outcomes. This reflected the conceptualisation of pathological gambling as a chronic or chronically relapsing disorder. The SOGS-R retained the lifetime measure and added a current (past six months) frame. When this adapted measure was first used (Abbott & Volberg, 1991, 1996), it was found that the current probable pathological and problem gambling estimates were substantially lower than the lifetime estimates. In psychiatric epidemiology this difference is generally regarded as an indication of recovery over time. It can, however, reflect other things and 'lifetime' estimates are likely to be unreliable as they are based on recall and interpretation of distant events, especially for older people. As with gambling participation and other aspects of gambling, retrospective accounts are a poor proxy for studies that focus on the recent past and current experience, and are prospective. When subgroups of participants in the 1991 national survey were re-assessed seven years later (Abbott, Williams & Volberg, 1999, 2004), it was found that

a substantial number of 1991 lifetime probable pathological and problem gamblers were no longer in these categories in 1998. In other words, participants failed to report problem gambling symptoms that they had previously reported. This means that the 'lifetime' SOGS significantly under-detects past problems.

In the present study, the incidence of PGSI problem gambling was 0.28% (CI 0.10 - 0.45), an estimated 8,046 people. The moderate-risk incidence was 1.1% (CI 0.7 - 1.5), an estimated 31,158 people. These were people who were not moderate-risk or problem gamblers in 2012 but who became moderate-risk or problem gamblers in 2013. This provides an estimate of 'inflow', the proportion and number of adults who develop moderate to more severe gambling-related problems during a two year period. The combined problem and moderate-risk estimate of 1.4% is identical to the incidence rate obtained in Sweden (Statens Folkhälsoinstitut, 2012), the only other national study to date that has measured incidence. The recent Victorian survey also provided an incidence estimate for problem gambling (Billi et al., 2014a). This estimate was 0.36%, similar to that of the present study. Given that the 2013 problem gambling and moderate-risk gambling prevalence rates were 0.5% and 1.4% respectively, it is evident that over half of the problem gamblers in that year were new problem gamblers and that over three-quarters of moderate-risk gamblers were people who had moved into these categories during the past 12 months.

The lifetime SOGS was included in the NGS to enable comparison with lifetime prevalence estimates in the earlier 1991 and 2000 national surveys, and to provide an indication of what proportion of 'new' problem gamblers developed problems for the first time rather than relapsed. Lifetime measures were also included in the Swedish and Victorian studies for the latter purpose. In the present study, it was found that of those who developed problems between 2012 and 2013, slightly over half (51.6%) were new problem gamblers and slightly under a half (48.4%) were people who, while not problem gamblers during the 12 months prior to 2012, were assessed as previously having been a problem or probable pathological gambler. In Victoria, two-thirds of incident problem gamblers had a previous history of probable pathological or problem gambling. As mentioned in the introduction, the NODS Clip2 was used to assess lifetime problems in the Victorian study. It is not known to what extent the differences in the two studies are due to actual differences in the populations or to methodological differences. In any event, in both studies it is evident that substantial numbers of 'new' problem gamblers are people who are relapsing rather than developing problems for the first time.

In the present study, of those who became moderate-risk gamblers in 2013, nearly three-quarters (71.1%) were people who had not previously been probable pathological or problem gamblers and just over a quarter (28.9%) had been probable pathological or problem gamblers. Overall, three-quarters (74.3%) of 2013 'new' problem and moderate-risk gamblers were assessed as not previously having been a probable pathological or problem gambler and a quarter (24.5%) were assessed as previously having a problem. In Sweden, a fifth of incident problem and moderate-risk gamblers had previously been assessed as being a probable pathological or problem gambler. These findings suggest that while less prone to relapse than problem gamblers, a substantial minority of people with less severe problems relapse.

It has been mentioned that the original SOGS, in the 'lifetime' format, has been shown to significantly under-estimate past lifetime problems. This means that it is highly probable that the proportions of problem and moderate-risk gamblers who are relapsing are actually higher, possibly significantly so, than appears to be the case. This will be examined prospectively in

subsequent waves of the NGS. However, the time period will be limited to four years. Longer term prospective studies are required to more fully assess the life course of problem gambling in the community.

Of those who were problem gamblers in 2012, over a half (55.9%), an estimated 7,261 people, were no longer problem gamblers in 2013; 9.7% became moderate-risk gamblers and 46.2% became low-risk or non-problem gamblers in 2013. None became non-gamblers. A slightly higher proportion of moderate-risk gamblers (62.9%), an estimated 25,782 people, were no longer moderate-risk or problem gamblers in 2013. From the foregoing results and discussion, it appears that while problem and moderate-risk prevalence rates did not change, even during the relatively short 12 month period, there was substantial change at the individual level. Most people who were in the problem and moderate-risk groups in 2013 were not in these groups the previous year. A number of previous prospective studies, including the Swedish, Victorian and Canadian studies, found similar movement in and out of problem groups over relatively short time periods. However, it is also evident that many 'new' problem and moderate-risk gamblers are not actually new; they have been in these categories previously and are relapsing. As originally found in Abbott, Williams and Volberg (1999, 2004), people with more severe problems appear to be more prone to relapse. It is possible that the levelling out of problem gambling prevalence that has been found in some jurisdictions, including New Zealand, reflects a reduction in the overall incidence of people with first time problems and a recycling and accumulation of people with more serious problems who are prone to relapse. This will be able to be partially assessed in the next two NGS waves.

A number of other transitions additional to movement into and out of the problem and moderate-risk categories were considered in the study. Non-problem and non-gamblers were the most stable, with 82.5% and 64.7% respectively remaining in the same category. Problem gamblers, as discussed above, were the next most stable albeit that only 44.1% remained problem gamblers. Low-risk and moderate-risk gamblers were the least stable with only a quarter of each remaining in these categories. A significant majority of people in the latter groups moved into lower risk or non-problem groups rather than into higher-risk or problem groups. Similar results were obtained in the recent Swedish, Victorian and Canadian studies. Although referred to as moderate-risk, only one in ten people in this group became problem gamblers during the next 12 months. Although much lower proportions of non-gamblers, non-problem gamblers and low-risk gamblers became problem gamblers than was the case for moderate-risk gamblers, approximately a half of incident problem gamblers came from these groups. This is because these groups are much larger than the moderate-risk group. From the results mentioned above, it is evident that a number of these people will have experienced gambling problems in the past, prior to the study period. In regard to public policy, while prevention programmes could be directed to moderate-risk gamblers with a view to reducing progression to more serious problems, this would miss a substantial number of people who develop problems. Including a focus on people who experienced problems, with a view to preventing relapse, would substantially increase coverage. Further research is required to determine how frequently people progress rapidly from non-gambling and non-problem gambling to moderate-risk and problem gambling and what proportions have experienced gambling problems in the past.

The prediction of gambling, at-risk gambling and problem gambling

Predictors of a number of the transitions discussed in the preceding section were identified. The identification of factors predicting problem and moderate-risk gambling onset was of particular interest. The number of people from the non-problem and gambling risk groups who became problem gamblers during the 12 month study period was small and there was insufficient statistical power to consider them on their own. Consequently the problem and moderate-risk groups were combined in the analyses discussed here. There was also interest in identifying predictors of movement from the non-problem group into either of the two risk or problem gambling groups. Consequently these three groups were combined and compared with the non-problem gambling group that did not develop at-risk or problem gambling. A further interest was in identifying factors that predicted persistent rather than transitory at-risk and problem states.

Additional to identifying predictors of the onset and stability of at-risk and problem gambling, predictors of starting gambling during the study period were also examined. Two categories were considered: (a) people who had not gambled during the past 12 months and who also reported that they had not gambled prior to that, and (b) people who had not gambled during the past 12 months and who reported that they had gambled previously. This separation was made to see whether or not different factors predict taking up gambling for the first time and returning to gambling after a year or more of abstinence.

Predictors of at-risk and problem gambling

Gambling-related factors

As mentioned in the incidence and transitions section, being a past problem or at-risk gambler is a very strong predictor of being a current problem gambler. Over a half of people who were problem gamblers in 2013 had been problem or moderate-risk gamblers in 2012, and a further 14% had been low-risk. Additionally, just under a half of 'new' problem gamblers in 2013 (those who were problem gamblers in 2013 but not 2012) scored as lifetime probable pathological or problem gamblers, meaning that they had experienced problems prior to 2012 and relapsed subsequently. To a somewhat lesser extent, past at-risk and problem gambling also predicted future moderate-risk gambling.

Additional to past problem and at-risk gambling, a number of gambling participation measures were strong predictors of the transition to moderate-risk or problem gambling as well as the transition to low-risk, moderate-risk or problem gambling. The strongest predictors in this category included gambling intensity (number of different gambling activities participated in, typical monthly expenditure and time spent playing EGMs in a typical day), weekly or more frequent participation in continuous gambling forms generally and participation, particularly regular participation, in a variety of specific gambling activities including EGMs, casino table games, horse and dog race betting, and housie or bingo. Some other activities were weaker predictors, predominantly with regard to the transition to the low-risk/moderate-risk/problem gambling group. Activities included sports betting, Instant Kiwi, card games, bets with friends and workmates, raffles/lotteries, Lotto, keno, text games and short-term speculative investments. These results are broadly consistent with findings from previous New Zealand and international cross-sectional prevalence surveys, including the 2012 NGS (Abbott et al., 2014b) as well as from prospective studies summarised and discussed in the introduction. They indicate that past gambling problems, intensity of participation and regular involvement in

EGMs, casino table games and some other forms of continuous gambling, are all strongly associated with problem and at-risk gambling. The results of the present study further indicate that they precede and predict the onset of future risk and problem gambling in the adult New Zealand population.

Two additional gambling-related factors predicted future risk or problems. People who reported spending time with one other person or a group of people when participating in their most enjoyed gambling activity were much less likely to become a moderate-risk or problem gambler during the next 12 months. People who gambled alone were at much higher risk. Gambling alone was also very strongly associated with lifetime and current problem gambling in the 1999 New Zealand national survey (Abbott & Volberg, 2000). In that study, usually gambling with friends and workmates was associated with a low probability of being a problem gambler. It appears likely that gambling alone is an important risk factor for the development of hazardous and problem gambling and that gambling with others is protective. However, in contrast, the 2012 NGS cross-sectional analyses did not find that people who gambled alone had a higher prevalence of moderate-risk and problem gambling than those who gambled with others. It is unclear why the cross-sectional and prospective NGS results differ. Further investigation is warranted and future waves of the present study will provide some relevant information on this matter.

Knowing people with gambling problems was the other gambling-related risk factor, but only in the case of the transition into the larger low-risk, moderate-risk or problem gambling group. Many prior cross-sectional studies including the 1991, 1999 and 2012 New Zealand national surveys have found having family members and friends who are problem gamblers is associated with a higher probability of being a problem gambler. Williams et al. (2015), as in the present study, also found this was a predictor of future problem gambling. While not included in the present analyses other research, both cross-sectional and, more recently, prospective has identified other gambling-related predictors including experiencing a big win in the past year, having family or friends who are regular gamblers, gambling to escape or win money and having more gambling fallacies (Williams et al., 2015). Overall, in the present study as in Williams et al. (2015) and the recent Victorian and Swedish studies, gambling-related factors are very strongly implicated in the progression from non-problem gambling to hazardous and problematic gambling.

Participants were asked a variety of questions about their use of strategies that could reduce gambling participation and expenditure such as setting separate gambling budgets, avoiding gambling venues, leaving credit cards at home when gambling and seeking help from formal and informal sources. Greater use of strategies of this type predicted future at-risk and problem gambling. Seeking help (from formal and informal sources) for gambling also predicted movement from the non-problem-low risk to the moderate-risk/ problem gambling group. This relationship was particularly strong with almost a third of this group reporting that they sought help (from formal and informal sources) during the previous year. Less than two percent of those who did not make this transition reported seeking help (from formal and informal sources). This finding underlines the relatively high level of help-seeking, in this instance among those who subsequently develop or are in the process of developing gambling problems. Further waves of the present study should provide information that will help clarify the meaning of the relationships between gambling control strategies, help seeking and problem gambling development. It is unlikely that they contribute to the development of risky and problematic gambling and more likely that the association arises because people who are starting to lose

control over their gambling and experience adverse consequences make greater use of strategies to attempt to maintain or regain control.

Ethnicity and other socio-demographic factors

All national surveys conducted in New Zealand since 1991 have found substantial ethnic differences in problem gambling prevalence, with Māori and Pacific people typically having rates three or more times higher than those of European/Other (Abbott et al., 2014b). Māori and Pacific people are demographically younger, have lower levels of education, are over-represented in high deprivation neighbourhoods (which also have high EGM venue and TAB densities) and are more often unemployed. While these factors contribute to their higher prevalence of problem and moderate-risk gambling, ethnic differences remain when the effects of these and other factors are controlled in multivariate analyses. In the 2012 NGS, when demographic risk factors were considered together in this way, only Māori and Pacific ethnicity and male gender remained as independent risk factors for problem gambling. Membership of these groups also predicted combined problem and moderate-risk gambling. For the combined group, Asian ethnicity was also a risk factor. Additional independent risk factors included younger age, lack of formal education, unemployment and residence in the most deprived deprivation quintile. People of Other Christian and non-Christian religions also were at greater risk than those of some other religious groups.

In the present study, ethnicity was found to be strongly associated with the onset of problem and moderate-risk gambling. Māori, Pacific people and Asian people were significantly more likely than European/Other to become moderate-risk and problem gamblers. The results were similar for the transition from non-problem gambling to low-, moderate- or problem gambling. As with the 2012 prevalence findings, ethnic differences remained when they were considered alongside other factors in multiple regression analyses. Unlike the prevalence analyses that just included demographic variables, these analyses included a much wider range of measures including gambling involvement, recent life events, psychological distress and quality of life.

In contrast to the situation for moderate-risk and problem gambling prevalence, males and females had similar moderate-risk and problem gambling incidence rates and gender differences did not emerge in the multivariate analyses. Migrants were also at higher risk than New Zealand born, as were people living in middle income households relative to those in the lowest and highest income categories. The household income differences remained significant in multivariate analyses. Gender differences were also lacking with respect to movement from non-problem gambling to low-risk, moderate-risk or problem gambling. Migrant status and household income did not predict movement into this wider at-risk/problem grouping. However, Other Christians and people of Other Religion were at greater risk. People with university degrees or higher (relative to those with no formal qualifications) and Christchurch and Wellington residents (relative to Auckland residents) were at lower risk. In the multivariate analysis, of the foregoing univariate demographic predictors, only the ethnic differences remained.

While risk factors for moderate-risk and problem gambling incidence and prevalence are somewhat similar, there are some differences that may indicate future shifts in the composition of the current moderate-risk and problem gambling population. However, caution is required in reading too much into apparent differences given small sample size and fairly wide confidence intervals. In future there might be an increase in the proportion of females in this category. However, this would not necessarily be the case if males have more persistent problems. Similarly the proportion of migrants might increase. In the 2012 NGS prevalence

study, low personal income was associated with higher rates of moderate-risk and problem gambling. Household income was not a risk factor. For incidence, personal income was not a risk factor but middle household income, relative to low income, was a significant predictor. This suggests that there could be a future decrease in the proportion of moderate-risk and problem gamblers from the lowest income groups and an increase in the proportion from middle income households. However, it is also possible that the association between low household income and problem gambling prevalence was partly a consequence of being a problem gambler. Temporal relationships between changes in gambling patterns, income and other factors will be able to be more fully assessed when there are data from all four waves of the study.

Life events, mental health and substance use

Psychological distress was a further risk factor for both transition from non-problem and low-risk gambling to moderate-risk or problem gambling and the transition from non-problem to low-risk, moderate risk- or problem gambling. This association was retained in multivariate analyses when the overlapping predictive power of other univariate predictors was taken into account. Lower quality of life and experiencing more significant life events were additional univariate risk factors for the onset of low-, moderate- and problem gambling. Unlike psychological distress, they were not retained in the multivariate results.

Substance use was the final category of variables to predict increased gambling risk or problems. While not significant risk factors for the development of moderate-risk and problem gambling, current drug, cannabis and tobacco use were all significant predictors of movement into the low-risk, moderate-risk or problem gambling category. Of these factors, only cannabis use remained in the multivariate analysis.

Discussion

Generally, the strongest predictors of future at-risk and problem gambling were a past or recent history of at-risk or problem gambling and intense gambling involvement including regular participation in EGMs and some other continuous forms of gambling during the preceding 12 months. Thus both more distant (distal) and recent (proximal) gambling participation patterns increased the likelihood of developing at-risk and problem gambling. Recent exposure to major life events, higher levels of psychological distress and lower quality of life also contributed to varying degrees, as did current tobacco and other drug use. These findings are consistent with those of previous prospective studies.

Apart from the foregoing factors, the other strongest and most consistent predictor was ethnicity. The ethnic results are robust, applying to both of the transitions examined and being retained in the multivariate analyses. These findings indicate that Pacific people are approximately seven times more likely than European/Other to develop moderate-risk or problem gambling and that Māori and Asian people are three to four times more likely to do so. These differences are comparable to ethnic differences in past year prevalence rates (Abbott et al., 2014b). In other words, not only are members of these groups greatly over-represented among the current 'stock' of moderate-risk and problem gamblers, they continue to be similarly over-represented in the intake of new moderate-risk and problem gamblers. This suggests that current ethnic prevalence disparities will continue, at least during the next few years. If these high risk groups have more persistent problems than others, these disparities could increase.

It is of interest that substantial ethnic differences remained in the multivariate analyses when the effects of other predictors were statistically controlled. This implies that there are factors

associated with ethnicity, over and above the other risk factors included in the current analyses that put these groups at greater risk for the development of hazardous and problem gambling. Earlier, in relation to exposure and adaptation theory, it was noted that Pacific people and Asian people both have 'bimodal' gambling participation patterns, whereby large proportions do not gamble but those people who do gamble tend to participate intensively and are at much higher risk for problem development. In large part, this is considered likely to be a consequence of relatively large proportions being migrants from countries with low access to the forms of gambling that are most strongly associated with gambling-related harm in this country. Membership of Other Christian groups and Other Religions that disapprove of gambling probably also contribute to lower overall participation. In some univariate analyses, migrant status and membership of these religious groups directly predicted at-risk and problem gambling. Further research is required to increase understanding of the cultural and other factors associated with ethnicity that put these ethnic groups at high risk. Although future phases of the NGS will provide relevant information, more focused ethnic specific studies will be required to more fully understand vulnerability and protective factors in these groups.

Māori do not have bimodal gambling patterns. Further research is required to understand why Māori continue to have relatively higher rates of gambling-related harm than European/Other, after the effects of a wide range of other factors are taken into account in multivariate analyses. Some measures not included in the present study may be important, for example residential proximity to EGM and TAB venues, physical health status and past and recent history of abuse and family violence. However, relative to the factors considered in the present study, these and other known predictors of prevalence and incidence appear to have low predictive power (Williams et al., 2015).

The analyses predicting the onset of at-risk and problem gambling do not differentiate between those who developed hazardous and problematic gambling for the first time and those who relapsed following periods of non-problem and/or low-risk gambling. At the 12 month follow-up, this distinction would have to have been made using the SOGS-R lifetime scores as a proxy for previous gambling problems. As discussed earlier, this measure fails to detect a moderate proportion of people who actually had problems in the past. Additionally, when divided into new and relapsing groups, the sample sizes are small, limiting the range of potential risk factors that can be considered. By the completion of the study, there will be larger numbers of people who develop problems for the first time (while they are in the study), as well as people who cease having problems and who relapse. Consideration of these different groups will provide some relevant information.

Predictors of continued at-risk and problem gambling

As discussed earlier, problem gambling and at-risk gambling at baseline (2012) was a moderate to strong predictor of continued problems or at-risk status. Over 12 months, just under a half of problem gamblers remained problem gamblers and one in ten became a moderate-risk gambler with the remainder moving into the low-risk and non-problem groups. None became non-gamblers. Around a quarter of low-risk and moderate-risk gamblers remained in these categories. One in ten moderate-risk gamblers became problem gamblers, a quarter moved into the low-risk group and over a third moved into the non-problem or non-gambling groups. These findings indicate a fairly high level stability over 12 months for problem gambling and a lower level for at-risk gambling.

Older adults (55 years and older) and New Zealand born people were more likely than younger adults and migrants to remain moderate-risk and problem gamblers. However, the confidence intervals are very wide in the case of older adults and the finding should be treated with caution. No gender, ethnic or other demographic differences were found with respect to problem duration and cessation. Some gambling intensity and participation measures were significant in univariate analyses and one of these, namely at least weekly participation, remained significant in the multivariate analysis. As with older adults, the confidence interval was very wide. People who sought help (from formal and informal sources) for gambling and current smokers also appeared to be at greater risk but again the confidence intervals are wide and the results need to be treated with considerable caution. Apart from migrant status, the only other robust finding was that people who reported leaving ATM and credit cards at home when they were gambling were much less likely to remain moderate-risk or problem gamblers.

A much larger number of predictors was found for remaining low-risk, moderate-risk or problem gamblers. Age and migrant status were not significant. Māori, however, were approximately three times more likely than European/Other, Pacific people and Asian people to remain in the at-risk and problem gambling categories. People without a formal qualification were at higher risk relative to those in one or more other education groups, and people in one of the higher income groups were also at higher risk relative to those in the lowest income category. A large number of statistically significant associations with gambling participation measures was found. Monthly or more frequent EGM and card game participation and annual or more frequent housie or bingo participation were the only participation and intensity measures that were retained in the multivariate analysis. In this analysis, people who reported spending time with one or more other people while taking part in their favourite gambling activity, relative to those who gambled alone, had a much lower probability of remaining an at-risk or problem gambler. In contrast, in the univariate analyses seeking help for gambling (from formal and informal sources) and avoiding places that have betting or gambling predicted continued at-risk and problem gambling. This was also the case for lower quality of life and current (weekly or more) tobacco use.

The analyses in this section identified factors associated with continuity (and 'recovery') in the two at-risk or problem gambling groups from 2012 to 2013. Small sample size compromised examination of predictors of retention within, and movement from, the moderate-risk or problem gambling group. The finding that that older people appear to have more persistent problems, while potentially important, is uncertain and requires replication. The finding of higher problem and moderate-risk gambling remission among migrants relative to New Zealand-born adults also requires replication and further investigation. It was not evident in the analyses when low-risk gamblers were grouped with moderate-risk and problem gamblers. It is possible that migrants, especially recent migrants, differ from New Zealand-born adults in that proportionately more have recently developed gambling problems and that fewer are relapsing. It may also be the case that patterns of moderate-risk and problem gambling are more fluid early on than is the case after multiple relapses. Some previous research has shown that a past history of problem gambling is the major predictor of continued problem gambling including relapse (Abbott, Williams & Volberg, 1999, 2004; Williams et al., 2015). At the conclusion of the present study, substantially more people will have moved into and out of the moderate-risk and problem gambling states. This will provide a clearer indication of the extent of problem development, recovery, remission and relapse during the four years of the study and enable predictors and correlates of these transitions to be identified.

The findings regarding retention within the larger low-risk, moderate-risk or problem gambling group are more robust, although they too will benefit significantly from the addition of information from future study waves. It is evident that both moving into, and remaining in, the moderate and at-risk and problem gambling category is predicted by regular gambling participation in EGMs and some other continuous gambling forms. This is not unexpected. It is of some interest, however, that annual housie or bingo and monthly or more frequent card game participation was retained in the multivariate analysis. While showing some association with the onset of at-risk and problem gambling, they were not retained in multivariate analyses that included EGMs, casino games and gambling expenditure, and a variety of other gambling measures. These findings suggest that while probably contributing to problem development to some extent, participation in housie or bingo and playing cards may play a more important role in sustaining at-risk and problem gambling. This possibility requires further study. Spending time with others while taking part in most enjoyed gambling activities was protective both with respect to the onset and continuation of at-risk and problem gambling. Further research is required to understand this more fully and explore ways in which it might be employed to help both prevent and reduce hazardous and problem gambling. The finding that seeking help (from formal and informal sources) and avoid gambling places was associated with the continuation of at-risk and problem gambling does not necessarily mean that these approaches contribute to more persistent gambling-related problems and harm. The association may arise because people who are developing more severe at-risk and problematic gambling more frequently do these things. It may be possible following the final study wave to assess this and perhaps conduct a nested case control study comparing people of similar risk/problem severity who did and did not seek help.

Predictors of initiating and re-initiating gambling

Slightly less than a third of people who did not report taking part in any form of gambling during the 12 months prior to the baseline interview, and at any other time prior to that, commenced participating in one or more forms of gambling during the first 12 months of the study. Māori were more likely than other major ethnic groups to take up gambling and both recent migrants and Other Christians were less likely to do so. As discussed earlier, all three of these groups have been shown, to varying degrees, to be at risk for moderate-risk and problem gambling. Moderate to high psychological distress, hazardous alcohol consumption and past and current tobacco use were also significant predictors of taking up gambling. All of these factors have been found to be associated with problem gambling in previous studies, both problem onset and through facilitating problem continuity and relapse. The present findings suggest that they are also predictive of taking up gambling in the first instance.

Over 40% of people who had not gambled in the past year but who had gambled prior to that, started gambling again during the first year of the study. Ethnic or other demographic differences were not evident. The strongest predictor, and the only predictor remaining in the multivariate analysis, was deprivation. People who experienced one or four deprivations were significantly more likely to reinitiate gambling. In the univariate analyses, past and current tobacco use and current use of drugs and hazardous alcohol consumption were also associated with increased risk. It appears that deprivation and/or psychological distress, along with substance use/misuse all contribute in some way to both the initiation and re-initiation of gambling. Thus it would appear that they contribute to problem gambling both by way of playing a part in gambling initiation and persistence per se, and through their more direct contribution to problem gambling onset, continuity and relapse. In the present analyses, all

gambling forms were grouped together. It would be helpful if future research could differentiate between different types and intensities of gambling engagement and see whether or not they have the same or different antecedents.

Conclusions

The 12 month follow-up findings confirm the major gambling participation, at-risk and problem gambling prevalence estimates from the baseline survey. They increase our confidence in their accuracy. While there is generally high consistency in the results of the two surveys, there was some reduction in regular EGM participation and in the number of people who took part in large numbers of gambling activities. These slight changes are in keeping with longer term trends (Abbott et al., 2014a) and may indicate that there was a further reduction in these high-risk gambling patterns from 2012 to 2013.

This study has provided, for the first time, problem gambling and at-risk gambling incidence estimates for the New Zealand adult population. Apart from Sweden, no other country has this information at a national level. At the subnational level, Victoria (Australia) has state-wide incidence estimates. All three studies found that the incidence rate was approximately half the prevalence rate. This indicates that around a half of current problem gamblers have recently developed problems.

The New Zealand, Swedish and Victorian studies all found that both problem gambling recovery and relapse are common. In New Zealand, although the problem gambling prevalence rate did not change significantly from 2012 to 2013, as mentioned about a half of the problem gamblers in 2013 were not problem gamblers in 2012. The prevalence rate did not change because a comparable number of problem gamblers in 2012 ceased being problem gamblers in 2013. Inflow balanced outflow. A number of previous prospective studies have found moderate to high rates of transition into and out of problem gambling. While there is consistency over time in the number of problem gamblers, for the most part they are not the same people. Again, as found in previous studies mentioned in the introduction, the at-risk groups were less stable, with around three-quarters of low- and moderate-risk gamblers transitioning over a 12 month period.

The New Zealand, Swedish and Victorian studies all included lifetime measures of problem gambling as well as the PGSI, a current measure. In all studies, it was found that a large proportion of 'new' problem gamblers had actually been problem gamblers previously. Just over a half of the 'new' 2013 NGS problem gamblers had previously been problem gamblers and were relapsing. Over a quarter of the 'new' moderate-risk gamblers had previously been a problem or probable pathological gambler. In Victoria, the relapsing proportions were somewhat higher, in Sweden somewhat lower. Lifetime measures are highly conservative when re-administered with a long time-lag. This means that it is probable that the actual proportions of 'new' problem and moderate-risk gamblers who are relapsing are considerably larger than the study estimates. The proportions of relapses could be as high as three-quarters for problem gamblers and a third for moderate-risk gamblers. These findings are important. While they confirm that problem and at-risk gambling are often transitory over the short-term, they also show that relapse is common. Additionally, they indicate that relapse propensity increases with problem severity.

One of the implications of the high rates of movement into and out of problem gambling and at-risk gambling is that prevalence estimates provide a somewhat misleading picture of the magnitude of problem gambling and gambling-related harm more generally. While they give an indication of current problems, they fail to reflect the much larger proportion of people who have experienced problems and harm in the past and who will, in many instances, continue to go through phases of loss of control and relapse. Even in the case of people who recover and do not relapse, harm to themselves and others in their family and wider community can be long-lasting, sometimes extending into future generations. However, these findings contradict the conceptualisation of pathological gambling as inevitably a life-long condition. Most people who develop problems experience relatively short episodes and while many do not have a recurrence, some adverse consequences are of long duration and substantial numbers relapse on one or multiple occasions.

The present study identified factors that predicted continued problem and at-risk gambling but at this stage of the study the period was relatively short. Risk factors included heavy gambling involvement, gambling alone, Māori ethnicity, being New Zealand born, lack of formal qualifications, current tobacco use and low quality of life. People who sought help (from formal and informal sources) for gambling and who avoided gambling venues were also more likely to continue to be at-risk or problem gamblers whereas those who left ATM and credit cards at home when gambling were less likely. Predictors of relapse, other than prior history of problem gambling, were not considered. At the completion of the study there will be sufficient data to obtain a more adequate account of other factors that contribute to problem gambling recovery, chronicity and relapse. The number of people seeking help (from formal and informal sources) for gambling problems during the past year was around 80% of the number of current problem gamblers. Just under a third of new problem and moderate-risk gamblers said they had sought help (from formal and informal sources) during this period. This indicates a high level of help-seeking. In future phases of the study, help-seeking will be considered in more detail.

The study also contributes to our understanding of factors that predict first taking up gambling, re-initiating gambling and developing at-risk and problem gambling. A number of the risk factors are common both to initiating gambling and developing at-risk or problem gambling. Māori more often took up gambling than did people of other ethnicities. Recent migrants and other Christians were less likely to do so. All three of these groups are also at high risk for the development of at-risk and problem gambling. Psychological distress, tobacco and hazardous alcohol use also predict both taking up gambling and developing gambling problems. Deprivation, and tobacco and hazardous alcohol use also predicted re-initiating gambling. Apart from prior history of problem gambling, intensity of involvement in a number of continuous forms of gambling including EGMs are the strongest predictors of problem gambling development. Pacific and Asian ethnicity are also strong risk factors for problem development.

Given the high proportion of 'new' problem and moderate-risk gamblers that are relapsing rather than developing problems for the first time, it is important that public education and prevention programmes target both first time onset and problem recurrence. Treatment services could also give greater attention to relapse prevention. Of those who developed gambling problems, similar numbers came from the moderate-risk gambling group and the remaining low-risk, non-problem gambling and non-gambling groups. It is likely that both whole-of-population and at-risk group prevention strategies will be required to reduce the incidence and prevalence of problem gambling and other gambling-related harms. This could include greater attention to high risk ethnic and other social groups. High incidence as well as prevalence rates

in these groups, and apparently higher problem chronicity for Māori, suggest that long-standing disparities will remain or increase unless more effective ways are found to address them.

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APPENDICES

Appendix 1: List of categorical variables for sensitivity analyses

1. Socio-demographic variables
    - Age group
    - Gender
    - Ethnicity
    - Region (Auckland, Wellington, Christchurch, rest of New Zealand)
2. Problem gambling
    - PGSI risk category
3. Gambling participation
    - Number of activities
    - Frequency of gambling
    - Pattern of participation (regular continuous, regular non-continuous, infrequent gambling, non-gamblers)
4. Management of gambling/help seeking behaviour
    - Sought help (from formal and informal sources) in last 12 months
5. Others
    - Number of life events (None, 1, 2, 3 or more)
    - Quality of life (WHOQol-8)
    - Psychological distress (K-10).

Appendix 2: List of covariates for descriptive statistics and for inferential analyses

1. Socio-demographic variables
    - Age group
    - Gender
    - Ethnicity
    - Country of birth
    - Arrival in New Zealand
    - Educational level (highest qualification)
    - Employment/labour force status
    - Religion
    - Household size
    - Annual personal income
    - Annual household income
    - Region (Auckland, Wellington, Christchurch, rest of New Zealand)
    - NZ Individual Deprivation Index
2. Gambling participation
    - Number of activities
    - Frequency of gambling
    - Dollars spent gambling
    - Most preferred activity
    - Annual participation by gambling mode
    - Monthly participation by gambling mode
    - Length of time spent gambling on gaming machines in a casino
    - Length of time spent gambling on gaming machines in a pub/club
    - Who they are with when gambling
    - Know people who have a problem with gambling
3. Management of gambling/help-seeking behaviour
    - Methods used to stop gambling too much
    - Sought help (from formal and informal sources) in last 12 months
4. Other outcomes
    - Number of life events (None, 1, 2, 3 or more)
    - Quality of life (WHOQol-8)
    - Psychological distress (K-10)
    - Alcohol (AUDIT-C) and drug use
    - Self-reported tobacco use.

Appendix 3: Wave 2 attrition from Wave 1 (unweighted numbers)

Variable	Description	Lost to follow-up	Retained	% Retained	p-value[#]
Gender	Male	1039	1603	60.7	
	Female	1467	2142	59.4	0.29
Age group (years)	18 - 24	312	259	45.4	
	25 - 34	495	574	53.7	
	35 - 44	478	783	62.1	
	45 - 54	437	758	63.4	
	55 - 64	331	591	64.1	
	65+	447	779	63.5	<0.0001
	Not reported	6	1	14.3	
Ethnic group (prioritised)	Māori	508	656	56.4	
	Pacific	339	439	56.4	
	Asian	395	403	50.5	
	European/Other	1239	2209	64.1	<0.0001
	Not reported	25	38	60.3	
Region	Auckland	876	1225	58.3	
	Wellington	212	420	66.5	
	Christchurch	112	230	67.3	
	Rest of NZ	1306	1870	58.9	<0.0001
Problem Gambling Severity Index score (PGSI)	No gambling in last year	596	705	54.2	
	Non-problem	1675	2759	62.2	
	Low-risk	144	181	55.7	
	Moderate-risk	66	67	50.4	
	Problem gambler	25	33	56.9	<0.0001
Number of gambling activities participated in	0	596	705	54.2	
	1	564	789	58.3	
	2	514	828	61.7	
	3	352	602	63.1	
	4-6	380	689	64.5	
	7-9	88	116	56.9	
	10+	12	16	57.1	<0.0001
Gambling frequency	At least weekly	552	935	62.9	
	At least monthly	569	842	59.7	
	At least 6 monthly	594	1007	62.9	
	At least once in past year	192	249	56.5	
	No gambling in last year	596	705	54.2	<0.0001
	Not reported	3	7	70.0	
Pattern of participation	Not in last year	596	705	54.2	
	Infrequent gambler	1364	2118	60.8	
	Regular non-continuous	384	675	63.7	
	Regular continuous	162	247	60.4	<0.0001
Help sought in last year (from formal and informal sources)	Non-gambler	435	508	53.9	
	No	2059	3226	61.0	
	Yes	12	11	47.8	<0.0001

Variable	Description	Lost to follow-up	Retained	% Retained	p-value[#]
Number of significant life events	0	734	1040	58.6	
	1	638	982	60.6	
	2	434	705	61.9	
	3	257	449	63.6	
	4	182	274	60.1	
	5+	260	294	53.1	0.003
	Not reported	1	1	50.0	
Quality of life (WHOQoL-8)	Below median (0 - 24)	1200	1641	57.8	
	Median score (25)	239	377	61.2	
	Above median (26 - 32)	1063	1723	61.8	0.006
	Not reported	4	4	50.0	
Psychological distress score (Kessler-10)	0 - 5	1779	2712	60.4	
	6 - 11	459	736	61.6	
	12 - 19	193	221	53.4	
	20 - 40	67	75	52.8	0.007
	Not reported	8	1	11.1	
Total		*2506*	*3745*	*59.9*	

[#] p-values are chi-squares tests for association, excluding 'Not reported' and 'missing' categories

Appendix 4: Prevalence and 95% confidence intervals for socio-demographic variables in Wave 1 and for those repeated in Wave 2

	Wave 1			Wave 2		
Demographic variables	**n**	**%**	**(95% CI)**	**n**	**%**	**(95% CI)**
Gender						
Male	2990	47.8	(46.4 - 49.3)			
Female	3261	52.2	(50.7 - 53.6)			
Ethnic group (prioritised)						
European/Other	4562	72.98	(71.9 - 74.1)			
Māori	651	10.4	(9.8 - 11.1)			
Pacific	309	5.0	(4.6 - 5.4)			
Asian	638	10.2	(9.5 - 11.0)			
Not reported	90	1.4	(1.1 - 1.8)			
Age group						
18 - 24 years	729	11.7	(10.6 - 12.8)			
25 - 34 years	1041	16.7	(15.5 - 17.8)			
35 - 44 years	1138	18.2	(17.1 - 19.3)			
45 - 54 years	1199	19.2	(18.1 - 20.4)			
55 - 64 years	940	15.1	(14.0 - 16.1)			
65+ years	1196	19.1	(18.1 - 20.2)			
Missing	7	-	-			
Country of birth						
NZ	4431	70.9	(69.6 - 72.2)			
Elsewhere	1820	29.1	(27.8 - 30.4)			
Arrival in NZ						
2008 or later	313	17.2	(15.1 - 19.3)			
Before 2008	1506	82.8	(80.7 - 84.8)			
Missing	4225	-	-			
Highest qualification						
No formal qual.	955	15.3	(14.3 - 16.2)			
School qual.	1478	23.6	(22.4 - 24.9)			
Trade/voc. qual.	1394	22.3	(21.1 - 23.5)			
Degree/higher	2422	38.8	(37.3 - 40.2)			
Not reported	2	0.0	(0.0 - 0.1)			
Labour force status						
Employed	4004	64.1	(62.7 - 65.5)	3472	66.0	(64.2 - 67.8)
Unemployed	504	8.1	(7.3 - 8.8)	361	7.6	(6.6 - 8.7)
Student/Homemaker/Retired	1705	27.3	(26.0 - 28.6)	987	26.4	(24.7 - 28.0)
Other	36	0.6	(0.3 - 0.8)	-	-	-
Not reported	2	0.0	(0.0 - 0.1)	-	-	-
Religion						
No religion	2377	38.0	(36.6 - 39.5)			
Anglican	983	15.7	(14.6 - 16.8)			
Catholic	800	12.8	(11.9 - 13.8)			
Presbyterian	610	9.8	(8.9 - 10.6)			
Other Christian	980	15.7	(14.7 - 16.7)			
Other religion	489	7.8	(7.1 - 8.6)			
Not reported	9.6	0.2	(0.1 - 0.3)			

	Wave 1			Wave 2		
Demographic variables	**n**	**%**	**(95% CI)**	**n**	**%**	**(95% CI)**
Household size						
1	606	9.7	(9.1 - 10.3)	361	9.6	(8. 8 - 10.5)
2	2168	34.7	(33.3 - 36.1)	1310	35.0	(33.2 - 36.8)
3	1087	17.4	(16.3 - 18.5)	712	19.0	(17.5 - 20.6)
4	1286	20.6	(19.3 - 21.8)	699	18.7	(17.1 - 20.2)
5+	1097	17.6	(16.3 - 18.8)	664	17.7	(16.1 - 19.3)
Not reported	5	0.1	(0.0 - 0.2)			
Personal Income ($)						
Up to 20,000	1954	33.2	(31.8 - 34.7)	1112	30.8	(29.0 - 32.6)
20,001 - 40,000	1601	27.2	(25.9 - 28.6)	949	26.3	(24.6 - 28.0)
40,001 - 60,000	1032	17.5	(16.4 - 18.7)	719	19.9	(18.3 - 21.5)
60,001 - 80,000	620	10.5	(9.6 - 11.5)	378	10.5	(9.3 - 11.6)
80,001 - 100,000	293	5.0	(4.3 - 5.6)	196	5.4	94.6 - 6.3)
Over 100,000	383	6.5	(5.7 - 7.3)	255	7.1	(6.0 - 8.1)
Missing	379	-	-	137	-	-
Household Income ($)						
Up to 20,000	861	15.5	(14.5 - 16.4)	497	14.1	(13.0 - 15.2)
20,001 - 40,000	899	16.1	(15.0 - 17.2)	552	15.7	(14.2 - 17.1)
40,001 - 60,000	761	13.7	(12.6 - 14.7)	482	13.7	(12.3 - 15.0)
60,001 - 80,000	764	13.7	(12.6 - 14.8)	446	12.7	(11.3 - 14.0)
80,001 - 100,000	746	13.4	(12.3 - 14.5)	493	14.0	(12.6 - 15.4)
Missing	598	-	-	200	-	-
Area of residence						
Auckland	1874	30	(29.1 - 30.9)			
Wellington	664	11	(10.1 - 11.1)			
Christchurch	402	6	(5.8 - 7.0)			
Rest of New Zealand	3310	53	(52.0 - 54.0)			
NZ Individual Deprivation Index						
	3540	56.6	(55.2 - 58.1)	2275	60.8	(58.9 - 62.6)
1	1348	21.6	(20.3 - 22.8)	752	20.1	(18.5 - 21.7)
2	683	10.9	(10.0 - 11.9)	336	9.0	(7.9 - 10.1)
3	271	4.3	(3.8 - 4.9)	184	4.9	(4.1 - 5.8)
4	201	3.2	(2.7 - 3.7)	74	2.0	(1.5 - 2.4)
5	106	1.7	(1.4 - 2.0)	75	2.0	(1.3 - 2.7)
6	61	1.0	(0.7 - 1.2)	35	0.9	(0.6 - 1.2)
7	30	0.5	(0.3 - 0.6)	9	0.3	(0.1 - 0.4)
8	9	0.1	(0.1 - 0.2)	3	0.1	(0.0 - 0.2)
Missing	1	-	-	1	-	-

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)
Baseline N = 6,251; Wave 2 N = 3,745
Not all variables re-assessed in Wave 2

Appendix 5: Prevalence and 95% confidence intervals for past year and past month gambling in Wave 1 and Wave 2

	Wave 1			Wave 2		
Gambling activity	**n**	**%**	**(95% CI)**	**n**	**%**	**(95% CI)**
In past 12 months						
Card games	265	4.2	(3.6 - 4.9)	125	3.3	(2.6 - 4.1)
Bets with friends/workmates	914	14.6	(13.6 - 15.7)	458	12.2	(11.0 - 13.5)
Text game or competition	169	2.7	(2.2 - 3.2)	68	1.8	(1.2 - 2.4)
Raffle/lottery (NZ or overseas)	2929	46.9	(45.4 - 48.3)	1784	47.6	(45.7 - 49.5)
Lotto	3893	62.3	(60.8 - 63.7)	2237	59.7	(57.8 - 61.6)
Keno	178	2.8	(2.4 - 3.3)	95	2.5	(2.0 - 3.0)
Instant Kiwi/other scratch tickets	2026	32.4	(31.0 - 33.8)	1118	29.8	(28.1 - 31.6)
Housie or bingo	104	1.7	(1.3 - 2.0)	49	1.3	(1.0 - 1.7)
Horse/dog race betting	732	11.7	(10.7 - 12.7)	394	10.5	(9.3 - 11.7)
Sports betting	287	4.6	(3.9 - 5.3)	103	2.7	(2.1 - 3.4)
Casino table games or EGMS (overseas)	228	3.6	(3.1 - 4.2)	94	2.5	(1.9 - 3.1)
Casino table games or EGMS (NZ)	590	9.4	(8.5 - 10.4)	270	7.2	(6.1 - 8.3)
Casino table games (NZ)	232	3.7	(3.1 - 4.3)	113	3.0	(2.2 - 3.8)
Casino EGMs (NZ)	517	8.3	(7.4 - 9.1)	227	6.1	(5.1 - 7.0)
Pub EGMs	717	11.5	(10.5 - 12.5)	332	8.9	(7.7 - 10.0)
Club EGMs	349	5.6	(4.9 - 6.3)	154	4.1	(3.4 - 4.9)
EGMs overall	1100	17.6	(16.4 - 18.8)	528	14.1	(12.7 - 15.5)
Short-term speculative investments	59	0.9	(0.7 - 1.2)	55	1.5	(0.9 - 2.0)
Overseas internet gambling†	39	0.6	(0.4 - 0.9)	16	0.4	(0.2 - 0.6)
Overseas internet gambling overall‡	104	1.7	(1.2 - 2.1)	42	1.2	(0.8 - 1.7)
In past month						
Card games	82	1.3	(1.0 - 1.7)	36	1.0	(0.6 - 1.3)
Bets with friends/workmates	97	1.5	(1.2 - 1.9)	62	1.7	(1.1 - 2.2)
Text game or competition	39	0.6	(0.4 - 0.9)	14	0.4	(0.1 - 0.7)
Raffle/lottery (NZ or overseas)	684	10.9	(10.1 - 11.8)	4.4	10.8	(9.7 - 11.9)
Lotto	2200	35.2	(33.8 - 36.6)	1224	32.7	(30.9 - 34.4)
Keno	86	1.4	(1.1 - 1.7)	45	1.2	(0.8 - 1.6)
Instant Kiwi/other scratch tickets	750	12.0	(11.0 - 13.0)	4.2	10.7	(9.6 - 11.9)
Housie or bingo	34	0.5	(0.4 - 0.7)	17	0.5	(0.3 - 0.6)
Horse/dog race betting	176	2.8	(2.3 - 3.3)	88	2.3	(1.8 - 2.9)
Sports betting	83	1.3	(1.0 - 1.7)	35	0.9	(0.6 - 1.3)
Casino table games or EGMS (overseas)	5	0.1	(0.0 - 0.1)	1	0.0	(0.0 - 0.1)
Casino table games or EGMS (NZ)	59	0.9	(0.6 - 1.2)	26	0.7	(0.2 - 1.2)
Casino table games (NZ)	13	0.2	(0.0 - 0.4)	15	0.4	(0.0 - 0.9)
Casino EGMs (NZ)	55	0.9	(0.6 - 1.2)	16	0.4	(0.2 - 0.6)
Pub EGMs	213	3.4	(2.9 - 3.9)	91	2.4	(1.9 - 3.0)
Club EGMs	94	1.5	(1.2 - 1.9)	42	1.1	(0.7 - 1.5)
EGMs overall	309	4.9	(4.3 - 5.6)	127	3.4	(2.8 - 4.0)
Short-term speculative investments	19	0.3	(0.1 - 0.5)	14	0.4	(0.1 - 0.6)
Overseas internet gambling†	16	0.2	(0.1 - 0.4)	8	0.2	(0.0 - 0.4)
Overseas internet gambling overall‡	41	0.6	(0.4 - 0.9)	20	0.5	(0.2 - 0.8)

† Not included in other overseas categories
‡ Excludes overseas raffles/lotteries
Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)
Baseline N = 6,251; Wave 2 N = 3,745

Appendix 6: Prevalence and 95% confidence intervals for gambling behaviour in Wave 1 and Wave 2

	Wave 1			Wave 2		
Gambling participation-related variables	**n**	**%**	**(95% CI)**	**n**	**%**	**(95% CI)**
Number of gambling activities participated in						
0	1261	20.2	(19.0 - 21.4)	828	22.1	(20.5 - 23.7)
1	1376	22.0	(20.8 - 23.2)	805	21.5	(19.9 - 23.0)
2	1318	21.1	(19.9 - 22.7)	828	22.1	(20.5 - 23.7)
3	964	15.4	(14.4 - 16.5)	627	16.7	(15.3 - 18.2)
4 - 6	1097	17.6	(16.4 - 18.7)	580	15.5	(14.1 - 16.9)
7 - 9	206	3.3	(2.8 - 3.8)	73	2.0	(1.4 - 2.5)
10+	28	0.4	(0.2 - 0.7)	5	0.1	(0.0 - 0.3)
Pattern of participation						
No gambling in past year	1261	20.2	(19.0 - 21.4)	828	22.1	(20.5 - 23.7)
Infrequent gambler	3590	57.4	(56.0 - 58.9)	2141	57.1	(55.3 - 59.0)
Regular non-continuous gambler	1007	16.1	(15.1 - 17.1)	548	14.6	(13.4 - 15.9)
Regular continuous gambler	393	6.3	(5.6 - 7.0)	229	6.1	(5.2 - 7.0)
Gambling frequency						
No gambling in past year	1261	20.2	(19.0 - 21.4)	828	22.2	(20.6 - 23.8)
At least weekly	1425	22.8	(21.6 - 24.0)	787	21.1	(19.6 - 22.6)
At least monthly	1368	21.9	(20.7 - 23.1)	786	21.0	(19.5 - 22.6)
At least 6 monthly	1704	27.3	(26.0 - 28.6)	1067	28.6	(26.8 - 30.3)
At least once in past year	483	7.7	(6.9 - 8.6)	268	7.2	(6.2 - 8.2)
Missing	10	-	-	12	-	-
Typical monthly gambling expenditure						
No gambling in past year	1278	20.4	(19.3 - 21.6)	838	22.4	(20.8 - 24.0)
$1 - $10	1019	16.3	(15.2 - 17.4)	654	17.5	(16.0 - 18.9)
$11 - $20	1003	16.0	(15.0 - 17.1)	592	15.8	(14.4 - 17.2)
$21 - $30	625	10.0	(9.1 - 10.9)	364	9.7	(8.6 - 10.8)
$31 - $50	709	11.3	(10.4 - 12.3)	394	10.5	(9.4 - 11.7)
$51 - $100	798	12.8	(11.8 - 13.8)	473	12.6	(11.3 - 13.9)
$101 - $500	688	11.0	(10.1 - 11.9)	364	9.7	(8.5 - 10.9)
>$500	129	2.1	(1.7 - 2.5)	64	1.7	(1.2 - 2.2)
Not reported	2	0.0	(0.0 - 0.1)	2	0.1	(0.0 - 0.2)
Most preferred activity						
No gambling in past year	1261	20.2	(19.0 - 21.4)	828	22.1	(20.5 - 23.7)
Cards games	126	2.0	(1.6 - 2.5)	65	1.7	(1.1 - 2.4)
Bets with friends/workmates	288	4.6	(4.0 - 5.2)	147	3.9	(3.2 - 4.7)
Text game or competition	15	0.2	(0.1 - 0.4)	8	0.2	(0.0 - 0.4)
Raffle/lottery (NZ or overseas)	575	9.2	(8.4 - 10.1)	380	10.1	(9.0 - 11.2)
Lotto	1105	17.7	(16.6 - 18.7)	605	16.1	(14.8 - 17.5)
Keno	17	0.3	(0.1 - 0.4)	11	0.3	(0.1 - 0.5)
Bullseye	13	0.2	(0.1 - 0.3)	3	0.1	(0.0 - 0.2)
Instant Kiwi/or other scratch tickets	549	8.8	(7.9 - 9.6)	297	7.9	(6.9 - 9.0)
Housie or bingo	44	0.7	(0.5 - 0.9)	27	0.7	(0.5 - 1.0)
Horse/dog race betting	362	5.8	(5.1 - 6.5)	204	5.4	(4.6 - 6.3)
Sports betting	74	1.2	(0.8 - 1.6)	34	0.9	(0.5 - 1.3)
Casino table games or EGMS (NZ and overseas)	254	4.1	(3.4 - 4.7)	127	3.4	(2.6 - 4.2)
Non-casino EGMs	219	3.5	(2.9 - 4.1)	130	3.5	(2.7 - 4.2)

	Wave 1			Wave 2		
Gambling participation-related variables	**n**	**%**	**(95% CI)**	**n**	**%**	**(95% CI)**
Short-term speculative investments	25	0.4	(0.2 - 0.6)	24	0.6	(0.3 - 1.0)
Overseas internet gambling	4	0.1	(0.0 - 0.1)	4	0.1	(0.0 - 0.2)
Other activities	35	0.6	(0.3 - 0.8)	23	0.6	(0.4 - 0.9)
No preference	397	6.4	(5.6 - 7.1)	266	7.1	(6.2 - 8.0)
No/none	847	13.5	(12.6 - 14.5)	538	14.4	(13.0 - 15.7)
Refused/Don't know	40	0.6	(0.4 - 0.9)	24	0.7	(0.4 - 0.9)
Who gambled with						
Alone	1869	50.4	(48.5 - 52.4)	1070	51.2	(48.6 - 53.8)
With one person	865	23.3	(21.7 - 25.0)	434	20.8	(18.7 - 22.9)
With several people/a group	972	26.2	(24.5 - 28.0)	586	28.0	(25.6 - 30.4)
Missing	2580	-	-	1624	-	-
Know people with a gambling problem						
Yes	2014	32.2	(30.9 - 33.6)	1150	30.7	(29.0 - 32.5)

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)
Baseline N = 6,251; Wave 2 N = 3,745

Appendix 7: Prevalence and 95% confidence intervals for time spent playing EGMs in an average day in Wave 1 and Wave 2

	Wave 1			Wave 2		
Venue and time	**n**	**%**	**(95% CI)**	**n**	**%**	**(95% CI)**
NZ casino						
Up to 15 minutes	120	23.4	(18.4 - 28.4)	43	18.9	(12.2 - 25.6)
16 - 30 minutes	118	23.1	(18.1 - 28.0)	54	23.9	(16.5 - 31.3)
31 - 60 minutes	113	22.1	(17.7 - 26.4)	47	20.7	(14.8 - 26.5)
> 60 minutes	161	31.5	(26.7 - 36.2)	83	36.5	(29.2 - 43.8)
Pub						
Up to 15 minutes	253	35.5	(30.9 - 40.1)	119	35.8	(29.2 - 42.4)
16 - 30 minutes	209	29.3	(25.0 - 33.7)	97	29.2	(23.0 - 35.4)
31 - 60 minutes	148	20.7	(17.2 - 24.2)	75	22.6	(15.9 - 29.2)
> 60 minutes	103	14.4	(11.5 - 17.3)	41	12.4	(8.7 - 16.2)
Club						
Up to 15 minutes	88	25.5	(19.7 - 31.2)	59	38.1	(28.5 - 47.7)
16 - 30 minutes	125	36.3	(30.2 - 42.4)	42	27.4	(19.3 - 35.6)
31 - 60 minutes	89	25.7	(20.3 - 31.1)	34	22.2	(14.5 - 29.9)
> 60 minutes	43	12.5	(8.8 - 16.3)	19	12.3	(6.8 - 17.8)

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)

Appendix 8: Prevalence and 95% confidence intervals by health status in Wave 1 and Wave 2

	Wave 1			Wave 2		
Health issue	**n**	**%**	**(95% CI)**	**n**	**%**	**(95% CI)**
Number of significant life events						
0	1711	27.4	(26.1 - 28.6)	1081	28.9	(27.2 - 30.5)
1	1645	26.3	(25.0 - 27.6)	1125	30.0	(28.2 - 31.8)
2	1151	18.4	(17.3 - 19.6)	701	18.7	(17.2 - 20.2)
3	727	11.6	(10.7 - 12.6)	433	11.6	(10.3 - 12.8)
4	479	7.7	(6.8 - 8.5)	215	5.7	(4.8 - 6.6)
5+	536	8.6	(7.7 - 9.4)	190	5.1	(4.2 - 5.9)
Missing	2	-	-	-	-	-
Quality of life (WHOQoL-8)						
Below median (Score 0 - 24)	2635	42.2	(40.7 - 43.6)	1534	41.0	(39.1 - 42.9)
Median (Score 25)	648	10.4	(9.5 - 11.3)	369	9.9	(8.8 - 11.0)
Above median (Score 26 - 32)	2962	47.4	(46.0 - 48.9)	1840	49.2	(47.2 - 51.1)
Missing	8	-	-	3	-	-
Psychological distress (Kessler-10)						
Score 0 - 5	4597	73.6	(72.3 - 74.9)	2831	75.6	(73.9 - 77.2)
Score 6 - 11	1204	19.3	(18.1 - 20.5)	659	17.6	(16.1 - 19.1)
Score 12 - 19	339	5.4	(4.8 - 6.1)	207	5.5	(4.7 - 6.4)
Score 20 - 40	107	1.7	(1.4 - 2.6)	48	1.3	(0.9 - 1.7)
Missing	5	-	-	-	-	-
Hazardous alcohol consumption (AUDIT-C)						
No	3925	62.9	(61.4 - 64.3)	2437	65.1	(63.2 - 66.9)
Yes	2319	37.1	(35.7 - 38.6)	1309	34.9	(33.1 - 36.8)
Missing	10	-	-	-	-	-
Other drug use						
Yes	916	14.7	(13.5 - 15.8)	427	11.4	(10.0 - 12.8)
No	5334	85.3	(84.2 - 86.5)	3319	88.6	(87.2 - 90.0)
Cannabis	757	12.1	(11.1 - 13.2)	342	9.1	(7.8 - 10.4)
Tobacco use						
Ever smoked	4109	65.7	(64.4 - 67.1)	2449	65.4	(63.6 - 67.2)
Smoked more than 100 cigarettes in lifetime	2779	44.5	(43.0 - 45.9)	1670	44.6	(42.7 - 46.5)
Ever smoked daily	2594	41.5	(40.1 - 42.9)	2187	41.6	(39.7 - 43.5)
How often currently smoke tobacco						
Does not smoke now	1616	25.9	(24.6 - 27.1)	1023	27.3	(25.6 - 29.0)
At least once a day	985	15.8	(14.7 - 16.8)	543	14.5	(13.1 - 15.9)
At least once a week	88	1.4	(1.0 - 1.8)	56	1.5	(1.0 - 2.0)
At least once a month	32	0.5	(0.3 - 0.7)	13	0.4	(0.2 - 0.5)
Less than once a month	57	0.9	(0.6 - 1.2)	35	0.9	(0.6 - 1.3)
Never smoked	3470	55.5	(54.1 - 57.0)	2075	55.4	(53.5 - 57.3)
Missing	3	-	-	-	-	-

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)
Baseline N = 6,251; Wave 2 N = 3,745

Appendix 9: Bivariate associations for transition from non-problem/low-risk gambler in Wave 1 to moderate-risk/problem gambler in Wave 2

Variable	%	Odds Ratio	(95% CI)	p-value
Age group (years)				
18 - 24	0.6	1.00		
25 - 34	3.2	5.56	(1.30 - 23.80)	
35 - 44	1.6	2.76	(0.66 - 11.55)	
45 - 54	1.8	3.03	(0.68 - 13.42)	
55 - 64	1.4	2.41	(0.49 - 11.80)	
65+	1.5	2.51	(0.56 - 11.19)	0.27
Gender				
Male	2.1	1.50	(0.78 - 2.86)	
Female	1.4	1.00		0.22
Ethnic group (prioritised)				
Māori	3.8	3.73	(1.59 - 8.75)	
Pacific	7.0	7.09	(3.41 - 14.74)	
Asian	3.3	3.20	(1.13 - 9.04)	
European/Other	1.1	1.00		<0.0001
Arrival in NZ				
NZ born	1.4	1.00		
before 2008	2.9	2.06	(1.06 - 4.02)	
since 2008	1.4	1.01	(0.20 - 4.97)	0.10
Country of birth				
NZ	1.4	1.00		
Other	2.7	1.94	(1.01 - 3.74)	0.05
Religion				
No religion	1.00	1.00		
Anglican	1.9	2.00	(0.71 - 5.67)	
Catholic	2.8	2.94	(1.03 - 8.45)	
Presbyterian	1.6	1.68	(0.56 - 4.99)	
Other Christian	2.0	2.00	(0.78 - 5.13)	
Other religion	3.3	3.44	(1.11 - 10.62)	0.26
Highest qualification				
No formal qualification	1.4	1.00		
Secondary school qualification	2.0	1.38	(0.49 - 3.88)	
Vocational or Trade qualification	2.7	1.93	(0.76 - 4.88)	
University degree or higher	1.0	0.70	(0.26 - 1.85)	0.11
Labour force status				
Employed	1.9	1.00		
Unemployed	1.3	0.69	(0.32 - 1.52)	
Student/Homemaker/Retired	1.3	0.65	(0.27 - 1.60)	0.50
Household size				
1	1.2	1.00		
2	1.6	1.28	(0.43 - 3.78)	
3	2.1	1.71	(0.49 - 5.99)	
4	2.0	1.65	(0.53 - 5.16)	
5+	1.7	1.44	(0.46 - 4.50)	0.90
Personal income				
<$20,000	2.0	1.00		
$20,001 - $40,000	2.0	0.96	(0.42 - 2.23)	
$40,001 - $60,000	2.5	1.25	(0.51 - 3.02)	
$60,001 - $80,000	0.7	0.35	(0.08 - 1.51)	
$80,001 - $100,000	0.8	0.37	(0.08 - 1.80)	
>$100,000	0.6	0.30	(0.04 - 2.29)	
Not reported	0.9	0.42	(0.05 - 3.24)	0.42

Variable	%	Odds Ratio	(95% CI)	p-value
Household income				
<$20,000	1.3	1.00		
$20,001 - $40,000	1.8	1.41	(0.49 - 4.07)	
$40,001 - $60,000	3.4	2.70	(1.00 - 7.30)	
$60,001 - $80,000	4.0	3.27	(1.20 - 8.95)	
$80,001 - $100,000	1.2	0.92	(0.25 - 3.47)	
>$100,000	0.5	0.37	(0.10 - 1.35)	
Not reported	1.3	1.02	(0.25 - 4.15)	<0.0001
Area of residence				
Auckland	2.4	1.00		
Wellington	1.5	0.63	(0.18 - 2.23)	
Christchurch	0.8	0.32	(0.09 - 1.19)	
Rest of NZ	1.6	0.66	(0.32 - 1.35)	0.34
New Zealand Individual Deprivation Index				
0	1.3	1.00		
1	2.5	2.00	(0.84 - 4.75)	
2	2.6	2.04	(0.79 - 5.30)	
3	1.9	1.54	(0.39 - 6.05)	
4	1.9	1.48	(0.45 - 4.88)	
5+	2.3	1.82	(0.59 - 5.63)	0.54
Number of gambling activities participated in				
1	1.1	1.00		
2	1.4	1.26	(0.40 - 3.95)	
3	2.00	1.79	(0.60 - 5.33)	
4-6	1.7	1.49	(0.53 - 4.17)	
7-9	4.9	4.59	(1.34 - 15.67)	
10+	15.3	16.02	(1.67 - 153.66)	0.05
Pattern of participation				
Infrequent gambler	1.6	1.00		
Regular non-continuous gambler	1.4	0.91	(0.42 - 2.00)	
Regular continuous gambler	4.1	2.72	(1.22 - 6.11)	0.03
Gambling frequency				
At least weekly	2.2	2.38	(0.96 - 5.88)	
At least monthly	2.3	2.43	(0.92 - 6.44)	
At least once in past year	1.0	1.00		0.14
Typical monthly gambling expenditure				
$1 - $10	1.3	1.00		
$11 - $20	0.5	0.35	(0.09 - 1.31)	
$21 - $30	0.3	0.22	(0.05 - 1.07)	
$31 - $50	0.8	0.57	(0.15 - 2.17)	
$51 - $100	2.9	2.30	(0.71 - 7.46)	
$101 - $500	5.1	4.08	(1.26 - 13.15)	
>$500	2.4	1.84	(0.36 - 9.31)	<0.0001
Cards games - annual				
No	1.7	1.00		
Yes	1.7	0.96	(0.32 - 2.91)	0.94
Bets with friends/workmates - annual				
No	1.8	1.00		
Yes	1.5	0.83	(0.36 - 1.95)	0.67
Text game or competition - annual				
No	1.8	1.00		
Yes	1.0	0.55	(0.13 - 2.37)	0.42
Raffle/lottery (NZ/overseas) - annual				
No	2.1	1.00		
Yes	1.5	0.71	(0.36 - 1.39)	0.32
Lotto - annual				
No	2.3	1.00		
Yes	1.6	0.70	(0.28 - 1.71)	0.43
Keno overall - annual				
No	1.7	1.00		
Yes	2.7	1.61	(0.63 - 4.12)	0.32

Variable	%	Odds Ratio	(95% CI)	p-value
Instant Kiwi/other scratch tickets - annual				
No	1.6	1.00		
Yes	1.8	1.12	(0.57 - 2.17)	0.75
Housie or bingo - annual				
No	1.7	1.00		
Yes	3.7	2.22	(0.58 - 8.46)	0.24
Horse/dog race betting - annual				
No	1.7	1.00		
Yes	2.0	1.19	(0.34 - 4.21)	0.78
Sports betting - annual				
No	1.7	1.00		
Yes	1.9	1.10	(0.24 - 5.02)	0.90
Casino table games or EGMs (overseas) - annual				
No	1.5	1.00		
Yes	7.2	5.18	(1.75 - 15.34)	0.003
Casino table games or EGMs (NZ) - annual				
No	1.2	1.00		
Yes	6.3	5.74	(2.82 - 11.67)	<0.0001
Casino table games (NZ) - annual				
No	1.5	1.00		
Yes	6.2	4.31	(1.36 - 13.60)	0.01
Casino EGMs (NZ) - annual				
No	1.3	1.00		
Yes	5.5	4.41	(2.14 - 9.08)	<0.0001
Pub EGMs - annual				
No	1.4	1.00		
Yes	3.7	2.64	(1.28 - 5.42)	0.01
Club EGM - annual				
No	1.3	1.00		
Yes	7.7	6.39	(3.00 - 13.60)	<0.0001
EGMs overall - annual				
No	1.2	1.00		
Yes	3.5	2.85	(1.46 - 5.57)	0.002
Short-term speculative investments - annual				
No	1.8	-		
Yes	0.0	-		
Overseas internet gambling - annual				
No	1.7	1.00		
Yes	6.9	4.26	(0.83 - 22.02)	0.08
Card games - monthly				
No	1.7	1.00		
Yes	4.6	2.79	(0.73 - 10.63)	0.13
Bets with friends/workmates - monthly				
No	1.7	1.00		
Yes	3.2	1.88	(0.43 - 8.16)	0.40
Text game or competition - monthly				
No	1.7	1.00		
Yes	4.4	2.66	(0.56 - 12.66)	0.22
Raffle/lottery (NZ/overseas) - monthly				
No	1.7	1.00		
Yes	2.1	1.30	(0.59 - 2.83)	0.51
Lotto - monthly				
No	1.4	1.00		
Yes	2.1	1.48	(0.75 - 2.92)	0.26
Keno - monthly				
No	1.7	1.00		
Yes	2.2	1.28	(0.37 - 4.43)	0.70
Instant Kiwi/other scratch tickets - monthly				
No	1.5	1.00		
Yes	3.0	2.08	(1.01 - 4.31)	0.05

Variable	%	Odds Ratio	(95% CI)	p-value
Housie or bingo - monthly				
No	1.7	-		
Yes	0.0	-		
Horse/dog race betting - monthly				
No	1.8	-		
Yes	0.0	-		
Sports betting - monthly				
No	1.7	1.00		
Yes	2.0	1.18	(0.16 - 8.99)	0.87
Casino table games or EGMs (overseas) - monthly				
No	1.7	-		
Yes	0.0	-		
Casino table games or EGMs (NZ) - monthly				
No	1.7	1.00		
Yes	4.9	2.99	(0.64 - 14.03)	0.16
Casino table games (NZ) - monthly				
No	1.7	-		
Yes	0.0	-		
Casino EGMs (NZ) - monthly				
No	1.6	1.00		
Yes	15.9	11.47	(2.41 - 54.50)	0.002
Pub EGMs - monthly				
No	1.5	1.00		
Yes	8.5	6.10	(2.46 - 15.16)	<0.0001
Club EGMs - monthly				
No	1.4	1.00		
Yes	17.1	14.13	(5.13 - 38.88)	<0.0001
EGMs overall - monthly				
No	1.3	1.00		
Yes	9.8	8.15	(3.79 - 17.50)	<0.0001
Short-term speculative investments - monthly				
No	1.7	-		
Yes	0.0	-		
Overseas internet gambling - monthly				
No	1.7	1.00		
Yes	10.8	6.95	(0.75 - 64.48)	0.09
Time spent playing EGMs in an average day (casino)				
No time	1.3	1.00		
Up to 15 minutes	2.2	1.66	(0.22 - 12.65)	
16 to 30 minutes	5.1	4.03	(1.02 - 15.94)	
31 to 60 minutes	7.8	6.33	(1.90 - 21.03)	
>60 minutes	7.4	6.00	(2.23 - 16.10)	0.0003
Time spent playing EGMs in an average day (pub)				
No time	1.4	1.00		
Up to 15 minutes	1.0	0.70	(0.09 - 5.27)	
16 to 30 minutes	1.6	1.15	(0.28 - 4.70)	
31 to 60 minutes	11.3	8.89	(3.39 - 23.31)	
>60 minutes	5.9	4.39	(1.34 - 14.41)	<0.0001
Time spent playing EGMs in an average day (club)				
No time	1.3	1.00		
Up to 15 minutes	2.8	2.25	(0.29 - 17.13)	
16 to 30 minutes	10.2	8.75	(3.10 - 24.73)	
31 to 60 minutes	10.3	8.77	(2.80 - 27.46)	
>60 minutes	3.7	2.91	(0.37 - 23.08)	<0.0001
Who spent time with on most enjoyed activity				
Alone	3.1	1.00		
With one person	0.9	0.27	(0.09 - 0.85)	
With several people/a group	1.00	0.31	(0.13 - 0.73)	
Not reported	0.7	0.22	(0.07 - 0.73)	0.003

Variable	%	Odds Ratio	(95% CI)	p-value
Know people with gambling problems				
No	1.5	1.00		
Yes	2.2	1.53	(0.79 - 2.99)	0.21
Methods - Setting a dollar figure before leaving home				
No	1.2	1.00		
Yes	3.6	3.02	(1.54 - 5.94)	0.001
Methods - Getting someone you trust to manage the money				
No	1.7	1.00		
Yes	9.6	6.20	(0.79 - 48.91)	0.08
Methods - Separating money for betting from other money and stopping				
No	1.7	1.00		
Yes	3.0	1.80	(0.52 - 6.18)	0.35
Methods - Leaving ATM and credit cards at home				
No	1.7	1.00		
Yes	3.8	2.25	(0.51 - 10.00)	0.29
Methods - Setting a time limit				
No	1.7	1.00		
Yes	2.6	1.53	(0.41 - 5.76)	0.53
Methods - Avoiding places that have betting or gambling				
No	1.6	1.00		
Yes	7.8	5.21	(1.76 - 15.47)	0.003
Sought help (from formal and informal sources) in last year				
No	1.7	1.00		
Yes	31.1	25.95	(1.59 - 423.46)	0.02
Number of significant life events				
0	0.7	1.00		
1	1.8	2.66	(0.98 - 7.23)	
2	2.1	2.99	(1.01 - 8.87)	
3	2.1	3.11	(0.89 - 10.87)	
4	3.3	4.90	(1.23 - 19.54)	
5+	1.7	2.41	(0.62 - 9.45)	0.26
Quality of life (WHOQoL-8)				
Below median (Score 0 - 24)	2.4	1.66	(0.83 - 3.36)	
Median score (Score 25)	0.6	0.44	(0.08 - 2.27)	
Above median (Score 26 - 32)	1.4	1.00		0.13
Psychological distress (Kessler-10)				
Score 0 - 5	1.3	1.00		
Score 6 - 11	2.5	1.97	(0.82 - 4.75)	
Score 12 - 19	6.2	5.10	(2.02 - 12.87)	
Score 20 - 40	2.5	1.99	(0.53 - 7.51)	0.005
Hazardous alcohol consumption (AUDIT-C)				
No	2.0	1.00		
Yes	1.3	0.67	(0.33 - 1.36)	0.27
Does not use drugs				
No	3.3	1.00		
Yes	1.5	0.45	(0.18 - 1.08)	0.07
Cannabis				
No	1.6	1.00		
Yes	3.0	1.93	(0.72 - 5.21)	0.19
Ever smoked tobacco				
Yes	1.9	1.31	(0.66 - 2.56)	
No	1.4	1.00		0.44
Ever smoked more than 100 cigarettes in lifetime				
Yes	2.1	1.53	(0.80 - 2.95)	
No	1.4	1.00		0.20
Ever smoked daily for a period of time				
Yes	2.1	1.52	(0.79 - 2.93)	
No	1.4	1.00		0.21

Variable	%	Odds Ratio	(95% CI)	p-value
Current tobacco use				
Does not smoke now	2.4	1.76	(0.84 - 2.83)	
Current smoker	1.6	1.17	(0.84 - 3.68)	
Never smoked	1.4	1.00		0.32

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)

Appendix 10: Bivariate associations for staying as moderate-risk/problem gambler in Wave 2

Variable	%	Odds Ratio	(95% CI)	p-value
Age group (years)				
18 - 24	31.2	1.00		
25 - 34	39.0	1.41	(0.25 - 8.10)	
35 - 44	40.7	1.52	(0.26 - 8.79)	
45 - 54	34.6	1.17	(0.20 - 6.83)	
55+	77.3	7.54	(0.74 - 77.13)	<0.0001
Gender				
Male	41.9	0.87	(0.33 - 2.32)	
Female	45.3	1.00		0.78
Ethnic group (prioritised)				
Māori	62.4	3.05	(0.93 - 9.93)	
Pacific	39.9	1.22	(0.29 - 5.07)	
Asian	19.4	0.44	(0.03 - 5.98)	
European/Other	35.3	1.00		0.15
Arrival in NZ				
NZ born	50.4	-		
before 2008	26.0	-		
since 2008	0.0	-		
Country of birth				
NZ	50.4	1.00		
Other	19.6	0.24	(0.07 - 0.85)	0.03
Religion				
No religion	33.1	1.00		
Anglican	20.9	0.53	(0.04 - 7.55)	
Catholic	43.1	1.53	(0.32 - 7.26)	
Presbyterian	83.7	10.38	(1.32 - 81.95)	
Other Christian	54.7	2.44	(0.67 - 8.83)	
Other religion	35.3	1.10	(0.18 - 6.66)	0.26
Highest qualification				
No formal qualification	43.2	1.00		
Secondary school qualification	28.8	0.53	(0.14 - 2.02)	
Vocational or Trade qualification	70.8	3.19	(0.67 - 15.25)	
University degree or higher	35.9	0.74	(0.17 - 3.13)	0.11
Labour force status				
Employed	36.1	1.00		
Unemployed	53.9	2.07	(0.56 - 7.69)	
Student/Homemaker/Retired	49.4	1.73	(0.41 - 7.29)	0.50
Household size				
1	63.2	1.00		
2	66.3	1.14	(0.25 - 5.29)	
3	32.1	0.28	(0.05 - 1.70)	
4	31.9	0.27	(0.05 - 1.53)	
5+	36.3	0.33	(0.07 - 1.54)	0.29
Personal income				
<$20,000	67.2	1.00		
$20,001 - $40,000	33.1	0.24	(0.06 - 0.99)	
$40,001 - $60,000	20.4	0.13	(0.02 - 0.64)	
$60,001 - $80,000	27.5	0.18	(0.03 - 1.21)	
$80,001 - $100,000	75.5	1.50	(0.15 - 14.7)	
Not reported	75.2	1.50	(0.15 - 14.86)	0.07

Variable	%	Odds Ratio	(95% CI)	p-value
Household income				
<$20,000	61.2	1.00		
$20,001 - $40,000	61.4	1.01	(0.17 - 5.86)	
$40,001 - $60,000	29.4	0.26	(0.06 - 1.10)	
$60,001 - $80,000	22.0	0.18	(0.03 - 1.11)	
$80,001 - $100,000	56.9	0.84	(0.16 - 4.50)	
>$100,000	50.5	0.65	(0.14 - 3.08)	
Not reported	45.4	0.53	(0.07 - 3.76)	0.38
Area of residence				
Auckland	38.5	1.00		
Wellington	29.5	0.67	(0.10 - 4.48)	
Christchurch	25.2	0.54	(0.05 - 5.60)	
Rest of NZ	56.0	2.04	(0.62 - 6.66)	0.41
New Zealand Individual Deprivation Index				
0	52.2	1.00		
1	21.9	0.26	(0.06 - 1.12)	
2	48.0	0.85	(0.18 - 3.93)	
3	49.0	0.88	(0.13 - 6.07)	
4	32.0	0.43	(0.06 - 3.12)	
5+	69.4	2.08	(0.27 - 16.25)	0.28
Number of gambling activities participated in				
1	12.0	1.00		
2	36.8	4.25	(0.21 - 84.86)	
3	19.1	1.72	(0.10 - 29.57)	
4-6	56.2	9.38	(0.64 - 137.71)	
7-9	39.7	4.80	(0.32 - 72.81)	
10+	53.0	8.25	(0.38 - 181.10)	0.30
Pattern of participation				
Infrequent gambler	23.4	1.00		
Regular non-continuous gambler	45.5	2.73	(0.71 - 10.52)	
Regular continuous gambler	63.2	5.61	(1.40 - 22.45)	0.05
Gambling frequency				
At least weekly	58.6	4.53	(0.57 - 36.25)	
At least monthly	16.4	0.63	(0.07 - 5.76)	
At least once in past year	23.8	1.00		0.01
Typical monthly gambling expenditure				
$1 - $10	0.0	-		
$11 - $20	19.1	-		
$21 - $30	46.9	-		
$31 - $50	0.0	-		
$51 - $100	22.3	-		
$101 - $500	41.7	-		
>$500	79.1	-		
Cards games - annual				
No	46.8	1.00		
Yes	33.1	0.56	(0.19 - 1.68)	0.30
Bets with friends/workmates - annual				
No	35.3	1.00		
Yes	59.3	2.68	(0.95 - 7.53)	0.06
Text game or competition - annual				
No	44.1	1.00		
Yes	36.6	0.73	(0.13 - 4.07)	0.72
Raffle/lottery (NZ/overseas) - annual				
No	47.3	1.00		
Yes	41.2	0.78	(0.26 - 2.36)	0.66
Lotto - annual				
No	50.5	1.00		
Yes	41.8	0.70	(0.16 - 3.20)	0.65
Keno overall - annual				
No	42.4	1.00		
Yes	50.3	1.37	(0.38 - 4.98)	0.63

Variable	%	Odds Ratio	(95% CI)	p-value
Instant Kiwi/other scratch tickets - annual				
No	42.3	1.00		
Yes	44.1	1.08	(0.36 - 3.20)	0.89
Housie or bingo - annual				
No	41.3	1.00		
Yes	59.3	2.07	(0.41 - 10.45)	0.38
Horse/dog race betting - annual				
No	41.5	1.00		
Yes	52.6	1.56	(0.44 - 5.57)	0.49
Sports betting - annual				
No	38.4	1.00		
Yes	62.8	2.70	(0.75 - 9.72)	0.13
Casino table games or EGMs (overseas) - annual				
No	43.9	1.00		
Yes	40.2	0.86	(0.20 - 3.73)	0.84
Casino table games or EGMs (NZ) - annual				
No	42.0	1.00		
Yes	45.8	1.17	(0.39 - 3.48)	0.78
Casino table games (NZ) - annual				
No	45.5	1.00		
Yes	21.4	0.33	(0.04 - 2.38)	0.27
Casino EGMs (NZ) - annual				
No	42.3	1.00		
Yes	45.3	1.13	(0.38 - 3.38)	0.83
Pub EGMs - annual				
No	46.4	1.00		
Yes	41.5	0.82	(0.30 - 2.25)	0.70
Club EGM - annual				
No	40.8	1.00		
Yes	51.7	1.55	(0.50 - 4.84)	0.45
EGMs overall - annual				
No	33.7	1.00		
Yes	46.7	1.72	(0.53 - 5.54)	0.36
Short-term speculative investments - annual				
No	43.5	-		
Yes	0.0	-		
Overseas internet gambling - annual				
No	43.7	1.00		
Yes	40.0	0.86	(0.14 - 5.13)	0.87
Card games - monthly				
No	45.1	1.00		
Yes	33.9	0.63	(0.15 - 2.58)	0.52
Bets with friends/workmates - monthly				
No	40.7	1.00		
Yes	71.7	3.69	(0.40 - 34.40)	0.25
Text game or competition - monthly				
No	43.2	1.00		
Yes	54.6	1.58	(0.24 - 10.54)	0.64
Raffle/lottery (NZ/overseas) - monthly				
No	42.0	1.00		
Yes	50.4	1.41	(0.40 - 4.98)	0.60
Lotto - monthly				
No	44.2	1.00		
Yes	42.6	0.94	(0.33 - 2.64)	0.90
Keno - monthly				
No	41.9	1.00		
Yes	73.2	3.80	(0.66 - 21.69)	0.13
Instant Kiwi/other scratch tickets - monthly				
No	42.8	1.00		
Yes	45.0	1.09	(0.38 - 3.12)	0.87

Variable	%	Odds Ratio	(95% CI)	p-value
Housie or bingo - monthly				
No	42.0	1.00		
Yes	85.8	8.33	(0.57 - 122.23)	0.12
Horse/dog race betting - monthly				
No	41.2	1.00		
Yes	61.3	2.27	(0.44 - 11.76)	0.33
Sports betting - monthly				
No	41.6	1.00		
Yes	63.7	2.46	(0.39 - 15.37)	0.34
Casino table games or EGMs (overseas) - monthly				
No	43.4	-		
Yes	0.0	-		
Casino table games or EGMs (NZ) - monthly				
No	41.4	1.00		
Yes	72.6	3.76	(0.60 - 23.62)	0.16
Casino table games (NZ) - monthly				
No	43.5	-		
Yes	0.0	-		
Casino EGMs (NZ) - monthly				
No	41.4	1.00		
Yes	72.6	3.76	(0.60 - 23.62)	0.16
Pub EGMs - monthly				
No	39.4	1.00		
Yes	48.6	1.46	(0.51 - 4.15)	0.48
Club EGMs - monthly				
No	40.0	1.00		
Yes	76.4	4.88	(0.89 - 26.68)	0.07
EGMs overall - monthly				
No	33.2	1.00		
Yes	53.2	2.28	(0.84 - 6.23)	0.11
Short-term speculative investments - monthly				
No	43.5	-		
Yes	0.0	-		
Overseas internet gambling - monthly				
No	43.4	1.00		
Yes	43.1	0.99	(0.11 - 8.81)	0.99
Time spent playing EGMs in an average day (casino)				
No time	42.3	1.00		
Up to 15 minutes	32.4	0.66	(0.05 - 8.94)	
16 to 30 minutes	-	-	- -	
31 to 60 minutes	65.9	2.64	(0.36 - 19.52)	
>60 minutes	44.7	1.11	(0.34 - 3.76)	0.78
Time spent playing EGMs in an average day (pub)				
No time	46.4	1.00		
Up to 15 minutes	24.3	0.37	(0.06 - 2.30)	
16 to 30 minutes	38.7	0.73	(0.13 - 4.24)	
31 to 60 minutes	44.8	0.94	(0.17 - 5.07)	
>60 minutes	46.0	0.99	(0.30 - 3.23)	0.88
Time spent playing EGMs in an average day (club)				
No time	40.8	1.00		
Up to 15 minutes	24.8	0.48	(0.08 - 2.75)	
16 to 30 minutes	52.6	1.61	(0.25 - 10.21)	
31 to 60 minutes	69.4	3.29	(0.64 - 19.95)	<0.0001
Who spent time with on most enjoyed activity				
Alone	53.8	1.00		
With one person	36.1	0.49	(0.13 - 1.80)	
With several people/a group	24.9	0.28	(0.08 - 1.05)	
Not reported	78.9	3.21	(0.51 - 20.21)	0.11

Variable	%	Odds Ratio	(95% CI)	p-value
Know people with gambling problems				
No	37.9	1.00		
Yes	45.5	1.37	(0.46 - 4.06)	0.57
Methods - Setting a dollar figure before leaving home				
No	42.8	1.00		
Yes	44.4	1.07	(0.39 - 2.90)	0.90
Methods - Getting someone you trust to manage the money				
No	43.5	1.00		
Yes	41.3	0.91	(0.15 - 5.68)	0.92
Methods - Separating money for betting from other money and stopping				
No	43.4	1.00		
Yes	43.6	1.01	(0.26 - 3.87)	0.99
Methods - Leaving ATM and credit cards at home				
No	47.5	1.00		
Yes	13.3	0.17	(0.05 - 0.62)	0.01
Methods - Setting a time limit				
No	41.6	1.00		
Yes	63.3	2.43	(0.32 - 18.65)	0.39
Methods - Avoiding places that have betting or gambling				
No	43.6	1.00		
Yes	42.4	0.95	(0.30 - 3.04)	0.93
Sought help (from formal and informal sources) in last year				
No	40.9	1.00		
Yes	78.1	5.15	(0.85 - 31.33)	0.08
Number of significant life events				
0	72.3	1.00		
1	32.0	0.18	(0.03 - 1.06)	
2	36.5	0.22	(0.04 - 1.24)	
3	61.7	0.62	(0.10 - 3.91)	
4	30.3	0.17	(0.03 - 1.10)	
5+	41.8	0.28	(0.05 - 1.45)	0.24
Quality of life (WHOQoL-8)				
Below median (Score 0 - 24)	41.8	0.44	(0.13 - 1.53)	
Median score (Score 25)	19.9	0.15	(0.02 - 1.19)	
Above median (Score 26 - 32)	62.0	1.00		0.17
Psychological distress (Kessler-10)				
Score 0 - 5	41.2	1.00		
Score 6 - 11	41.0	0.99	(0.29 - 3.42)	
Score 12 - 19	53.8	1.67	(0.41 - 6.71)	
Score 20 - 40	38.3	0.89	(0.17 - 4.51)	0.87
Hazardous alcohol consumption (AUDIT-C)				
No	42.3	1.00		
Yes	44.3	1.09	(0.41 - 2.86)	0.87
Does not use drugs				
No	49.7	1.00		
Yes	40.3	0.68	(0.21 - 2.21)	0.52
Cannabis				
No	41.6	1.00		
Yes	48.2	1.31	(0.38 - 4.52)	0.67
Ever smoked tobacco				
Yes	48.9	2.64	(0.80 - 8.75)	
No	26.6	1.00		0.11
Ever smoked more than 100 cigarettes in lifetime				
Yes	50.2	2.13	(0.70 - 6.47)	
No	32.1	1.00		0.18
Ever smoked daily for a period of time				
Yes	45.5	1.21	(0.43 - 3.46)	
No	40.7	1.00		0.72

Variable	%	Odds Ratio	(95% CI)	p-value
Current tobacco use				
Does not smoke now	43.2	1.61	(0.36 - 7.10)	
Smokes at least once a day	52.4	2.33	(0.65 - 8.40)	
Smokes at least once a week	82.2	9.79	(0.77 - 122.04)	
Smokes at least once a month	17.2	2.62	(0.16 - 43.68)	
Never smoked	32.1	1.00		<0.0001

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)

Appendix 11: Bivariate associations for transition from non-problem gambler in Wave 1 to low-risk/moderate-risk/problem gambler in Wave 2

Variable	%	Odds Ratio	(95% CI)	p-value
Age group (years)				
18 - 24	8.9	1.00		
25 - 34	11.7	1.35	(0.63 - 2.89)	
35 - 44	7.0	0.77	(0.36 - 1.63)	
45 - 54	5.6	0.60	(0.28 - 1.31)	
55 - 64	3.7	0.39	(0.17 - 0.90)	
65+	4.2	0.44	(0.20 - 0.99)	0.0004
Gender				
Male	6.4	1.00		
Female	6.4	0.99	(0.69 - 1.43)	0.97
Ethnic group (prioritised)				
Māori	13.6	3.21	(2.10 - 4.91)	
Pacific	16.7	4.07	(2.57 - 6.47)	
Asian	11.2	2.58	(1.46 - 4.56)	
European/Other	4.7	1.00		<0.0001
Arrival in NZ				
NZ born	5.9	1.00		
before 2008	7.5	1.29	(0.87 - 1.92)	
since 2008	11.1	1.98	(0.83 - 4.72)	0.17
Country of birth				
NZ	5.9	1.00		
Other	7.9	1.36	(0.94 - 1.99)	0.11
Religion				
No religion	5.1	1.00		
Anglican	4.3	0.83	(0.47 - 1.48)	
Catholic	7.3	1.47	(0.83 - 2.61)	
Presbyterian	6.9	1.37	(0.75 - 2.51)	
Other Christian	10.4	2.15	(1.27 - 3.63)	
Other religion	10.5	2.17	(1.10 - 4.30)	0.01
Highest qualification				
No formal qualification	6.3	1.00		
Secondary school qualification	8.8	1.44	(0.82 - 2.53)	
Vocational or Trade qualification	7.2	1.16	(0.66 - 2.05)	
University degree or higher	4.5	0.70	(0.40 - 1.23)	0.03
Labour force status				
Employed	6.2	1.00		
Unemployed	7.8	1.28	(0.71 - 2.30)	
Student/Homemaker/Retired	6.4	1.04	(0.67 - 1.62)	0.72
Household size				
1	5.3	1.00		
2	5.3	1.01	(0.58 - 1.74)	
3	6.6	1.26	(0.67 - 2.37)	
4	5.9	1.12	(0.60 - 2.06)	
5+	10.1	2.01	(1.12 - 3.60)	0.06
Personal income				
<$20,000	8.4	1.00		
$20,001 - $40,000	5.8	1.48	(0.94 - 2.33)	
$40,001 - $60,000	7.7	1.36	(0.80 - 2.31)	
$60,001 - $80,000	4.3	0.72	(0.37 - 1.43)	
$80,001 - $100,000	7.2	1.26	(0.50 - 3.19)	
>$100,000	2.4	0.40	(0.14 - 1.18)	
Not reported	4.2	0.48	(0.19 - 1.20)	0.08

Variable	%	Odds Ratio	(95% CI)	p-value
Household income				
<$20,000	7.0	1.00		
$20,001 - $40,000	5.3	1.33	(0.75 - 2.36)	
$40,001 - $60,000	10.0	1.98	(1.07 - 3.64)	
$60,001 - $80,000	7.9	1.53	(0.82 - 2.86)	
$80,001 - $100,000	6.8	1.30	(0.69 - 2.47)	
>$100,000	4.2	0.77	(0.42 - 1.43)	
Not reported	6.8	0.97	(0.43 - 2.20)	0.11
Area of residence				
Auckland	8.4	1.00		
Wellington	4.4	0.50	(0.27 - 0.95)	
Christchurch	2.5	0.29	(0.11 - 0.73)	
Rest of NZ	6.4	0.75	(0.50 - 1.12)	0.02
New Zealand Individual Deprivation Index				
0	5.5	1.00		
1	6.1	1.13	(0.71 - 1.81)	
2	8.8	1.67	(0.95 - 2.92)	
3	8.6	1.64	(0.75 - 3.56)	
4	11.8	2.32	(1.11 - 4.87)	
5	20.4	4.44	(1.24 - 15.94)	
6+	7.7	1.44	(0.56 - 3.73)	0.06
Number of gambling activities participated in				
1	2.9	1.00		
2	6.4	2.27	(1.25 - 4.13)	
3	4.4	1.56	(0.82 - 2.99)	
4-6	9.7	3.62	(2.08 - 6.29)	
7-9	17.4	7.05	(2.98 - 16.70)	
10+	33.7	17.07	(3.03 - 96.02)	<0.0001
Pattern of participation				
Infrequent gambler	5.4	1.00		
Regular non-continuous gambler	6.0	1.11	(0.72 - 1.71)	
Regular continuous gambler	18.7	4.01	(2.43 - 6.61)	<0.0001
Gambling frequency				
At least weekly	9.0	2.94	(1.82 - 4.74)	
At least monthly	8.3	2.69	(1.64 - 4.43)	
At least once in past year	3.3	1.00		<0.0001
Typical monthly gambling expenditure				
$1 - $10	3.1	1.00		
$11 - $20	3.2	1.05	(0.44 - 2.51)	
$21 - $30	3.9	1.26	(0.50 - 3.17)	
$31 - $50	5.3	1.75	(0.75 - 4.12)	
$51 - $100	9.9	3.42	(1.55 - 7.55)	
$101 - $500	14.8	5.45	(2.45 - 12.05)	
>$500	13.7	4.96	(1.28 - 19.23)	<0.0001
Cards games - annual				
No	6.2	1.00		
Yes	10.3	1.73	(0.84 - 3.55)	0.14
Bets with friends/workmates - annual				
No	6.0	1.00		
Yes	8.2	1.40	(0.91 - 2.17)	0.13
Text game or competition - annual				
No	6.6	1.00		
Yes	1.7	0.24	(0.07 - 0.82)	0.02
Raffle/lottery (NZ/overseas) - annual				
No	6.4	1.00		
Yes	6.4	1.00	(0.68 - 1.46)	0.99
Lotto - annual				
No	4.7	1.00		
Yes	6.8	1.46	(0.83 - 2.58)	0.19

Variable	%	Odds Ratio	(95% CI)	p-value
Keno overall - annual				
No	6.1	1.00		
Yes	15.1	2.73	(1.45 - 5.17)	0.002
Instant Kiwi/other scratch tickets - annual				
No	5.3	1.00		
Yes	8.0	1.56	(1.09 - 2.24)	0.01
Housie or bingo - annual				
No	6.3	1.00		
Yes	15.4	2.73	(1.22 - 6.11)	0.01
Horse/dog race betting - annual				
No	6.0	1.00		
Yes	12.8	2.31	(1.31 - 4.09)	0.004
Sports betting - annual				
No	6.1	1.00		
Yes	12.4	2.17	(1.08 - 4.37)	0.03
Casino table games or EGMs (overseas) - annual				
No	6.3	1.00		
Yes	9.2	1.50	(0.62 - 3.66)	0.37
Casino table games or EGMs (NZ) - annual				
No	5.7	1.00		
Yes	12.8	2.42	(1.48 - 3.95)	0.0004
Casino table games (NZ) - annual				
No	6.1	1.00		
Yes	14.1	2.52	(1.22 - 5.22)	0.01
Casino EGMs (NZ) - annual				
No	5.8	1.00		
Yes	13.1	2.47	(1.47 - 4.13)	0.001
Pub EGMs - annual				
No	4.9	1.00		
Yes	16.8	3.89	(2.54 - 5.96)	<0.0001
Club EGM - annual				
No	5.7	1.00		
Yes	16.2	3.18	(1.88 - 5.37)	<0.0001
EGMs overall - annual				
No	5.6	1.00		
Yes	18.3	3.76	(2.23 - 6.35)	<0.0001
Short-term speculative investments - annual				
No	4.6	1.00		
Yes	13.9	3.37	(2.30 - 4.95)	<0.0001
Overseas internet gambling - annual				
No	6.5	1.00		
Yes	2.0	0.30	(0.07 - 1.29)	0.11
Card games - monthly				
No	6.3	1.00		
Yes	18.3	3.35	(1.22 - 9.26)	0.02
Bets with friends/workmates - monthly				
No	6.2	1.00		
Yes	17.2	3.11	(1.17 - 8.25)	0.02
Text game or competition - monthly				
No	6.4	1.00		
Yes	3.4	0.51	(0.06 - 4.08)	0.52
Raffle/lottery (NZ/overseas) - monthly				
No	5.9	1.00		
Yes	9.5	1.68	(1.09 - 2.58)	0.02
Lotto - monthly				
No	4.7	1.00		
Yes	8.3	1.82	(1.25 - 2.64)	0.002

Variable	%	Odds Ratio	(95% CI)	p-value
Keno - monthly				
No	6.3	1.00		
Yes	11.1	1.85	(0.65 - 5.28)	0.25
Instant Kiwi/other scratch tickets - monthly				
No	5.5	1.00		
Yes	11.5	2.21	(1.45 - 3.38)	0.0002
Housie or bingo - monthly				
No	6.3	1.00		
Yes	38.7	9.41	(3.24 - 27.30)	<0.0001
Horse/dog race betting - monthly				
No	6.1	1.00		
Yes	24.3	4.94	(2.01 - 12.15)	0.001
Sports betting - monthly				
No	6.3	1.00		
Yes	16.0	2.84	(0.82 - 9.82)	0.10
Casino table games or EGMs (overseas) - monthly				
No	6.4	-		
Yes	0.0	-		
Casino table games or EGMs (NZ) - monthly				
No	6.3	1.00		
Yes	31.2	6.77	(1.63 - 28.22)	0.01
Casino table games (NZ) - monthly				
No	6.4	-		
Yes	0.0	-		
Casino EGMs (NZ) - monthly				
No	6.2	1.00		
Yes	49.4	14.70	(3.38 - 63.99)	0.0003
Pub EGMs - monthly				
No	5.6	1.00		
Yes	37.1	10.05	(5.36 - 18.84)	<0.0001
Club EGMs - monthly				
No	6.0	1.00		
Yes	34.4	8.22	(3.60 - 18.79)	<0.0001
EGMs overall - monthly				
No	5.2	1.00		
Yes	36.6	10.62	(6.28 - 17.97)	<0.0001
Short-term speculative investments - monthly				
No	6.4	-		
Yes	0.0	-		
Overseas internet gambling - monthly				
No	6.4	-		
Yes	0.0	-		
Time spent playing EGMs in an average day (casino)				
No time	5.8	1.00		
Up to 15 minutes	5.0	0.86	(0.22 - 3.36)	
16 to 30 minutes	11.5	2.13	(0.79 - 5.76)	
31 to 60 minutes	17.9	3.56	(1.42 - 8.93)	
>60 minutes	19.3	3.90	(1.69 - 8.99)	0.001
Time spent playing EGMs in an average day (pub)				
No time	4.9	1.00		
Up to 15 minutes	12.3	2.71	(1.21 - 6.05)	
16 to 30 minutes	14.1	3.16	(1.56 - 6.41)	
31 to 60 minutes	23.6	5.94	(2.89 - 12.22)	
>60 minutes	33.6	9.73	(3.90 - 24.27)	<0.0001
Time spent playing EGMs in an average day (club)				
No time	5.7	1.00		
Up to 15 minutes	1.9	0.32	(0.07 - 1.42)	
16 to 30 minutes	16.4	3.22	(1.47 - 7.06)	
31 to 60 minutes	26.7	5.97	(2.54 - 14.02)	
>60 minutes	39.9	10.92	(2.71 - 43.95)	<0.0001

Variable	%	Odds Ratio	(95% CI)	p-value
Who spent time with on most enjoyed activity				
Alone	7.8	1.00		
With one person	6.9	0.87	(0.52 - 1.46)	
With several people/a group	7.6	0.97	(0.62 - 1.53)	
Not reported	2.9	0.35	(0.20 - 0.62)	0.003
Know people with gambling problems				
No	5.0	1.00		
Yes	8.9	1.84	(1.29 - 2.64)	0.001
Methods - Setting a dollar figure before leaving home				
No	5.6	1.00		
Yes	10.1	1.92	(1.29 - 2.86)	0.001
Methods - Getting someone you trust to manage the money				
No	6.5	-		
Yes	0.0	-		
Methods - Separating money for betting from other money and stopping				
No	6.0	1.00		
Yes	17.7	3.35	(1.66 - 6.74)	0.001
Methods - Leaving ATM and credit cards at home				
No	6.4	1.00		
Yes	15.2	2.63	(0.70 - 9.85)	0.15
Methods - Setting a time limit				
No	6.3	1.00		
Yes	20.8	3.93	(1.53 - 10.12)	0.005
Methods - Avoiding places that have betting or gambling				
No	6.4	1.00		
Yes	8.4	1.33	(0.42 - 4.24)	0.63
Sought help (from formal and informal sources) in last year				
No	6.4	-		
Yes	100.0	-		
Number of significant life events				
0	3.3	1.00		
1	7.6	2.41	(1.38 - 4.24)	
2	6.5	2.03	(1.12 - 3.71)	
3	7.5	2.37	(1.19 - 4.72)	
4	6.0	1.89	(0.84 - 4.27)	
5+	11.4	3.79	(1.85 - 7.76)	0.01
Quality of life (WHOQoL-8)				
Below median (Score 0 - 24)	8.6	2.11	(1.43 - 3.10)	
Median score (Score 25)	8.0	1.95	(1.03 - 3.70)	
Above median (Score 26 - 32)	4.3	1.00		0.001
Psychological distress (Kessler-10)				
Score 0 - 5	5.5	1.00		
Score 6 - 11	7.5	1.37	(0.88 - 2.15)	
Score 12 - 19	13.1	2.56	(1.33 - 4.94)	
Score 20 - 40	22.9	5.06	(1.46 - 17.51)	0.003
Hazardous alcohol consumption (AUDIT-C)				
No	5.9	1.00		
Yes	7.2	1.22	(0.85 - 1.77)	0.28
Does not use drugs				
No	13.3	1.00		
Yes	5.4	0.37	(0.23 - 0.59)	<0.0001
Cannabis				
No	5.5	1.00		
Yes	13.9	2.77	(1.68 - 4.58)	<0.0001
Ever smoked tobacco				
Yes	6.8	1.25	(0.85 - 1.84)	
No	5.5	1.00		0.26

Variable	%	Odds Ratio	(95% CI)	p-value
Ever smoked more than 100 cigarettes in lifetime				
Yes	7.0	1.21	(0.84 - 1.73)	
No	5.9	1.00		0.30
Ever smoked daily for a period of time				
Yes	7.2	1.27	(0.89 - 1.82)	
No	5.8	1.00		0.19
Current tobacco use				
Does not smoke now	4.9	0.83	(0.53 - 1.31)	
Smokes at least once a day	11.9	2.17	(1.39 - 3.39)	
Smokes at least once a week	5.8	0.99	(0.20 - 4.92)	
Smokes at least once a month	1.7	0.28	(0.04 - 2.19)	
Never smoked	5.9	1.00		<0.0001

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)

Appendix 12: Bivariate associations for staying as low-risk/moderate-risk/problem gambler in Wave 2

Variable	%	Odds Ratio	(95% CI)	p-value
Age group (years)				
18 - 24	35.9	1.00		
25 - 34	40.0	1.19	(0.32 - 4.48)	
35 - 44	48.5	1.68	(0.44 - 6.40)	
45 - 54	59.3	2.60	(0.67 - 10.07)	
55 - 64	57.1	2.37	(0.57 - 9.79)	
65+	62.3	2.94	(0.68 - 12.71)	0.36
Gender				
Male	44.5	0.70	(0.37 - 1.33)	
Female	53.4	1.00		0.27
Ethnic group (prioritised)				
Māori	68.3	2.90	(1.41 - 5.99)	
Pacific	46.8	1.19	(0.55 - 2.57)	
Asian	44.3	1.08	(0.32 - 3.61)	
European/Other	42.5	1.00		0.02
Arrival in NZ				
NZ born	49.5	1.00		
before 2008	45.9	0.87	(0.42 - 1.77)	
since 2008	40.2	0.69	(0.13 - 3.53)	0.85
Country of birth				
NZ	49.5	1.00		
Other	45.0	0.84	(0.42 - 1.65)	0.60
Religion				
No religion	45.7	1.00		
Anglican	44.0	0.94	(0.28 - 3.140	
Catholic	56.9	1.57	(0.64 - 3.88)	
Presbyterian	72.4	3.12	(0.85 - 11.47)	
Other Christian	48.0	1.10	(0.47 - 2.55)	
Other religion	32.7	0.58	(0.18 - 1.90)	0.38
Highest qualification				
No formal qualification	65.8	1.00		
Secondary school qualification	35.0	0.28	(0.11 - 0.73)	
Vocational or Trade qualification	56.8	0.69	(0.28 - 1.70)	
University degree or higher	43.3	0.40	(0.15 - 1.02)	0.04
Labour force status				
Employed	45.5	1.00		
Unemployed	54.9	1.46	(0.64 - 3.31)	
Student/Homemaker/Retired	52.2	1.31	(0.50 - 3.40)	0.62
Household size				
1	59.6	1.00		
2	55.5	0.85	(0.33 - 2.18)	
3	57.7	0.93	(0.30 - 2.90)	
4	44.5	0.54	(0.20 - 1.52)	
5+	36.7	0.39	(0.13 - 1.16)	0.35
Personal income				
<$20,000	49.8	1.00		
$20,001 - $40,000	58.6	1.42	(0.60 - 3.38)	
$40,001 - $60,000	43.4	0.77	(0.30 - 1.98)	
$60,001 - $80,000	28.4	0.40	(0.12 - 1.29)	
$80,001 - $100,000	87.8	7.27	(1.71 - 30.98)	
>$100,000	26.6	0.37	(0.06 - 2.14)	
Not reported	43.2	0.77	(0.19 - 3.73)	0.02

Variable	%	Odds Ratio	(95% CI)	p-value
Household income				
<$20,000	48.2	1.00		
$20,001 - $40,000	50.6	1.10	(0.43 - 2.86)	
$40,001 - $60,000	56.7	1.41	(0.50 - 3.97)	
$60,001 - $80,000	42.8	0.81	(0.26 - 2.54)	
$80,001 - $100,000	62.1	1.76	(0.52 - 5.94)	
>$100,000	43.4	0.82	(0.31 - 2.20)	
Not reported	44.59	0.87	(0.24 - 3.17)	0.88
Area of residence				
Auckland	52.4	1.00		
Wellington	50.4	0.92	(0.34 - 2.53)	
Christchurch	40.7	0.62	(0.14 - 2.72)	
Rest of NZ	47.0	0.81	(0.40 - 1.62)	0.89
New Zealand Individual Deprivation Index				
0	50.9	1.00		
1	51.2	1.01	(0.40 - 2.55)	
2	37.1	0.57	(0.24 - 1.37)	
3	45.5	0.80	(0.28 - 2.28)	
4	32.4	0.46	(0.13 - 1.66)	
5+	82.3	4.49	(1.16 - 17.31)	0.10
Number of gambling activities participated in				
1	42.5	1.00		
2	39.4	0.88	(0.22 - 3.59)	
3	44.7	1.09	(0.29 - 4.18)	
4-6	48.7	1.28	(0.35 - 4.70)	
7-9	56.1	1.73	(0.44 - 6.86)	
10+	94.9	25.08	(2.34 - 268.87)	0.10
Pattern of participation				
Infrequent gambler	36.8	1.00		
Regular non-continuous gambler	53.4	1.97	(0.90 - 4.32)	
Regular continuous gambler	65.9	3.32	(1.54 - 7.15)	0.01
Gambling frequency				
At least weekly	62.0	6.13	(2.34 - 16.09)	
At least monthly	47.2	3.36	(1.14 - 9.87)	
At least once in past year	21.0	1.00		0.001
Typical monthly gambling expenditure				
$1 - $10	31.2			
$11 - $20	21.9	0.62	(0.08 - 4.75)	
$21 - $30	21.0	0.58	(0.10 - 3.55)	
$31 - $50	28.8	0.89	(0.12 - 6.87)	
$51 - $100	47.1	1.96	(0.38 - 9.98)	
$101 - $500	58.5	3.10	(0.68 - 14.07)	
>$500	75.7	6.85	(1.19 - 39.47)	0.006
Cards games - annual				
No	47.3	1.00		
Yes	55.9	1.41	(0.59 - 3.39)	0.44
Bets with friends/workmates - annual				
No	51.4	1.00		
Yes	40.9	0.66	(0.31 - 1.41)	0.28
Text game or competition - annual				
No	49.9	1.00		
Yes	31.3	0.46	(0.12 - 1.70)	0.24
Raffle/lottery (NZ/overseas) - annual				
No	50.6	1.00		
Yes	47.2	0.87	(0.43 - 1.75)	0.70
Lotto - annual				
No	50.7	1.00		
Yes	48.2	0.90	(0.37 - 2.22)	0.83
Keno overall - annual				
No	46.8	1.00		
Yes	63.0	1.94	(0.60 - 6.25)	0.27

Variable	%	Odds Ratio	(95% CI)	p-value
Instant Kiwi/other scratch tickets - annual				
No	47.4	1.00		
Yes	49.5	1.09	(0.57 - 2.09)	0.81
Housie or bingo - annual				
No	46.1	1.00		
Yes	79.6	4.55	(1.50 - 13.77)	0.01
Horse/dog race betting - annual				
No	47.2	1.00		
Yes	55.6	1.40	(0.63 - 3.13)	0.41
Sports betting - annual				
No	47.5	1.00		
Yes	57.4	1.49	(0.58 - 3.83)	0.41
Casino table games or EGMs (overseas) - annual				
No	46.5	1.00		
Yes	64.7	2.11	(0.71 - 6.32)	0.18
Casino table games or EGMs (NZ) - annual				
No	45.6	1.00		
Yes	54.9	1.45	(0.72 - 2.95)	0.30
Casino table games (NZ) - annual				
No	49.0	1.00		
Yes	46.2	0.89	(0.31 - 2.57)	0.84
Casino EGMs (NZ) - annual				
No	46.0	1.00		
Yes	55.2	1.44	(0.69 - 3.00)	0.33
Pub EGMs - annual				
No	43.0	1.00		
Yes	56.8	1.74	(0.86 - 3.53)	0.12
Club EGM - annual				
No	42.6	1.00		
Yes	79.0	5.07	(2.00 - 12.83)	0.0006
Non-casino EGM overall - annual				
No	41.7	1.00		
Yes	73.9	3.96	(1.83 - 8.58)	0.0005
EGMs overall - annual				
No	41.9	1.00		
Yes	53.6	1.60	(0.81 - 3.16)	0.17
Short-term speculative investments - annual				
No	48.2	1.00		
Yes	77.3	3.67	(0.32 - 42.17)	0.30
Overseas internet gambling - annual				
No	47.6	1.00		
Yes	82.5	5.18	(0.94 - 28.63)	0.06
Card games - monthly				
No	46.5	1.00		
Yes	78.9	4.30	(1.29 - 14.37)	0.02
Bets with friends/workmates - monthly				
No	47.9	1.00		
Yes	60.2	1.64	(0.43 - 6.27)	0.47
Text game or competition - monthly				
No	48.5	1.00		
Yes	53.7	1.23	(0.16 - 9.36)	0.84
Raffle/lottery (NZ/overseas) - monthly				
No	45.3	1.00		
Yes	62.4	2.00	(0.95 - 4.23)	0.07
Lotto - monthly				
No	39.3	1.00		
Yes	57.3	2.08	(1.08 - 3.99)	0.03
Keno - monthly				
No	47.4	1.00		
Yes	76.7	3.65	(0.87 - 15.35)	0.08

Variable	%	Odds Ratio	(95% CI)	p-value
Instant Kiwi/other scratch tickets - monthly				
No	46.5	1.00		
Yes	54.7	1.39	(0.69 - 2.78)	0.35
Housie or bingo - monthly				
No	48.3	1.00		
Yes	58.9	1.54	(0.34 - 6.95)	0.58
Horse/dog race betting - monthly				
No	46.7	1.00		
Yes	70.5	2.73	(0.96 - 7.78)	0.06
Sports betting - monthly				
No	48.4	1.00		
Yes	52.5	1.18	(0.32 - 4.37)	0.80
Casino table games or EGMs (overseas) - monthly				
No	48.8	-		
Yes	0.0	-		
Casino table games or EGMs (NZ) - monthly				
No	47.3	1.00		
Yes	77.0	3.74	(0.86 - 16.38)	0.08
Casino table games (NZ) - monthly				
No	48.5	-		
Yes	100.0	-		
Casino EGMs (NZ) - monthly				
No	47.0	1.00		
Yes	79.4	4.36	(1.01 - 18.73)	0.05
Pub EGMs - monthly				
No	42.2	1.00		
Yes	73.6	3.82	(1.78 - 8.20)	0.0006
Club EGMs - monthly				
No	45.6	1.00		
Yes	83.1	5.86	(1.52 - 22.52)	0.01
EGMs overall - monthly				
No	37.8	1.00		
Yes	76.4	5.32	(2.59 - 10.93)	<0.0001
Short-term speculative investments - monthly				
No	48.3	1.00		
Yes	72.0	2.74	(0.19 - 39.21)	0.46
Overseas internet gambling - monthly				
No	48.2	1.00		
Yes	73.1	2.92	(0.48 - 17.77)	0.25
Time spent playing EGMs in an average day (casino)				
No time	46.3	1.00		
Up to 15 minutes	29.9	0.50	(0.09 - 2.81)	
16 to 30 minutes	15.9	0.22	(0.04 - 1.15)	
31 to 60 minutes	62.0	1.89	(0.47 - 7.70)	
>60 minutes	74.7	3.42	(1.30 - 8.98)	0.02
Time spent playing EGMs in an average day (pub)				
No time	43.34	1.00		
Up to 15 minutes	18.2	0.29	(0.06 - 1.32)	
16 to 30 minutes	44.5	1.05	(0.31 - 3.57)	
31 to 60 minutes	74.4	3.80	(1.15 - 12.53)	
>60 minutes	78.5	4.76	(1.91 - 11.86)	0.001
Time spent playing EGMs in an average day (club)				
No time	42.9	1.00		
Up to 15 minutes	76.4	4.30	0.45 - 41.41)	
16 to 30 minutes	56.6	1.74	(0.43 - 6.96)	
31 to 60 minutes	96.1	32.74	(3.88 - 276.24)	
>60 minutes	85.2	7.69	(1.66 - 35.55)	0.001

Variable	%	Odds Ratio	(95% CI)	p-value
Who spent time with on most enjoyed activity				
Alone	61.3	1.00		
With one person	39.1	0.41	(0.17 - 0.95)	
With several people/a group	36.6	0.37	(0.15 - 0.87)	
Not reported	52.4	0.70	(0.25 - 1.91)	0.06
Know people with gambling problems				
No	40.5	1.00		
Yes	54.8	1.78	(0.93 - 3.41)	0.08
Methods - Setting a dollar figure before leaving home				
No	44.9	1.00		
Yes	54.4	1.47	(0.75 - 2.86)	0.26
Methods - Getting someone you trust to manage the money				
No	48.7	1.00		
Yes	44.3	0.84	(0.20 - 3.60)	0.81
Methods - Separating money for betting from other money and stopping				
No	46.2	1.00		
Yes	63.3	2.01	(0.86 - 4.67)	0.11
Methods - Leaving ATM and credit cards at home				
No	47.8	1.00		
Yes	58.0	1.51	(0.51 - 4.45)	0.46
Methods - Setting a time limit				
No	48.1	1.00		
Yes	55.0	1.32	(0.43 - 4.03)	0.63
Methods - Avoiding places that have betting or gambling				
No	46.4	1.00		
Yes	68.5	2.51	(1.05 - 6.00)	0.04
Sought help (from formal and informal sources) in last year				
No	47.8	1.00		
Yes	87.1	7.37	(1.24 - 43.94)	0.03
Number of significant life events				
0	57.0	1.00		
1	54.9	0.92	(0.35 - 2.41)	
2	49.2	0.73	(0.25 - 2.11)	
3	56.8	0.99	(0.35 - 2.83)	
4	30.7	0.34	(0.10 - 1.12)	
5+	38.4	0.47	(0.15 - 1.44)	0.37
Quality of life (WHOQoL-8)				
Below median (Score 0 - 24)	55.6	2.35	(1.15 - 4.82)	
Median score (Score 25)	61.2	2.96	(0.98 - 8.93)	
Above median (Score 26 - 32)	34.8	1.00		0.04
Psychological distress (Kessler-10)				
Score 0 - 5	52.3	1.00		
Score 6 - 11	39.3	0.59	(0.28 - 1.24)	
Score 12 - 19	60.2	1.38	(0.52 - 3.63)	
Score 20 - 40	38.1	0.56	(0.17 - 1.83)	0.27
Hazardous alcohol consumption (AUDIT-C)				
No	48.1	1.00		
Yes	49.1	1.04	(0.54 - 2.00)	0.90
Does not use drugs				
No	53.6	1.00		
Yes	46.6	0.76	(0.35 - 1.62)	0.47
Cannabis				
No	47.7	1.00		
Yes	51.3	1.16	(0.52 - 2.56)	0.72
Ever smoked tobacco				
Yes	50.4	1.32	(0.67 - 2.61)	
No	43.5	1.00		0.43

Variable	%	Odds Ratio	(95% CI)	p-value
Ever smoked more than 100 cigarettes in lifetime				
Yes	55.2	1.78	(0.93 - 3.40)	
No	40.9	1.00		0.08
Ever smoked daily for a period of time				
Yes	53.4	1.48	(0.78 - 2.81)	
No	43.6	1.00		0.23
Current tobacco use				
Does not smoke now	58.0	1.99	(0.87 - 4.59)	
Smokes at least once a day	51.3	1.52	(0.72 - 3.24)	
Smokes at least once a week	96.8	44.36	(4.06 - 484.10)	
Smokes at least once a month	17.1	0.30	(0.02 - 5.07)	
Smokes less than once a month	24.0	0.46	(0.03 - 7.91)	
Never smoked	40.9	1.00		0.02

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)

Appendix 13: Bivariate associations for re-initiation of gambling in Wave 2

Variable	%	Odds Ratio	(95% CI)	p-value
Age group (years)				
18 - 24	57.0	1.00		
25 - 34	47.9	0.70	(0.14 - 3.38)	
35 - 44	44.7	0.61	(0.14 - 2.60)	
45 - 54	35.6	0.42	(0.10 - 1.77)	
55 - 64	45.1	0.62	(0.13 - 2.91)	
65+	38.7	0.48	(0.11 - 1.99)	0.83
Gender				
Male	42.4	1.00		
Female	43.8	0.95	(0.50 - 1.78)	0.86
Ethnic group (prioritised)				
Māori	49.0	1.31	(0.53 - 3.25)	
Pacific	17.7	0.29	(0.06 - 1.54)	
Asian	51.0	1.41	(0.46 - 4.35)	
European/Other	42.4	1.00		0.40
Arrival in NZ				
NZ born	42.7	1.00		
before 2008	37.6	0.81	(0.39 - 1.70)	
since 2008	61.9	2.18	(0.60 - 7.93)	0.38
Country of birth				
NZ	42.7	1.00		
Other	44.1	1.06	(0.53 - 2.12)	0.86
Religion				
No religion	49.4	1.00		
Anglican	46.2	0.88	(0.32 - 2.40)	
Catholic	35.2	0.56	(0.18 - 1.70)	
Presbyterian	66.7	2.05	(0.53 - 7.95)	
Other Christian	28.0	0.40	(0.17 - 0.95)	
Other religion	40.9	0.71	(0.17 - 2.99)	0.21
Highest qualification				
No formal qualification	45.6	1.00		
Secondary school qualification	48.7	1.13	(0.38 - 3.34)	
Vocational or Trade qualification	43.0	0.90	(0.32 - 2.55)	
University degree or higher	40.4	0.81	(0.31 - 2.11)	0.90
Labour force status				
Employed	42.0	1.00		
Unemployed	48.0	1.28	(0.32 - 5.04)	
Student/Homemaker/Retired	45.0	1.13	(0.56 - 2.31)	0.90
Household size				
1	45.6	1.00		
2	41.1	0.83	(0.36 - 1.95)	
3	53.6	1.38	(0.50 - 3.85)	
4	42.2	0.87	(0.31 - 2.50)	
5+	36.5	0.69	(0.23 - 2.07)	0.79
Personal income				
<$20,000	55.5	1.00		
$20,001 - $40,000	31.8	0.37	(0.15 - 0.92)	
$40,001 - $60,000	37.6	0.48	(0.18 - 1.27)	
$60,001 - $80,000	47.1	0.71	(0.23 - 2.23)	
$80,001 - $100,000	35.6	0.44	(0.12 - 1.69)	
>$100,000	47.5	0.73	(0.20 - 2.61)	
Not reported	33.1	040	(0.07 - 2.13)	0.46

Variable	%	Odds Ratio	(95% CI)	p-value
Household income				
<$20,000	54.5	1.00		
$20,001 - $40,000	31.5	0.38	(0.13 - 1.10)	
$40,001 - $60,000	58.6	1.18	(0.43 - 3.24)	
$60,001 - $80,000	39.8	0.55	(0.16 - 1.90)	
$80,001 - $100,000	25.8	0.29	(0.09 - 0.96)	
>$100,000	42.2	0.61	(0.23 - 1.63)	
Not reported	41.2	0.59	(0.15 - 2.31)	0.23
Area of residence				
Auckland	50.5	1.00		
Wellington	50.8	1.01	(0.31 - 3.27)	
Christchurch	12.6	0.14	(0.03 - 0.72)	
Rest of NZ	42.1	0.71	(0.34 - 1.48)	0.11
New Zealand Individual Deprivation Index				
0	35.5	1.00		
1	57.3	2.43	(1.07 - 5.55)	
2	52.0	1.97	(0.63 - 6.19)	
3	8.8	0.18	(0.02 - 1.52)	
4	81.2	7.86	(1.36 - 45.38)	
5	64.8	3.35	(0.89 - 12.65)	
6+	35.5	2.43	(1.07 - 5.55)	0.02
Number of significant life events				
0	51.1	1.00		
1	22.9	0.29	(0.11 - 0.78)	
2	49.4	0.94	(0.38 - 2.32)	
3	46.2	0.83	(0.29 - 2.37)	
4	34.9	0.51	(0.12 - 2.27)	
5+	52.0	1.04	(0.31 - 3.48)	0.16
Quality of life (WHOQoL-8)				
Below median (Score 0 - 24)	42.0	0.95	(0.47 - 1.92)	
Median score (Score 25)	45.3	1.08	(0.44 - 2.68)	
Above median (Score 26 - 32)	43.3	1.00		0.96
Psychological distress (Kessler-10)				
Score 0 - 5	42.6	1.00		
Score 6 - 11	42.2	0.98	(0.47 - 2.08)	
Score 12 - 19	53.0	1.52	(0.39 - 5.96)	
Score 20 - 40	34.4	0.71	(0.08 - 6.63)	0.92
Hazardous alcohol consumption (AUDIT-C)				
No	36.1	1.00		
Yes	56.6	2.31	(1.17 - 4.56)	0.02
Does not use drugs				
No	62.0	1.00		
Yes	39.3	0.40	(0.16 - 0.96)	0.04
Cannabis				
No	41.1			
Yes	56.0	1.83	(0.69 - 4.84)	0.23
Ever smoked tobacco				
Yes	47.5	2.09	(1.00 - 4.35)	
No	30.3	1.00		0.05
Ever smoked more than 100 cigarettes in lifetime				
Yes	51.2	1.79	(0.97 - 3.32)	
No	36.9	1.00		0.06
Ever smoked daily for a period of time				
Yes	52.9	1.98	(1.07 - 3.68)	
No	36.1	1.00		0.03
Current tobacco use				
Does not smoke now	41.9	1.23	(0.60 - 2.53)	
Smokes at least once a day	68.6	3.74	(1.48 - 9.45)	
Never smoked	36.9	1.00		0.02

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)

Appendix 14: Bivariate associations for initiation of gambling in Wave 2

Variable	%	Odds Ratio	(95% CI)	p-value
Age group (years)				
18 - 24	31.7	1.00		
25 - 34	32.1	1.02	(0.43 - 2.40)	
35 - 44	29.2	0.89	(0.39 - 2.03)	
45 - 54	39.7	1.42	(0.63 - 3.19)	
55 - 64	30.9	0.97	(0.40 - 2.33)	
65+	28.4	0.86	(0.39 - 1.87)	0.76
Gender				
Male	33.0	1.00		
Female	30.8	1.11	(0.71 - 1.73)	0.66
Ethnic group (prioritised)				
Māori	55.6	2.61	(1.20 - 5.68)	
Pacific	31.4	0.95	(0.52 - 1.74)	
Asian	22.5	0.60	(0.35 - 1.04)	
European/Other	32.5	1.00		0.01
Arrival in NZ				
NZ born	35.6	1.00		
before 2008	32.5	0.87	(0.55 - 1.38)	
since 2008	14.2	0.30	(0.13 - 0.71)	0.02
Country of birth				
NZ	35.6	1.00		
Other	27.6	0.69	(0.45 - 1.07)	0.10
Religion				
No religion	40.7	1.00		
Anglican	42.3	1.07	(0.49 - 2.32)	
Catholic	48.4	1.37	(0.65 - 2.86)	
Presbyterian	36.1	0.32	(0.17 - 0.59)	
Other Christian	18.0	0.44	(0.22 - 0.88)	
Other religion	23.1	0.82	(0.35 - 1.94)	0.0002
Highest qualification				
No formal qualification	31.9	1.00		
Secondary school qualification	27.0	0.79	(0.39 - 1.60)	
Vocational or Trade qualification	32.0	1.15	(0.61 - 2.17)	
University degree or higher	35.0	1.01	(0.46 - 2.20)	0.62
Labour force status				
Employed	33.5	1.00		
Unemployed	34.4	0.81	(0.50 - 1.29)	
Student/Homemaker/Retired	28.9	1.04	(0.49 - 2.20)	0.63
Household size				
1	38.3	1.00		
2	30.8	0.72	(0.39 - 1.34)	
3	29.4	0.67	(0.33 - 1.36)	
4	30.3	0.70	(0.33 - 1.50)	
5+	33.5	0.81	(0.40 - 1.63)	0.81
Personal income				
<$20,000	25.0	1.00		
$20,001 - $40,000	35.1	1.62	(0.93 - 2.84)	
$40,001 - $60,000	31.4	1.37	(0.69 - 2.74)	
$60,001 - $80,000	43.3	2.29	(0.86 - 6.08)	
$80,001 - $100,000	34.7	1.59	(0.48 - 5.23)	
>$100,000	48.1	2.78	(0.92 - 8.40)	
Not reported	48.1	2.78	(1.19 - 6.48)	0.14

Variable	%	Odds Ratio	(95% CI)	p-value
Household income				
<$20,000	26.9	1.00		
$20,001 - $40,000	25.5	0.93	(0.48 - 1.80)	
$40,001 - $60,000	30.8	1.21	(0.58 - 2.52)	
$60,001 - $80,000	27.0	1.01	(0.44 - 2.29)	
$80,001 - $100,000	30.1	1.17	(0.52 - 2.64)	
>$100,000	41.9	1.96	(0.96 - 3.99)	
Not reported	43.4	2.09	(0.94 - 4.65)	0.29
Area of residence				
Auckland	28.9	1.00		
Wellington	34.1	1.27	(0.63 - 2.57)	
Christchurch	28.8	1.00	(0.34 - 2.88)	
Rest of NZ	34.8	1.31	(0.81 - 2.12)	0.71
New Zealand Individual Deprivation Index				
0	30.5	1.00		
1	32.3	1.09	(0.62 - 1.90)	
2	34.6	1.20	(0.59 - 2.45)	
3	27.1	0.84	(0.33 - 2.18)	
4	30.9	1.02	(0.36 - 2.88)	
5	39.4	1.48	(0.53 - 4.18)	
6+	30.5	1.09	(0.62 - 1.90)	0.96
Number of significant life events				
0	33.8	1.00		
1	32.5	0.94	(0.54 - 1.64)	
2	30.4	0.86	(0.45 - 1.63)	
3	18.8	0.46	(0.19 - 1.11)	
4	37.2	1.16	(0.43 - 3.12)	
5+	42.8	1.47	(0.49 - 4.41)	0.52
Quality of life (WHOQoL-8)				
Below median (Score 0 - 24)	32.8	1.00		
Median score (Score 25)	29.0	1.05	(0.66 - 1.67)	
Above median (Score 26 - 32)	31.7	0.88	(0.41 - 1.90)	0.90
Psychological distress (Kessler-10)				
Score 0 - 5	33.9	1.00		
Score 6 - 11	17.0	0.40	(0.20 - 0.81)	
Score 12 - 19	52.1	2.12	(0.90 - 5.03)	
Score 20 - 40	37.8	1.19	(0.31 - 4.53)	0.01
Hazardous alcohol consumption (AUDIT-C)				
No	29.5	1.00		
Yes	42.2	1.74	(1.01 - 3.01)	0.05
Does not use drugs				
No	36.8	1.00		
Yes	31.4	0.79	(0.32 - 1.96)	0.61
Cannabis				
No	31.7	1.00		
Yes	32.7	1.05	(0.36 - 3.05)	0.93
Ever smoked tobacco				
Yes	39.8	1.99	(1.28 - 3.09)	
No	24.9	1.00		0.002
Ever smoked more than 100 cigarettes in lifetime				
Yes	45.6	2.45	(1.55 - 3.88)	
No	25.5	1.00		0.0001
Ever smoked daily for a period of time				
Yes	46.4	2.49	(1.56 - 3.97)	
No	25.8	1.00		0.0001
Current tobacco use				
Does not smoke now	43.1	2.21	(1.26 - 3.87)	
Smokes at least once a day	53.8	3.40	(1.77 - 6.52)	
Smokes at least once a week	3.7	0.11	(0.01 - 1.06)	
Never smoked	25.5	1.00		<0.0001

Data weighted for 2013 Census data (both Waves) and attrition (Wave 2)