



**NEW ZEALAND NATIONAL GAMBLING STUDY:
WAVE 3 (2014)**

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PO Box 5013
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Authors:

Professor Max Abbott
Dr Maria Bellringer
Dr Nick Garrett
Dr Stuart Mundy-McPherson

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CONTENTS

ACKNOWLEDGEMENTS	1
EXECUTIVE SUMMARY	5
1 BACKGROUND	17
2 RESEARCH METHODS	26
2.1 Ethics approval.....	26
2.2 Survey instrument	26
2.3 Overview of the survey methodology	27
2.3.1 Baseline (Wave 1 assessment).....	27
2.3.2 Wave 2 (one year) and Wave 3 (two year) follow-up assessments.....	28
2.4 Survey population	29
2.4.1 Sample size	29
2.4.2 Composition of the sample by gender and age groups.....	29
2.4.3 Composition of the sample by ethnicity.....	30
2.5 Weighting.....	30
2.5.1 Generalities	30
2.5.2 Census benchmark.....	31
2.5.3 Attrition-specific weights.....	31
2.6 Data analysis	31
2.6.1 Attrition analyses.....	31
2.6.2 Descriptive statistics.....	32
2.6.3 Inferential statistics	32
3 RESULTS	34
3.1 Attrition analyses	34
3.2 Descriptive statistics	34
3.2.1 Socio-demographic variables that could have changed in the prior year.....	35
3.2.2 Gambling participation	35
3.2.3 Problem gambling	37
3.2.4 Health status.....	40
3.3 Transitions, incidence and relapse	42
3.3.1 Transitions.....	42
3.3.2 Incidence.....	47
3.3.3 Relapse.....	47
3.4 Associations with transitions	48
3.4.1 Transition to moderate-risk/problem gambler	48
3.4.2 Staying as moderate risk/problem gambler.....	51
3.4.3 Transition to low-risk/moderate-risk/problem gambler	53
3.4.4 Staying as low-risk/moderate-risk/problem gambler	60
3.4.5 Initiation of gambling in Wave 2 or Wave 3 from the prior wave.....	64
3.4.6 Re-initiation of gambling in Wave 2 or Wave 3 from the prior wave.....	66
4 SUMMARY, DISCUSSION AND CONCLUSIONS.....	68
6 REFERENCES	82
APPENDIX 1: Categorical values for sensitivity analyses	86
APPENDIX 2: Covariates for descriptive statistics and for inferential analyses	87
APPENDIX 3: Wave 3 attrition from Wave 1 (unweighted numbers)	88
APPENDIX 4: Prevalence and 95% confidence intervals for socio-demographic variables repeated across the waves.....	90
	2

APPENDIX 5: Prevalence and 95% confidence intervals for past year and past month gambling in Waves 1, 2 and 3	91
APPENDIX 6: Prevalence and 95% confidence intervals for past year and past month gambling in Waves 1, 2 and 3	92
APPENDIX 7: Prevalence and 95% confidence intervals for time spent gambling on EGMs in an average day in Waves 1, 2 and 3	94
APPENDIX 8: Prevalence and 95% confidence intervals by health status in Waves 1, 2 and 3	95
APPENDIX 9: Bivariate associations for transition from non-problem / low-risk gambler to moderate-risk / problem gambler, aggregated across the waves	96
APPENDIX 10: Bivariate associations for staying as a moderate-risk / problem gambler, aggregated across the waves.....	101
APPENDIX 11: Bivariate associations for transition from non-problem gambler to low-risk / moderate-risk / problem gambler, aggregated across the waves	106
APPENDIX 12: Bivariate associations for transition from non-problem gambler to low-risk / moderate-risk / problem gambler for Māori, aggregated across the waves.....	111
APPENDIX 13: Bivariate associations for transition from non-problem gambler to low-risk / moderate-risk / problem gambler for Pacific people, aggregated across the waves.....	113
APPENDIX 14: Bivariate associations for staying as a low-risk / moderate-risk / problem gambler, aggregated across the waves.....	114
APPENDIX 15: Bivariate associations for staying as a low-risk / moderate-risk / problem gambler for Māori, aggregated across the waves	119
APPENDIX 16: Bivariate associations for staying as a low-risk / moderate-risk / problem gambler for Pacific people, aggregated across the waves	120
APPENDIX 17: Bivariate associations for initiating gambling, aggregated across the waves	121
APPENDIX 18: Bivariate associations for re-initiating gambling, aggregated across the waves	123

LIST OF TABLES

Table 1: Gender and age of participants in Waves 1 to 3	30
Table 2: Ethnicity of participants in Waves 1 to 3	30
Table 3: Transitions for inferential analyses	33
Table 4: Prevalence and 95% confidence intervals for problem gambling risk in Waves 1, 2 and 3	37
Table 5: Prevalence and 95% confidence intervals for problem gambling risk in Waves 1, 2 and 3 by ethnicity	39
Table 6: Prevalence and 95% confidence intervals for methods used to stop gambling too much and help-seeking behaviour in Waves 1, 2 and 3	40
Table 7: Transitions between PGSI groups between the waves	43
Table 8: Total transitions between PGSI groups by ethnicity	44
Table 9: Wave 3 moderate-risk/problem gambling among participants who were Wave 2 non-gambler/non-problem gambler/low-risk gambler.....	48
Table 10: Multivariate logistic regression for transition from non-problem / low-risk gambler to moderate-risk / problem gambler aggregated across the waves	51
Table 11: Multiple logistic regression for staying as a moderate-risk / problem gambler aggregated across the waves.....	53
Table 12: Multiple logistic regression for transition from non-problem gambler to low-risk / moderate-risk / problem gambler aggregated across the waves	58
Table 13: Multiple logistic regression for transition from non-problem gambler to low-risk / moderate-risk / problem gambler aggregated across the waves for Māori.....	59
Table 14: Multiple logistic regression for transition from non-problem gambler to low-risk / moderate-risk / problem gambler aggregated across the waves for Pacific people.....	59
Table 15: Multiple logistic regression for staying a low-risk / moderate-risk / problem gambler aggregated across the waves.....	63
Table 16: Multiple logistic regression for staying a low-risk / moderate-risk / problem gambler aggregated across the waves for Māori	64
Table 17: Multiple logistic regression for staying a low-risk / moderate-risk / problem gambler aggregated across the waves for Pacific people	64
Table 18: Multiple logistic regression for initiation of gambling, aggregated across the waves	66
Table 19: Multiple logistic regression for re-initiation of gambling, aggregated across the waves	67

LIST OF FIGURES

Figure 1: Number of participants interviewed in Wave 1, Wave 2 and Wave 3	29
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EXECUTIVE SUMMARY

This report describes the third phase of the New Zealand National Gambling Study, presenting and discussing results from the two year follow-up assessment of participants conducted in 2014 (Wave 3). It focuses on transitions between gambling states (no gambling, non-problem gambling, low-risk gambling, moderate-risk gambling and problem gambling), and risk and resilience for problem gambling from Wave 1 (2012) to Wave 3 (2014). The incidence of problem gambling between Wave 2 and Wave 3 (i.e. the number of 'new' cases of problem gambling arising) is also detailed.

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 findings to the general adult population. Wave 2 was from March to November 2013 when 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; a 71% response rate was achieved. Wave 3 took place from March to December 2014 with 3,115 participants re-interviewed (83% response rate).

An additional cohort of 100 moderate-risk and problem gamblers was initiated in Wave 3. The purpose was to boost numbers of participants in these categories to allow more detailed analyses of transitions over time. This cohort comprises participants recruited from gambling venues and via advertisements, who were screened as moderate-risk or problem gamblers with the Problem Gambling Severity Index (PGSI). The questionnaire for this additional group corresponds to that used in Wave 1 for the main NGS. Results for these participants will be presented separately.

There was some differential attrition over time from Wave 1 to Wave 3. While the differences between the samples were generally small, in Wave 3 there was higher attrition among younger participants, people who had gambled on 10 or more activities in the past year and those who not gambled in the past year, and people who had experienced five or more major life events in the past year. There was greater retention among European/Other, people resident in Wellington and Christchurch, non-problem gamblers and problem gamblers, and people whose quality of life was above the median score. Wave 3 data analyses were adjusted to account for attrition effects. The adjustments for differential attrition and weighting enabled findings to be generalised to the New Zealand adult population.

The survey instrument for the 2014 two year follow-up (Wave 3) of the National Gambling Survey was similar to Wave 1 and Wave 2 surveys and covered 12 key areas:

1. Leisure activities and gambling participation
2. Past gambling and recent gambling behaviour change
3. Problem gambling
 - Problem Gambling Severity Index
 - Help-seeking behaviours
 - Gambling in households
4. Life events and on-going hassles
5. Attitudes to gambling in New Zealand
6. Mental health
 - General psychological distress
 - Quality of life
7. Alcohol use/misuse

8. Substance use/misuse
 - Tobacco
 - Other drugs
9. Health conditions
10. Social connectedness
11. New Zealand Individual Deprivation Index
12. Demographics.

Results

Major findings

Results

- Gambling participation (76.7% of adults), at-risk (1.5% moderate-risk, 5.0% low-risk) and problem gambling (0.3%) prevalence estimates in 2014 were largely unchanged from 2013 and 2012.
- The at-risk groups were the least stable over time (i.e. people were more likely to transition to higher or lower risk status), the non-problem and non-gambling groups were the most stable, and the problem gambling group was in the middle.
- Prevalence in each risk group did not change over time as people leaving each group were matched by new entrants.
- Substantial proportions of ‘new’ problem gamblers (21%), and to a lesser extent, moderate-risk gamblers (15%) have relapsed from past problem or moderate-risk gambling.
- The incidence rate of problem gambling from 2013 to 2014 (0.18%) was similar to that from 2012 to 2013 (0.28%).
- The strongest risk factors for developing at-risk or problem gambling were previously having a gambling problem, gambling intensity, ethnicity and some other demographic factors.
- Māori and Pacific adults continued to have higher rates of low-risk, moderate-risk and problem gambling over time. They also had higher incidence and more persistent problem and at-risk gambling.

Implications

- Whole-of-population public and targeted prevention strategies, taking into account ethnic and other differences, should be considered due to the substantial minority of problem and at-risk gamblers coming from non-problem and non-gambler sectors of the population.
- Greater attention could be given to relapse prevention through public policy and education, and in treatment programmes.

New Zealand gambling and problem gambling prevalence: 2012, 2013 and 2014

Gambling participation

- In 2014, it was estimated that 76.7% of adults participated in one or more gambling activities during the past 12 months, slightly less than in 2013 (77.9%) and 2012 (79.8%). However, these apparent differences are unlikely to be significant as estimate confidence intervals overlap.
- In 2014, as in 2012 and 2013, gambling participation was higher for European/Other (79.5%) and Māori (78.7%) than for Pacific people (71.6%) and Asian people (58.1%).

- There were no major changes from 2012 to 2014 with regard to the proportions of non-gamblers, infrequent gamblers, regular non-continuous gamblers and regular continuous gamblers. In 2014, 23.3% were non-gamblers, 56.5% infrequent gamblers, 15.3% regular infrequent gamblers and 4.9% regular continuous gamblers.
- There were generally no major changes from 2012 to 2014 in the number of gambling activities participated in during the past 12 months, gambling frequency, overall gambling expenditure, most preferred gambling activity and with whom people participated.
- However, somewhat fewer people reported typical monthly gambling expenditure of \$101-\$500 in 2014 than in 2012. Somewhat fewer participated in 7-9 activities in 2013 than in 2012; the reduction was maintained in 2014.
- There were no substantial reductions over time in the proportions of adults who participated annually in each of the individual gambling activities. However, from 2012 to 2013, there were slight reductions for pub (11.5% to 8.9%) and casino electronic gaming machine (EGM) (8.3% to 6.1%) gambling, EGM gambling overall (casino, pub and club EGMs combined) (17.6% to 14.1%), and sports betting (4.6% to 2.7%). There were no further reductions in these activities from 2013 to 2014. Participation was also somewhat lower in 2013 than in 2012 for making bets with friends or workmates. This difference was not evident in 2014.
- There was no difference in past year overseas internet gambling participation from 2012 to 2013 to 2014 (respectively 1.7%, 1.2% and 0.9%).
- In 2014, as in 2012 and 2013, the most popular past year activities were Lotto (59.6%), raffles or lotteries (45.7%), Instant Kiwi and/or other scratch tickets (29.1%), and bets with friends and workmates (13.0%). Participation in all other activities was less than 10%.
- From 2012 to 2013, there were no changes in monthly participation in any gambling activity. For combined EGM participation there was a reduction from 2012 to 2013 (respectively 4.9% and 3.4%); this was maintained in 2014 (3.5%). Monthly participation in raffles and lotteries, and Instant Kiwi and/or other scratch tickets was somewhat lower in 2014 than in 2012.
- Similar to findings in 2012 and 2013, in 2014 the most popular past month activity was Lotto (32.4%) followed by Instant Kiwi and/or other scratch tickets (9.5%), and raffles and lotteries (8.7%). In 2014, monthly participation in all other activities was less than three percent.

At-risk and problem gambling

- Problem gambling risk, as assessed by the Problem Gambling Severity Index (PGSI), did not change across the 2012, 2013 and 2014 surveys.
- In 2014, 0.3% were problem gamblers, 1.5% were moderate-risk gamblers, 5.0% were low-risk gamblers and 70.0% were non-problem gamblers. Although the 2014 problem gambling point prevalence estimate was lower than the 2012 and 2013 estimates, the confidence intervals overlap. Consequently, it is unlikely that problem gambling prevalence reduced. The point estimates for moderate-risk and low-risk gamblers were very similar in all three surveys.
- In all three surveys, European/Other had higher rates of non-problem gambling than Māori, Pacific and Asian adults.
- In all three surveys, Māori and Pacific adults had higher rates of problem, moderate-risk and low-risk gambling than European/Other adults. Asian rates were similar to European/Other rates.

- 2014 ethnic estimates are:
 - Māori: 1.6% problem gamblers, 4.7% moderate-risk gamblers, 9.5% low-risk gamblers, 63.0% non-problem gamblers
 - Pacific: 1.9% problem gamblers, 5.7% moderate-risk gamblers, 10.2% low-risk gamblers, 53.8% non-problem gamblers
 - Asian: 0.1% problem gamblers, 1.4% moderate-risk gamblers, 5.2% low-risk gamblers, 51.5% non-problem gamblers
 - European/Other: 0.1% problem gamblers, 0.7% moderate-risk gamblers; 4.0% low-risk gamblers; 74.7% non-problem gamblers.

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

- Similar percentages of adults who gambled in 2012, 2013 and 2014 used the following methods to stop gambling too much: a trusted person managed the money (0.5% in 2014); left automated teller machine (ATM)/credit cards at home (1.1%), set a time limit for gambling (1.2%) and avoided betting/gambling venues (1.4%).
- Somewhat lower percentages reported setting a money limit for gambling in 2013 (13.4%) than in 2012 (16.0%); however, the 2014 estimate (15.9%) was similar to 2012. Somewhat lower percentages also reported separating betting money and stopping when it was used in 2013 (2.2%) than in 2012 (3.5%). As with setting a money limit, the percentage increased slightly in 2014 (2.7%).
- Across the three surveys, the same percentage (0.1%) reported seeking formal (professional) help for gambling in the past year and similar percentages (range of 0.3% to 0.4%) reported seeking formal or informal (e.g. from family or friends) help for gambling.

Significant life events

- In 2014, 29.0% of adults had not experienced any significant life event, 28.5% experienced one event, 19.8% experienced two events, 13.0% experienced three events, 4.4% experienced four events and 5.2% experienced five or more events.
- Similar percentages of adults experienced one or more significant life events in 2012, 2013 and 2014 (range of 71.0% to 72.6%).
- Somewhat more adults experienced one significant life event in 2013 (30.0%) than in 2012 (26.3%) and 2014 (28.5%).
- Similar percentages experienced two (range of 18.4% to 19.8%) and three (range of 11.6% to 13.0%) life events across the three surveys.
- Somewhat fewer adults experienced four and five or more life events in 2013 (respectively 5.7% and 5.1%) and 2014 (4.4% and 5.2%) than in 2012 (7.7% and 8.6%).

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

- In 2014, 48.5% of adults scored above the median for quality of life, 6.9% experienced moderately high or high levels of psychological distress, 33.1% engaged in hazardous alcohol consumption, 17.1% smoked tobacco in the past year, 10.5% reported using illegal or recreational drugs other than alcohol and tobacco, and 8.9% reported cannabis use.
- Across the three surveys, there were similar levels of quality of life (range of high levels from 47.4% to 49.2%), psychological distress (range of moderately high and high from 6.8% to 7.1%) and tobacco use (range of 17.1% to 18.6%).

- Hazardous alcohol consumption was lower in 2014 (33.1%) than in 2012 (37.1%). Other drug use and cannabis use were both lower in 2013 (11.4%, 9.1%) than in 2012 (14.7%, 12.1%); the reduction was maintained in 2014 (10.5%, 8.9%).

Transitions including problem gambling incidence and relapse

Stability of PGSI groups

- Non-problem and non-gamblers were the most stable groups between 2013 and 2014 with 83.0% and 64.1% respectively remaining in the same group.
- The problem, moderate-risk and low-risk groups were less stable with less than a third (respectively 27.4%, 27.8% and 27.8%) staying in the same group.

Stability of PGSI groups by ethnicity

- PGSI transitions from the 2012 to 2013, and 2013 to 2014 surveys were combined to enable comparisons to be made by major ethnic groups.
- As for the population as a whole, the non-problem and non-gamblers were generally the most stable groups for all ethnic groups. Over half of participants remained in each of these groups across the survey waves.
- Relative to other ethnic groups, a higher proportion of Māori remained problem gamblers across the waves. Around two-thirds (68.3%) of Maori problem gamblers remained in that category and a further 7.9% transitioned to the moderate-risk category (total 75.2%). For Pacific adults, just over half (54.0%) of problem gamblers remained in the problem or moderate-risk categories. The corresponding percentages for Asian and European/Other were 19.9% and 39.7% respectively.

Commencing gambling and transitions to increased risk or problem gambling

- Across the three surveys, overall, a third (33.4%) of non-gamblers became non-problem gamblers, 2.0% became low-risk gamblers, 0.2% became moderate-risk gamblers and 0.1% became problem gamblers.
- A small proportion (4.3%) of non-problem gamblers became low-risk gamblers, 0.7% became moderate-risk gamblers and 0.1% became problem gamblers.
- One in ten (9.7%) of low-risk gamblers became moderate-risk gamblers and 0.6% became problem gamblers.
- One in ten (9.7%) of moderate-risk gamblers became problem gamblers.

Commencing gambling and transitions to increased risk or problem gambling by ethnicity

- Overall, about half (49.0%) of Māori non-gamblers started gambling or moved into higher risk categories, substantially more than was the case for other ethnic groups. Corresponding estimates for Pacific, Asian and European/Other people are 33.7%, 24.2% and 37.7%. Somewhat more Māori (4.5%) and Pacific (3.4%) than Asian (2.0%) or European/Other (1.9%) people moved from the non-gambling to one of the risk or problem gambling categories.
- Māori, Pacific and Asian non-problem gamblers (respectively 9.9%, 14.1% and 7.7%) more often than European/Other (4.2%) transitioned into the at-risk and problem gambling categories.

- Relative to European/Other, Māori and Pacific low-risk and moderate-risk gamblers more often moved into higher risk or problem categories. Of Māori low-risk gamblers, 16.8% became moderate-risk or problem gamblers and 12.1% of moderate-risk gamblers became problem gamblers. The corresponding Pacific estimates were 13.5% and 14.9%. The European/Other estimates were 9.1% and 7.9%. The Asian sample was not sufficiently large to provide reliable estimates.

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

- Across the three surveys, overall, a fifth (20.5%) of problem gamblers became non-gamblers, around a quarter (26.4%) became non-problem gamblers and an eighth (16.7%) became low-risk or moderate-risk gamblers. Over a third (36.3%) remained problem gamblers.
- Over half of the moderate-risk gamblers moved into the low-risk (24.9%) or non-problem gambling (32.1%) categories and 5.6% became non-gamblers.
- Over half of the low-risk gamblers (58.1%) became non-problem gamblers and 4.8% became non-gamblers.

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

- Overall, 7.9% of Māori problem gamblers became moderate-risk gamblers, 12.2% became low-risk gamblers and 11.5% became non-problem gamblers. Over two-thirds (68.3%) remained problem gamblers.
- Relative to Māori (32.7%), substantially more Pacific (75.6%), Asian (100%) and European/Other (61.1%) adults transitioned from problem gambling to at-risk gambling, non-problem gambling and non-gambling and fewer (24.4%, 0%, 38.9% respectively) remained problem gamblers.
- More Asian (94.7%) than Māori (59.6%), Pacific (54.5%) and European/Other (64.1%) moderate-risk gamblers became low-risk, non-problem gamblers or non-gamblers.
- Relative to Māori (44.4%), more Pacific (63.7%), Asian (73.4%) and European/Other (65.3%) low-risk gamblers became non-problem gamblers or non-gamblers.
- Relatively more Asian low-risk gamblers stopped gambling (19.2%) than Māori (1.4%), Pacific (4.3%) and European/Other (3.9%) low-risk gamblers.

Incidence and relapse

- Based on the number of participants who became problem gamblers during the 12 month period between the 2013 and 2014 surveys, the national incidence rate for problem gambling is 0.18% (CI 0.06, 0.30), approximately 5,942 people (CI 1,980, 9,903). This compares with the 2012 to 2013 incidence estimate of 0.28% (CI 0.10, 0.45). The confidence intervals overlap so it is most unlikely that there was a change.
- Of those who developed problem gambling between 2013 and 2014, 79% (CI 58.2, 99.7) were new problem gamblers and 21% (CI 0.3, 41.8) were people who had problems in 2012 or previously in their lifetimes.
- It is estimated that 1.0% (CI 0.68, 1.35), approximately 32,386 people (CI 22,023, 43,721), of those who were not moderate-risk or problem gamblers in 2013 became moderate-risk gamblers in 2014. This compares with the 2012 to 2013 moderate-risk incidence rate of 1.1% (CI 0.7, 1.5).
- Of people who became moderate-risk gamblers in 2014, 85% (CI 74.3, 95.8) were new moderate-risk gamblers (i.e. had never been moderate-risk or problem gamblers before);

this compares with 71% (CI 54.2, 87.9) who had become new moderate-risk gamblers in 2013. In 2014, 15% of the people who became moderate-risk gamblers were people who were not moderate-risk gamblers in 2013 but who had been moderate-risk or problem gamblers in 2012 or at some stage earlier than 2012.

- In 2014, 17% of moderate-risk and problem gamblers (combined) were people who were not in this category in 2013 but had been moderate-risk or problem gamblers prior to 2013 (i.e. they had relapsed into moderate-risk/problem gambling). In Wave 2 (2013), 26% were in this relapse category.

Problem cessation

- Of those who were problem gamblers in 2013, 72.6% (CI 50.7, 94.6), approximately 12,237 people (CI 8,539, 15,952) were no longer problem gamblers in 2014; 6.5% became moderate-risk gamblers, 2.6% low-risk gamblers, 19.4% non-problem gamblers and 44.1% non-gamblers. From 2012 to 2013, relatively more participants remained in the problem gambling (44.1%) category and none became non-gamblers.
- Of those who were moderate-risk gamblers in 2013, 72.2% (CI 60.0, 84.3), approximately 36,926 people (CI 30,724, 43,128) were no longer moderate-risk gamblers in 2014; 9.9% became problem gamblers, 24.5% low-risk gamblers, 33.7% non-problem gamblers and 4.1% non-gamblers. These percentages are very similar to the corresponding 2012 to 2013 transitions.

Predictors of transitions to gambling, non-problem gambling, at-risk gambling and problem gambling

Analyses were conducted on combined data from transitions across the three waves of the study (2012 to 2013, and 2013 to 2014). Some categories were also combined. This increased statistical power and facilitated the identification of risk and protective factors. Given the often substantial overlap between the various measures, multiple logistic regression as well as bivariate associations were examined.

Predictors of the transition from non-problem or low-risk gambler to moderate-risk or problem gambler

Aggregated across the three waves, 1.6% of the total transitions were into the moderate-risk or problem gambling categories from the non-problem or low-risk gambler categories. The remainder stayed as non-problem or low-risk gamblers.

- In the bivariate associations, gambling participation measures were generally the strongest predictors of movement from non-problem or low-risk gambling to moderate-risk or problem gambling. For example, relative to adults who took part in one gambling activity during the past 12 months, those who took part in seven to nine, or ten or more activities were respectively seven and nearly fifteen more times more likely to become a moderate-risk or problem gambler. Past year and past month participation in a variety of individual gambling activities, particularly continuous forms, were also associated with greater risk of becoming a moderate-risk or problem gambler. With respect to both past year and past month participation, the strongest association was with overall EGM involvement. Slightly lower risk was associated with monthly EGM participation in casino, club and pub settings and longer average session times in these settings. Monthly card game participation was

also a high risk factor. High reported typical monthly gambling expenditure was an additional risk factor. Gambling with other people was a protective factor.

- Getting a trusted person to manage money, setting a gambling expenditure limit before leaving home and separating money for betting from other money and stopping gambling when the former is spent were additional gambling-related risk factors.
- Ethnicity was a strong risk factor with Pacific adults at particularly high risk (OR 8.2) relative to European/Other adults. Māori (OR 4.8) and Asian (OR 3.1) adults were also at high risk. High deprivation (a score of four or more on the New Zealand Deprivation Index) was an additional risk factor. High household income was protective.
- Experiencing any significant life events rather than none, lower quality of life and low-medium or high-medium psychological distress also predicted the development of moderate-risk or problem gambling. Past and current tobacco use as well as current cannabis and other drug use were further risk factors.
- In the multiple logistic regression analyses, three gambling participation measures remained significant risk factors, namely typical monthly gambling expenditure of \$101-\$500, monthly overall EGM participation and avoiding places that have betting or gambling. Gambling with other people remained protective.
- Large ethnic differences remained when other factors were taken into account with Pacific (OR 7.2), Māori (OR 4.9) and Asian (OR 3.1) adults at significantly higher risk for the development of moderate-risk or problem gambling than European/Other adults. High household income remained protective.
- As in the bivariate analyses, low-medium and high-medium psychological distress and drug use were additional risk factors.

Predictors of staying a moderate risk or problem gambler

Across the three waves, 43% of the moderate-risk and problem gamblers remained in the combined moderate-risk-problem gambling category.

- In the bivariate associations, a number of gambling participation measures predicted longer duration moderate-risk and problem gambling, namely weekly gambling, regular continuous and non-continuous gambling, high typical monthly gambling expenditure, annual sports betting, and monthly or more frequent participation in keno, horse and dog race betting and pub EGMs. Having ever sought help for gambling (formal, or formal and informal combined) was an additional predictor. Gambling with others was associated with shorter duration moderate-risk/problem gambling.
- Pacific people (OR 2.6) were at higher risk than European/Other people of remaining moderate-risk or problem gamblers, as were Presbyterians and Other Christians. People with secondary education compared to people with no formal qualifications, those living in households of three or four people, and people with household incomes of \$60,001-\$80,000 were less likely to remain moderate/risk/problem gamblers.
- In the multiple logistic regression analyses, only at least weekly gambling participation and having ever sought formal help for gambling remained statistically significantly associated with staying as moderate-risk/problem gamblers. Both were very strong predictors.

Predictors of the transition from non-problem gambling to low-risk, moderate-risk or problem gambling

Total population

Aggregated across the three waves, 5.8% of the transitions were from the non-problem gambling category into the low-risk, moderate-risk or problem gambling categories. The remainder stayed in the non-problem gambling category.

- As for the transition to moderate-risk or problem gambling, in the bivariate associations, a large number of gambling participation measures predicted the transition to low-risk, moderate-risk and problem gambling. Predictors included number of activities engaged in, high typical monthly gambling expenditure, regular continuous gambling, at least weekly or monthly overall gambling participation, and annual and monthly participation in a wide variety of continuous gambling activities. Of the various gambling activities, the strongest predictors were monthly casino table games participation; monthly EGM participation overall and in pubs, casinos and clubs, and longer average EGM sessions in each of these settings, especially in pubs and clubs. Monthly housie or bingo participation and both monthly horse/dog race betting and sports betting were moderately strong predictors. Gambling with other people was not protective for this transition.
- Some other gambling-related factors, while statistically significant, were less strongly predictive. These factors were setting a dollar limit for gambling before leaving home, separating gambling money from other money, setting a time limit for gambling, having sought formal or informal support for gambling and knowing another person or persons with a gambling problem.
- Pacific (OR 4.7), Māori (OR 2.9) and Asian adults (OR 2.2), relative to European/Other (OR 1.0) adults were at high risk. A number of additional demographic factors predicted the transition from non-problem to low-risk, moderate-risk and problem gambling, namely younger age, migrants, Presbyterian or Other religion (other than Christian), higher deprivation and large household size. Adults with a university degree, adults earning more than \$100,000 per annum and adults living in parts of the country other than Auckland were less likely to transition.
- Experiencing one or more significant life events in the past year, lower quality of life, higher psychological distress and past year tobacco, cannabis and other drug use were additional risk factors.
- In the multiple logistic regression analyses, four gambling participation factors remained significant, namely at least weekly and monthly overall gambling participation, monthly casino table games or EGM participation, monthly pub EGM participation and high average time spent playing pub EGMs.
- Relative to European/Other, Pacific (OR 4.8), Māori (OR 2.3) and Asian (OR 2.9) adults remained at high risk.
- Experiencing significant life events, high psychological distress, lower quality of life and cannabis use also remained significant in the multiple logistic regression analyses.

Māori

Across the three study waves, 11.5% of the transitions for Māori were into the low-risk, moderate-risk and problem gambling categories from the non-problem category.

- As found for the general population, in the bivariate associations, various gambling participation measures predicted the transition to low-risk, moderate-risk and problem

gambling from non-problem gambling including regular continuous gambling, number of activities participated in, and annual and monthly participation in a number of individual activities. Of these the strongest risk factors were taking part in seven to nine gambling activities, monthly casino table games or EGM participation and monthly pub EGM participation. High average time spent playing pub EGMs was also a risk factor.

- Setting a dollar limit for gambling before leaving home and setting a time limit were also significant predictors.
- Māori aged between 35 and 64 years were significantly less likely than Māori aged 18 to 24 years to move into the low-risk, moderate-risk and problem gambling categories. Higher personal income was also protective.
- Lower quality of life and higher psychological distress were further risk factors.
- In the multiple logistic regression analyses, age was the only demographic predictor with Māori aged 35 to 64 years at much lower risk than those aged 18 to 24 years.
- Time spent playing pub EGMs in an average day and setting a dollar limit before leaving home remained statistically significant in the analysis.
- Higher psychological distress was the only other significant predictor.

Pacific people

Across the three study waves, 17% of the transitions for Pacific adults were into the low-risk, moderate-risk and problem gambling categories from the non-problem category.

- Lower quality of life and higher personal income were the only factors in the bivariate associations that predicted this transition. Lower quality of life was the sole predictor remaining in the multiple logistic regression analyses.

Predictors of staying a low-risk, moderate-risk or problem gambler

Across the three waves, 46% of the low-risk/moderate-risk/problem gamblers remained in that combined category.

- In the bivariate associations, participation in 10 or more gambling activities at Wave 1, regular continuous and regular non-continuous gambling, at least weekly or monthly gambling, high typical monthly gambling expenditure, and annual or monthly participation in a large number of particular gambling activities predicted staying in the low-risk/moderate-risk/problem gambling category. Activities included card games, housie or bingo, betting on horse or dog races, sports betting, casino table games or EGMs, EGMs in clubs, pubs and casinos, overseas internet gambling, keno and Lotto. Of these, monthly or more frequent participation in EGMs (overall), pub EGMs, betting on horse or dog races, keno, card games and annual overseas internet gambling were the strongest predictors. Longer average time spent playing EGMs in pub, club and casino settings was also a strong predictor.
- Knowing people with gambling problems, setting a dollar limit for gambling before leaving home, separating money for gambling from other money, and having sought help for gambling from formal sources in the past year were additional predictors. The latter was a very strong predictor.
- Māori were nearly three times more likely to stay in the low-risk/moderate-risk/problem gambling category than European/Other. Presbyterians were also more likely to remain in this category. Relative to people without formal qualifications, those with secondary school qualifications or a university degree were less likely to remain.

- None of the significant life events, mental health or substance use/misuse measures were significantly related to at-risk/problem gambling persistence.
- In the multiple logistic regression analyses, of the demographic measures, only ethnicity was retained with both Māori and Pacific adults being more likely to remain in the low-risk/moderate-risk/problem gambling category. Gambling participation measures were also retained; specifically, at least weekly participation, annual casino table games or EGM involvement, and monthly or more frequent participation in betting on horse or dog races, pub EGMs and club EGMs.

Māori

Across the three waves, 65% of Māori low-risk, moderate risk and problem gamblers remained in that category.

- As for the overall population, in the bivariate associations, gambling participation measures were the strongest risk factors for remaining a low-risk/moderate-risk/problem gambler. Taking part in more than three different gambling activities in Wave 1 and typically spending over \$50 a month on gambling were strong risk factors, as was monthly or more frequent keno participation. Past year and monthly or more frequent involvement with pub EGMs and EGMs overall, and time spent playing pub EGMs in an average day were moderately strong risk factors. Annual participation in casino table games or EGMs, casino EGMs and club EGMs were further predictors, albeit less strong than the other participation measures.
- Setting a dollar limit for gambling before leaving home, hazardous alcohol use, cannabis use and other drug use were additional predictors.
- In the multiple logistic regression analyses, only two measures remained statistically significantly associated with remaining a low-risk, moderate-risk or problem gambler, namely spending 60 minutes or more playing pub EGMs in an average day and setting a dollar limit for gambling before leaving home.

Pacific people

Across the three waves, 52% of Pacific low-risk, moderate-risk and problem gamblers remained in that category.

- In the bivariate associations, three measures predicted retention in this category, namely annual sports betting with friends/workmates, sports betting and casino EGM participation. Of these, only casino EGM participation remained in the multiple logistic regression analyses.

Initiation of gambling in Wave 2 or Wave 3 from the prior wave

Across the waves, 29% of transitions were for people who started gambling in Wave 1 or Wave 2 from not gambling in the prior wave.

- Relative to European/Other, in the bivariate associations, Asian adults were less likely to start gambling. Migrants, especially recent migrants, Other Christians (other than Anglican, Catholic or Presbyterian) and Other Religions (non-Christian) were also less

likely to start gambling. Adults living in Christchurch or outside the three largest metropolitan areas were more likely to start gambling than Auckland residents were.

- Relative to adults with the lowest psychological stress, those with moderately low stress were less likely to commence gambling whereas those with moderately high stress were more likely to. Hazardous alcohol use and past or current tobacco use also predicted starting gambling.
- In the multiple logistic regression analyses, Other Christian, Other Religion, psychological distress and ever having smoked daily remained as significant predictors of starting gambling.

Re-initiation of gambling in Wave 2 or Wave 3 from the prior wave

Across the waves, 44% of transitions were for people who had not gambled in the past year but who had previously gambled and who started gambling again in Wave 2 or Wave 3.

- Relative to Auckland residents, in the bivariate associations, people living in Christchurch had a lower risk for re-initiating gambling than people living in Auckland.
- Hazardous drinking, drug use and past and current tobacco use were additional risk factors.
- In the multiple logistic regression analyses, Christchurch residence remained protective and ever having smoked tobacco was retained as a risk factor.

Conclusion

The study findings have implications for policy and practice in public health and treatment. As a substantial minority of problem and at-risk gamblers come from non-problem and non-gambler sectors of the population, both whole-of-population public and targeted prevention strategies are likely to be required. These interventions will need to take account of ethnic and other differences. The high proportion of people in the general population who are relapsing rather than developing problems for the first time means that greater attention could be given to relapse prevention through public policy and education. Relapse could also be considered in treatment programmes, although the relapse rates for clients attending treatment services is likely to be different from the general population. Further research is required to advance understanding of connections between exposure to high densities of EGMs and other gambling activities in high deprivation communities; ethnicity; personal and social vulnerabilities and resilience; and gambling-related harm.

1 BACKGROUND

The New Zealand National Gambling Study (NGS) is a nationally representative prospective survey of adults aged 18 years and older, which provides information on the prevalence, incidence, nature and effects of gambling in New Zealand. It employed a face-to-face household recruitment methodology with data collected via computer-assisted personal interviews (CAPI). The NGS commenced in 2012 (Wave 1) and is following the same participants over a period of three years. The Wave 1 baseline sample comprised 6,251 adults aged 18 years and older. It was a multi-stage, stratified, probability-proportional-to-size sample with over-sampling of Māori, Pacific people and Asian people. Wave 2 re-interviewed 3,745 participants 12 months after the initial interview whilst 3,115 participants were re-interviewed in Wave 3 (two years after initial interview). Re-interviewing of participants for Wave 4 (2015) is completed.

The Wave 1 baseline survey incorporated a range of measures including gambling participation, gambling strategies and cognitions, gambling attitudes, problem gambling, health and well-being, psychological status, readiness to change, substance use/misuse, life events, social capital/support and demographic information. Many of the same measures have been used in previous New Zealand and international gambling studies, allowing 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 and Wave 3 in order to measure change over time and identify factors predictive of change in gambling and problem gambling.

An additional cohort of 100 moderate-risk and problem gamblers was initiated in Wave 3. The purpose was to boost numbers of participants in these categories to allow more detailed analyses of transitions over time, and to compare characteristics of the new cohort with moderate-risk and problem gamblers in the main NGS. Participants for this additional cohort were recruited from gambling venues and via advertisements, and were screened as moderate-risk or problem gamblers with the Problem Gambling Severity Index (PGSI). The questionnaire for this additional group corresponds to that used in Wave 1 for the main NGS participants. The additional cohort will be re-interviewed 12 months after recruitment with the questionnaire corresponding to that used in Wave 2 for the main NGS participants.

This report describes Wave 3 of the New Zealand National Gambling Study, presenting and discussing results from the two year follow-up assessment of participants conducted in 2014, with reference to findings from Wave 1 and Wave 2. Results for the additional cohort participants will be presented separately. 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., 2015a). The Wave 2 results are detailed in a fourth report (Abbott, Bellringer, Garrett, & Mundy-McPherson, 2015b).

Study objectives

The major interests of Wave 3 of the National Gambling Study were to:

- Investigate incidence of problem gambling from Wave 2 to Wave 3 (i.e. the number of 'new' cases of problem gambling)
- Investigate transitions between levels of gambling risk (i.e. no gambling, non-problem gambling, low-risk gambling, moderate-risk gambling and problem gambling)
- Investigate risk and resiliency factors for problem gambling.

Background

Worldwide, since the mid-1980s, there has been substantial growth in gambling availability, participation and expenditure (Abbott et al., 2014a; Bogart, 2011). It has been argued that this expansion is unprecedented in nature and scale and has wide-ranging impacts, both positive and negative (Abbott & Volberg, 1999). During this period, there have been hundreds of general population surveys of gambling and problem gambling. This includes a substantial number of New Zealand studies. This body of research has provided a great deal of information about gambling participation and gambling-related problems and other harm, and how they have changed over time. Reviews of these studies are provided in earlier NGS reports (Abbott et al., 2014a, 2014b, 2015a, 2015b) and are not repeated here. The first phase of the NGS (Abbott et al., 2014a) was largely designed to provide detailed information about changes in gambling participation and problems during the past decade.

In many jurisdictions, gambling participation initially increased with increasing availability. Participation subsequently levelled out and declined, while availability continued to increase (Abbott et al., 2014a, 2015b). A similar trend was evident for problem gambling with initial increases followed by decreases (Abbott et al., 2015b; Williams et al., 2012).

In New Zealand there was an unprecedented rise in gambling availability and expenditure from 1987 to 1990. A national lottery, scratch lottery, and club and pub electronic gaming machines (EGMs) were introduced at this time. From 1985 to 1990, overall gambling participation increased (Department of Internal Affairs, 2007), and problem gambling prevalence was substantially higher in 1990 (Abbott & Volberg, 1991a; 1996) than in any subsequent New Zealand survey. No national problem gambling survey had been conducted prior to 1990. However, problem and pathological gambling were included in the 1986 Christchurch general population psychiatric epidemiology study (Wells et al., 1992). Prevalence rates were much lower in that study than in the 1990 national survey. Given these findings, and the findings from some other jurisdictions (Williams et al., 2012), it seems likely that gambling problems increased during this early expansion phase. This is consistent with the availability hypothesis (Abbott, 2006).

Gambling availability and expenditure in New Zealand continued to grow during the 1990s. Increased availability included a further rise in EGM venues and numbers, the establishment of casinos in major metropolitan centres and the introduction of sports betting. Surveys showed that although availability and expenditure increased, overall past year gambling participation reduced slightly and regular (weekly or more) participation in continuous forms of gambling decreased significantly. Problem gambling prevalence was also substantially lower in 1999 than in 1990. The finding of decreased participation and decreased gambling-related problems during a period of increased availability is consistent with the adaptation hypothesis (Abbott, 2006). The finding of decreased problems with decreased participation, especially in continuous forms, is also consistent with the single distribution or total consumption model (Rose, 2001).

Since 2000, overall gambling availability continued to increase in New Zealand although EGM venues and numbers reduced steadily from 2003. Total official gambling expenditure remained fairly constant since 2004. However, it reduced by about a fifth in inflation-adjusted terms and the reduction is greater when considered on a per capita basis. The NGS (Abbott et al., 2014a) and other surveys (Tu, Gray & Walton, 2014) found during the 2000s that annual and regular participation continued to decline overall as well as for most individual gambling activities including non-casino EGMs and horse/dog race betting. Reduced participation is evident across most demographic groups, especially weekly participation by younger people. There

were some exceptions. Little or no reduction was found for Pacific and Asian people, unemployed people, older people and people lacking formal qualifications.

In contrast to the 1990s, there is no evidence that problem gambling prevalence decreased with decreasing participation rates during the 2000s (Abbott et al., 2014a; 2015a; Tu, Gray & Walton, 2014). When methodological differences between studies are taken into account, it appears that problem gambling prevalence has remained much the same during the past 10 to 15 years. These findings are not consistent with either the availability or adaptation hypotheses. Both predict further reductions in gambling-related harm over time when participation and expenditure fall, especially in high-risk continuous gambling activities including EGMs and horse/dog race betting. Similar results have been obtained in recent general population studies in Victoria (Abbott et al., 2015c) and Sweden (Abbott et al., 2014c). Further research is required to understand why gambling-related problems appear to have plateaued in New Zealand and some other places, when participation in gambling generally, as well as in high-risk forms, has declined markedly.

In addition to providing information on gambling participation and problem gambling prevalence rates, general population studies identify risk factors for problem gambling. A number of gambling participation and demographic factors consistently emerge as predictors of problem gambling and related harm. Participation risk factors include self-reported gambling involvement in childhood, current regular participation in continuous forms of gambling, engagement in multiple gambling activities, gambling for long periods of time, high gambling expenditure, living with someone considered to have a gambling problem, and gambling alone. As the baseline NGS survey and other prevalence studies are cross-sectional, temporal relationships between participation and problem gambling are unclear. This is also the case, to varying degrees, for other factors found to be associated with problem gambling. In the baseline survey, problem gamblers and, to a lesser extent, moderate risk and low risk gamblers had higher rates of hazardous drinking, tobacco use, other drug use, self-rated poor health, psychological distress and low quality of life. Problem gamblers also much more often than non-problem gamblers experienced major life events and deprivations such as being forced to buy cheaper food, unemployment, receiving income from benefits and putting up with cold to save heating costs. These associations could arise because these factors precede and contribute to problem gambling. However, they could also arise because they are a consequence of problem gambling. Alternatively, both problem gambling and associated factors could share an underlying common cause or causes.

While gambling participation has decreased substantially in New Zealand during the past 20 years, and problem gambling and related harm has probably plateaued, substantial differences remain between some demographic groups. This applies to both participation and gambling harm. Many of these differences have persisted for over 20 years (Abbott et al., 2014a; 2014b). Māori continue to have higher rates of gambling participation and harm. Pacific people have similar rates of harm to Māori. They differ in that they have lower participation rates. For more serious problem gambling, multivariate analyses identified Māori and Pacific ethnicity as the main risk factors, followed by male gender. Overall, males have similar participation rates to females; however, they more often take part regularly in some continuous forms of gambling and have higher self-reported expenditure.

Some other groups resemble Pacific people in that they have a pattern of lower participation and higher harm (problem and moderate risk gambling combined). They include Asian males, younger adults, other Christians and non-Christian religions. Although proportionately more people in these groups do not gamble, those who do gamble include a substantial number who gamble intensively and are at high risk for gambling harm. The combined availability/adaptation hypotheses (Abbott, 2006) propose that populations and population sectors that are

recently introduced to continuous gambling activities, including EGMs, are initially at high risk for the development of gambling-related problems. Many people in these groups, in addition to recent exposure, live in deprived communities with very high concentrations of non-casino EGM venues and Totalisator Agency Boards (TABs). They are probably also more vulnerable because they disproportionately experience other risk factors for gambling harm including lack of formal qualifications, unemployment and mental health problems.

The 2012 NGS baseline findings are broadly consistent with those of previous New Zealand and international prevalence research. They indicate that problem gambling and other gambling-related harm constitute a significant public health issue. They disproportionately affect Māori and Pacific people as well as people from some other groups that are vulnerable for a variety of reasons. Given their strong associations with a range of financial, educational, social and other health problems it is probable that they contribute to these problems and widen existing social and health inequalities. Considering the persistence of these differences over 20 years and the stabilisation of overall rates of harm despite continued reductions in gambling participation, it is reasonable to believe that whole of population approaches to harm reduction (e.g. reducing gambling availability and further reducing participation) will need to be augmented by policies and public health interventions that focus on the most at-risk populations and the factors that contribute to their vulnerability.

The NGS baseline survey and three reports based on the survey findings mainly involve consideration of cross-sectional relationships (Abbott et al., 2014a, 2014b, 2015a). Where participants were asked about past events and change over time it required them to recall and report experiences that had taken place many months or years previously. While this provides some useful information, participants' responses are often distorted by recall deficiencies and other factors. Prospective studies, where the same people are re-assessed over a period of time, are required to reduce recall bias and clarify temporal (chicken or egg) relationships between factors of interest including risk and protective factors for problem gambling development and factors associated with problem chronicity, recovery, remission and relapse.

The second (Abbott et al., 2015b) and subsequent phases of the NGS were primarily designed to assess the incidence of problem gambling, other transitions between levels of gambling risk and identify factors associated with these transitions. This is the first time that information of this type has been available in New Zealand. In addition to this prospective aspect of the study, the NGS provides a series of cross-sectional prevalence studies at 12 month intervals, enabling assessment of change and stability in population-level gambling participation and harm over time.

A comprehensive review of previous prospective gambling studies is provided in Abbott et al. (2015b) and will be updated in the final NGS report. The final report will incorporate findings from the present phase of the study and the final, fourth, phase. Most previous prospective studies involved relatively small samples and had significant methodological deficiencies. It is only recently that large-scale prospective studies have been conducted. Apart from the NGS, to our knowledge only two have large samples representative of a state's or country's adult population. An overview report on one of these studies (Victorian Gambling Study: VGS) has recently been published (Billi et al., 2014). The other study (Swedish Longitudinal Gambling Study: SWELOGS) is still in progress. While some reports have been published on the early phases of the Swedish study they are not yet available in English. The NGS, VGS and SWELOGS include a number of methodological commonalities that will facilitate future comparative analyses and potential data pooling.

Problem gambling (previously commonly referred to as compulsive or pathological gambling) was initially conceptualised as a chronic disorder. The formal diagnosis of pathological

gambling, in contrast to most mental health disorders, did not require the defining signs and symptoms to cluster together during a specified period. Additionally, there was no provision for an 'in remission' designation. Consistent with this initial conceptualisation, measures of problem gambling were lifetime measures. The most widely used problem gambling measure, the South Oaks Gambling Screen (SOGS), was adapted for the 1990 New Zealand national survey to include both current and lifetime measures. This new measure (SOGS-R) was validated in a general population context (Abbott & Volberg, 1992, 1996, 2006). Since then, most gambling studies used the SOGS-R, frequently dropping the lifetime frame and just using a past 12 month format. More recently the Problem Gambling Severity Index (PGSI), another past 12 month measure, and other instruments have been developed and increasingly used.

When first used, it was found that current SOGS-R prevalence estimates were approximately half the lifetime estimates (Abbott & Volberg, 1991b). This suggested that over time a substantial proportion of problem gamblers ceased having problems. In 1990, there were no treatment facilities for problem gamblers in New Zealand so it was assumed that this was primarily a consequence of natural recovery or remission. Subsequent studies that have used both lifetime and current measures obtained similar results. While strongly suggestive that problem gambling is much more fluid than initially thought, there are other possible interpretations.

SOGS-R classification as a current problem or probable pathological gambler requires that a specified number of criteria are met during the preceding six or 12 months. As previously mentioned, for lifetime problem or probable pathological gambling, there is no requirement for relevant signs or symptoms to cluster together. They could have occurred at any time in the past. This means that a number of people deemed to be lifetime problem or pathological gamblers may actually never have met current diagnostic criteria. This results in uncertainty about what the difference between lifetime and current rates means. If the clustering requirement was applied to the determination of both current and lifetime problems, it is likely that lifetime rates would be lower. Consequently, the difference between lifetime and current rates would be reduced. However, there are also reasons to believe that lifetime prevalence is underestimated. When phrased in the lifetime format, people are reflecting on distant experiences. It is expected that recall will be less reliable than when applied to a shorter timeframe. The first prospective general adult population study of problem gambling found that substantial numbers of lifetime probable pathological and problem gamblers assessed in 1990 did not report having ever experienced past problems when they were re-assessed seven years later (Abbott & Volberg, 1999; Abbott, Williams & Volberg, 2004). It was concluded that lifetime rates are unreliable and probably highly conservative. As expected, albeit contrary to the conceptualisation of pathological gambling at the time, this study also found that many people who were classified as current problem and probable pathological gamblers in 1990 no longer experienced current problems when re-assessed in 1998. This was especially the case for people who reported less severe problems at baseline who, at that time, did not have comorbid alcohol problems and who favoured participation in forms of gambling other than betting on horse and dog races.

Cross-sectional surveys provide information about recent gambling behaviour, problem gambling and various other related matters. They also provide information about prior experiences; however, this information is less reliable and, for gambling problems, is likely to reflect substantial under-reporting. While providing an indication of change over time at the individual level, retrospective accounts are, at best, a poor proxy for prospective investigation. As mentioned earlier, prospective studies are required to assess more accurately changes including problem development, duration, recovery and relapse.

Prospective studies have confirmed that individuals' gambling behaviour and problems change appreciably over time (Abbott & Clark, 2007; Abbott et al., 2015b). People who gamble and report no risk factors or harm are the most stable. Change appears to be greatest for people who experience low to moderate levels of gambling problems, with most evidencing reduced problems over time and a minority developing problems that are more serious. Problem gamblers are relatively more stable although a moderate to large proportion reduce their problem levels or overcome them. A number, however, subsequently relapse. Very large general population samples are required to reliably assess rates of problem onset (incidence), recovery and remission. While a number of prospective studies provide an indication of incidence and other transitions, small sample size, non-representative samples, low numbers of problem gamblers, as well as non-random attrition and a raft of other methodological shortcomings reduce confidence in their findings.

Recently published Canadian studies provide the most comprehensive account of risk and protective factors for problem gambling onset and relapse (Williams et al., 2015). Information was obtained on a very large number of potential factors. Multivariate analyses accounted for the majority of variance at all assessment points, indicating that the results provide a fairly comprehensive account of relevant predictors.

In the Canadian studies, when problem gambling development was considered, irrespective of whether it was first-time onset or relapse, a large number of individual predictors were identified including those mentioned in the preceding paragraph. However, many of these factors were found to be no longer significant when their overlapping predictive power was taken into account in multivariate analyses. The strongest predictor was already being an at-risk or problem gambler. This was followed by a number of other aspects of gambling behaviour including increasing frequency of EGM and/or casino table game participation. Impulsivity, having a behavioural addiction, lifetime history of addiction to alcohol or drugs and a family history of mental health problems were the only other variables that added significantly to multivariate prediction.

When separate predictive models were developed for first time problem onset, problem chronicity and relapse, it was found that there was a great deal of overlap. Almost all of the gambling-related factors predicted first-time onset. However, being an at-risk gambler and living in close proximity to EGM venues were more strongly predictive of problem continuation and relapse. A number of other factors, on the other hand, were more strongly linked to problem onset. This included intensive gambling involvement, having a big win in the past year and gambling being a favourite leisure activity. Impulsivity and depression were additional strong predictors of problem onset.

As previously mentioned, apart from enabling the assessment of individual changes in gambling participation and problems over time, the NGS provides a series of cross-sectional prevalence studies, 12 months apart. In the first (2013) follow-up, there was little or no change from 2012 in the majority of measures of gambling participation and harm. There were slight reductions in some measures including gambling on seven or more activities in the past year, betting on EGMs, casino table games, sports betting, and making bets with friends or workmates. Apart from EGMs, where participation decreased, past month participation in all gambling activities was similar to 2012. There were no significant changes in the proportions of non-gamblers, infrequent gamblers, regular non-continuous gamblers and regular continuous gamblers. There were also no significant changes in the proportions of problem gamblers, moderate-risk gamblers, low-risk gamblers and non-problem gamblers. Ethnic differences in these categories also did not change significantly from 2012 to 2013.

Although there was no significant change in the prevalence of problem gambling from 2012 to 2013 (0.5%), just over half of the people who had problems in 2013 had not been problem gamblers 12 months earlier. Similarly, of those who were problem gamblers in 2012, less than a half remained problem gamblers the following year. A further 10%, however, moved into the moderate-risk category. In other words, while there is stability in problem gambling prevalence at the general population level, around half are not the same people from one year to the next.

For people with less serious problems (moderate-risk) during 2013 (1.5%), just over a quarter had also been in this category the previous year. Most had been low-risk or non-problem gamblers in 2012. Much smaller proportions had been had been non-gamblers or problem gamblers. Of those who were moderate-risk gamblers in 2012, nearly two-thirds were no longer moderate-risk or problem gamblers in 2013. Non-problem gamblers and non-gamblers were the most stable groups from 2012 to 2013, followed by problem gamblers. Moderate-risk and low-risk gamblers were the least stable.

Based on the number of people who became problem gamblers during the 12 month period between assessments, the national problem gambling incidence estimate is 0.28% (CI 0.10-0.45); approximately 8,000 (3,000-13,000) individuals. Of these 'new' cases, around half reported having had gambling problems prior to 2012. Given that the measure used to assess this, the lifetime SOGS-R, has been shown to significantly under-detect past cases of problem gambling (Abbott, Williams, & Volberg, 1999), it is likely that the proportion of people relapsing over a 12 month period is greater than half. Similar results have recently been reported for Victoria, Australia (Billi et al., 2014). This is an important finding with implications for policy and practice. It suggests that one reason for the levelling out in rates of gambling harm is the accumulation of substantial numbers of people who developed problems during earlier phases of gambling expansion and who remain prone to relapse. It also suggests that greater emphasis could be given to relapse and secondary prevention.

The situation was somewhat different for people with less severe problems. In 2013, of the estimated 1.1% (CI 0.7-1.5) 'new' moderate-risk gamblers, approximately 31,000 (20,000-42,000) individuals who had not been a problem or moderate-risk gambler in 2012, somewhat more than a quarter reported having had gambling problems prior to 2012. This is a lower proportion than was found for people with more serious problems. However, given the likely under-detection of past problems, it means that a substantial number of people who develop less serious problems are also relapsing problem gamblers.

Risk and protective factors for the initiation of gambling and the re-initiation of gambling were identified, as were factors for that predicted the development and/or continuation of at-risk and problem gambling.

While Māori were more likely to start gambling for the first time than people of other ethnicities were, this finding did not remain when other predictors were considered together in multivariate analyses. In multivariate analyses, controlling for other factors, daily tobacco smokers were significantly more likely to take up gambling. Recent migrants, people of other (non-Christian) religions and people in the low to mid psychological distress range were less likely to commence gambling during 2013 (Abbott et al., 2015b). Deprivation was the strongest predictor of re-initiating gambling after having stopped and the only predictor retained in multivariate analyses.

A large number of factors predicted the transition from non-problem or low-risk gambling to moderate-risk or problem gambling. The strongest individual risk factors were aspects of gambling behaviour (e.g. participating in multiple activities, regular EGM and casino table games participation, long EGM sessions and high gambling expenditure) and seeking help for

gambling. Participation in casino table games or EGMs was retained as a strong risk factor in multivariate analyses. Ethnicity was another strong risk factor with Pacific, Māori and Asian people more likely than European/Other to develop problems. People living in households earning between \$40,001 to \$80,000 and people experiencing higher levels of psychological distress were also at higher risk, as were people who reported avoiding gambling venues. Gambling with other people, rather than gambling alone, was a strong protective factor.

While predictors of remaining a moderate-risk or problem gambler were identified, the number of participants in this category was not large and the findings need to be treated with caution. More people remained in the combined low-risk, moderate-risk, problem gambling category and the results are consequently more robust. A number of gambling participation measures were predictive of moving into this combined category, as were being of Māori ethnicity, regular smoking, having a low quality of life, avoiding gambling venues and seeking help for gambling. Having a secondary school qualification was a protective factor. In multivariate analyses, a relatively small number of predictors were retained. Regular EGM and card games participation, along with annual or more frequent housie or bingo participation, were the only gambling activity measures to remain significant. Gambling with others, as was found for the development of moderate-risk and problem gambling, was highly protective.

The NGS 12 month follow-up findings indicate that there has been relatively little change from 2012 to 2013 in gambling participation and harm at the general population level. They are generally consistent with the findings of other recent New Zealand gambling surveys, increasing our confidence in the reliability of the NGS participation and harm prevalence estimates.

The most important aspect of the NGS is its prospective nature. This, along with its large sample size and relatively high response and retention rates, mean that for the first time we have estimates of the number of New Zealand adults who develop at-risk and problem gambling during a 12 month period (incidence), as well as an indication of the proportions that are new cases and are relapsing. They also provide estimates of problem reduction or cessation. The findings are generally consistent with previous studies indicating that problem and at-risk gambling are often transitory over the short-term. However, they also suggest that over the longer term, relapse is common, especially for people with more severe problems. The 24 month follow-up findings presented in this report and the findings from the subsequent 36 month follow-up will provide additional information regarding the individual gambling and problem gambling trajectories over time. The total number of transitions ‘captured’ will increase with each wave of the study. This will enable more robust determination of risk and protective factors of problem development, continuation, cessation/remission and relapse.

A number of the same factors predict the initiation of gambling and the development of at-risk and/or problem gambling (e.g. Māori ethnicity, psychological distress, smoking and hazardous alcohol use). There are, however, some interesting exceptions. Recent migrants and Other Christians were less likely to start gambling but more likely than European/Other to develop moderate-risk or problem gambling patterns. These are similar to findings from previous New Zealand cross-sectional gambling participation and problem gambling prevalence studies.

Prior history of problem gambling and intensity of involvement in continuous forms of gambling are the strongest predictors of problem gambling development. This is consistent with the findings of recent large, general population studies in Victoria (Australia), Sweden and Canada. The high proportion of ‘new’ moderate-risk and problem gamblers who are relapsing rather than developing problems for the first time is potentially important and warrants further consideration. Longer-term prospective tracking is required to more fully assess and understand the extent of relapse and reasons for it.

Māori, Pacific and Asian ethnicity are additional strong risk factors for the development of at-risk and problem gambling. High Māori and Pacific prevalence rates have prevailed since the first national gambling study was conducted in 1990 (Abbott & Volberg, 1991b). The new finding that these two groups also have high incidence rates mean that it is likely that ethnic prevalence differences will continue. This will partly depend on rates of problem cessation/remission. Although they should be treated as preliminary given small sample size, the NGS findings suggest that Māori may have more persistent problems than other ethnic groups. If this is so, long-standing disparities would be expected to increase, unless ways are found to address them. It is even less certain how persistent moderate-risk and problem gambling are for Asian and Pacific people. To date, Asian prevalence rates in New Zealand have not been found to be significantly higher than of European/Other. However, if Asian recovery/remission rates are similar or lower, it is likely that prevalence rates will be higher in future. It is hoped that the final two phases of the NGS will shed more light on this matter, among others.

2 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.

2.1 Ethics approval

Ethical approval to re-contact and re-interview participants for Wave 3 and Wave 4 was granted by the Health and Disability Ethics Committees on 3 March 2014 (Reference: NTY/11/04/040/AM03). Two amendments to the process for recruitment of the additional cohort of moderate-risk and problem gamblers from gambling venues and via advertisements were granted by the Health and Disability Ethics Committees on 29 May 2014 (Reference: NTY/11/04/040/AM05) and 13 November 2014 (Reference: NTY/11/04/040/AM06) respectively.

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 Survey instrument

The survey instrument¹ for the National Gambling Study Wave 3 assessment was extensive and covered 12 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 (including 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 DiClemente's (1986) stages of change model.
 - Gambling in households
4. Major life events

¹ Available from the Gambling and Addictions Research Centre, Auckland University of Technology website: www.aut-grc.ac.nz

5. Attitudes towards gambling
6. 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 scores from the original WHOQoL instrument (Schmidt, Muhlan & Power, 2005).
7. 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.
8. Substance use/misuse
 - Tobacco
 - Other drugs
9. General health conditions (individual questions)
10. Social connectedness
Questions around social connectedness were based on those used in the Victorian Gambling Study (Victorian Responsible Gambling Foundation, 2011, 2012).
11. 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).
12. Demographics

2.3 Overview of the survey methodology

2.3.1 Baseline (Wave 1 assessment)

The full Wave 1 survey methodology is described in Report number 1 of this series of reports on the New Zealand National Gambling Survey (Abbott et al., 2014a). For ease of reading the current report, key aspects of the survey methodology have been reproduced below.

- 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 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.

2.3.2 Wave 2 (one year) and Wave 3 (two year) follow-up assessments

Interviews for the Wave 2 and Wave 3 follow-up assessments were respectively conducted 12 and 24 months after the original interview date, or as near to this as practically possible. Contacting and interviewing participants followed the process described for the Wave 1 assessment with the following differences:

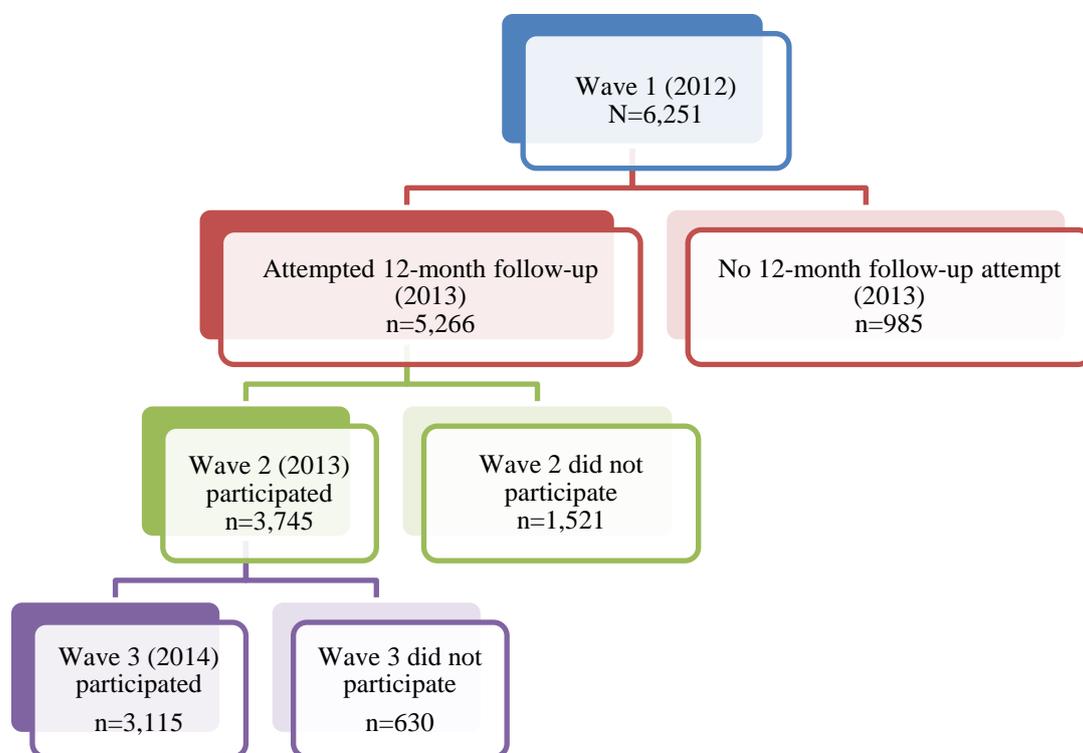
- Interviewers re-contacted participants face-to-face (i.e. door-to-door), at the residential address of the participant that was recorded at the previous assessment. The exception was for a small proportion of participants where significant travel was involved to the participant's address (usually a 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.
- As reciprocity in recognition for respondents' time, a \$20 (Wave 2) or \$40 (Wave 3) koha was given to participants on completion of the follow-up assessments.
- 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 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.

2.4 Survey population

2.4.1 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. Therefore, a 71% response rate was achieved in 2013 (60% of the total original sample). From March to December 2014 (Wave 3), 3,115 participants were again contacted and interviewed. This was an 83% response rate (Figure 1).

Figure 1: Number of participants interviewed in Wave 1, Wave 2 and Wave 3



2.4.2 Composition of the sample by gender and age groups

Just over half (58%) of the participants re-interviewed in Wave 3 were female; this was similar in both the previous waves. In Wave 2 and Wave 3, two-fifths (41%) of the participants were aged 40 to 59 years, about 30% were aged 18 to 39 years and about 29% were aged 60 years or older. This pattern is different from Wave 1 when there were slightly more participants in the youngest age grouping (36%) and thus slightly less participants in the other two age groups (Table 1).

Table 1: Gender and age of participants in Waves 1 to 3

Gender and age	Wave 1		Wave 2		Wave 3	
	n	(%)	n	(%)	n	(%)
Gender						
Male	2,642	(42.3)	1,607	(42.9)	1,319	(42.3)
Female	3,609	(57.7)	2,138	(57.1)	1,796	(57.7)
<i>Total</i>	<i>6,251</i>	<i>(100.0)</i>	<i>3,745</i>	<i>(100.0)</i>	<i>3,115</i>	<i>(100.0)</i>
Age groups[†]						
18 - 39 years	2,234	(35.7)	1,187	(31.7)	935	(30.0)
40 - 59 years	2,342	(37.5)	1,502	(40.1)	1,276	(41.0)
60+ years	1,668	(26.7)	1,055	(28.2)	903	(29.0)
<i>Total</i>	<i>6,244[#]</i>	<i>(99.9)</i>	<i>3,744^{##}</i>	<i>(100.0)</i>	<i>3,114^{##}</i>	<i>(100.0)</i>

[†] Age recorded at the 2012 baseline assessment

[#] Seven respondents refused age questions

^{##} One respondent refused aged questions

2.4.3 Composition of the sample by ethnicity

In Wave 3, the majority of participants identified as European/Other (62%), followed by Māori (17%), Pacific (12%) and Asian (11%). This was similar to the ethnic composition of the population in Wave 2 but was marginally different from Wave 1 when a slightly higher percentage was noted for Māori, Pacific and Asian participants (Table 2). However, because participants were permitted to identify with more than one ethnicity and were recorded in all categories in which they identified, percentages over time are not directly comparable.

Table 2: Ethnicity of participants in Waves 1 to 3

Ethnic group [†]	Wave 1		Wave 2		Wave 3	
	n	(%)	n	(%)	n	(%)
European/Other	4,035	(64.5)	2,261	(60.4)	1,933	(62.1)
Māori	1,164	(18.6)	651	(17.4)	518	(16.6)
Pacific	830	(13.3)	473	(12.6)	368	(11.8)
Asian	827	(13.2)	416	(11.1)	335	(10.8)
<i>Total</i>	<i>6,856</i>	<i>(109.6)</i>	<i>3,801</i>	<i>(101.5)</i>	<i>3,154</i>	<i>(101.3)</i>

Note: Māori, Pacific and Asian participants were oversampled at the Wave 1 assessment

[†] Unprioritised ethnicity - some respondents identified with more than one of the four broad ethnic groups and have been included in each group they identified with. This means that the total percentage has exceeded 100%.

2.5 Weighting

2.5.1 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 subsequent waves. 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 current analyses, Wave 1 weights, in order to be representative of the New Zealand population, were based on age group, gender and ethnicity. Wave 3 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.

2.5.2 Census benchmark

Factor weights for analyses were based on the 2013 Census, from Wave 1 to Wave 3.

2.5.3 Attrition-specific weights

The participants in Wave 3 (n=3,115) represented 83% of the participants in Wave 2 (n=3,745) and, therefore, represented 50% 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 did not all fall under non-response; therefore, this has affected the Wave 3 attrition from Wave 1.

The application of age, gender and ethnicity-based weights to Wave 2 and Wave 3 data caused an underestimation of the estimated proportions in the moderate-risk and problem gambler categories. However, small numbers in some of the cells of the four-way table caused 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 1 sample to preserve the observed proportions in each PGSI risk category. It was then applied separately to the Wave 2 and Wave 3 samples in order to match the weighted marginal frequencies of the Wave 1 sample, in an effort to allay any gambling outcome-based differential attrition.

2.6 Data analysis

2.6.1 Attrition analyses

Attrition effects are displayed using tables indicating the unweighted frequency and proportion in each category (including a category for missing values) in Wave 1 participants, Wave 2 participants and non-participants, and Wave 3 participants and non-participants. All characteristics were taken from Wave 1. The p-values testing independence² between Wave 3 participants and non-participants are displayed in each case. The categorical variables concerned are presented in Appendix 1.

² Based on Poisson deviance or Pearson’s χ^2 statistic.

2.6.2 *Descriptive statistics*

Wave 3 prevalence statistics

Census+attrition-weighted proportions in the Wave 3 sample are presented for the categorical variables presented in Appendix 2. Population prevalence and 95% confidence intervals based on the census+attrition weights are also presented.

Transition descriptive statistics

Tables describing key PGSI risk category transitions between Wave 1, Wave 2 and Wave 3 display census+attrition-weighted frequencies, along with transition incidence proportions and 95% confidence intervals based on the latter. Transition tables (including incidence proportions and confidence intervals) have also been produced by the major ethnic groups (European/Other, Māori, Pacific and Asian).

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

- Gambling participation (frequency, number and pattern of activities)
- Psychological distress (K-10; likely well, likely mild, likely moderate, likely severe)
- Quality of life (WHOQoL-8)
- Alcohol (AUDIT-C) and other drug use

2.6.3 *Inferential statistics*

Inference on transitions

Inferential statistics have focused on explaining the transitions. The Wave 3 inferential analysis combined data from the three waves and assumed that the transitions from Wave 1 to Wave 2, and from Wave 2 to Wave 3 are independent (i.e. that the same risk and protective factors have similar impact whether it is from Wave 1 to Wave 2, or Wave 2 to Wave 3). Therefore, inferential models were investigated using an indicator variable to test differences between the wave transitions (Wave 1 to Wave 2 vs. Wave 2 to Wave 3); however, individual repeated measures were not investigated (this will occur in Wave 4 when numbers are optimal). The transitions of focus are shown in Table 3. The result of assuming independence between Wave 1 and Wave 2 transitions, and Wave 2 to Wave 3 transitions is that standard errors may be overestimated, meaning that some associations that did not reach statistical significance may, in fact, be statistically significant. However, a more complex model with additional parameters would be required to account for the multiple waves and may have a similar effect on results. As stated, these more complex models will be further investigated in the next report with the full 4 waves of data, where numbers are optimal.

The transitions were examined in turn using weighted logistic regression, using the census+attrition weights for each wave. For each transition, the 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 has a p-value < 0.2. Models were then developed for each of the major data domains (e.g. demographics, gambling 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 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.

Table 3: Transitions for inferential analyses

Reference state (Wave 1 or Wave 2)	Progression state (12 months later)	n
Transition to moderate-risk/problem gambler		
Non-problem/low-risk gambler →	Moderate-risk/problem gambler	76
	Non-problem/low-risk gambler	4,611
Persistence of moderate-risk/problem gambler		
Moderate-risk/problem gambler →	Moderate-risk/problem gambler	51
	Non-problem/low-risk gambler	67
Cessation of gambling from moderate-risk/problem gambler[#]		
Moderate-risk/problem gambler →	No gambling	12
	Moderate-risk/problem gambler	51
Transition to risk		
No risk →	Low-risk/moderate-risk/problem gambler	254
	No risk	4,095
Persistence of risk		
Low-risk/moderate-risk/problem gambler →	Low-risk/moderate-risk/problem gambler	210
	No risk	247
Initiation of gambling (ever)		
Never gambled + no gambling →	Non-problem/low-risk/moderate-risk/ problem gambler	234
	Never gambled	578
Re-initiation of gambling (in Wave 2 and Wave 3)		
Ever gambled + no gambling →	Non-problem/low-risk/moderate-risk/ problem gambler	275
	No gambling	346

[#] The numbers for cessation of gambling were too small for robust inferential analysis
n relates to the number of person-transitions from Wave 1 or Wave 2 to 12 months later. It does not refer to number of participants. Values adjusted for 2013 Census data and attrition.
‘No gambling’ relates to no gambling in the past 12 months

Relapse into moderate-risk/problem gambling in Wave 3 was assessed as follows. Wave 3 moderate-risk or problem gamblers who were not in those categories in Wave 2 but who either had been in Wave 1 or who at some time prior had been classified as problem gamblers or probable pathological gamblers³. The numbers were too small for robust inferential analysis; therefore, the results have only been presented descriptively.

³ Using the South Oaks Gambling Screen-Revised (SOGS-R)

3 RESULTS

This chapter details the results of data analyses focusing on:

- Attrition (section 3.1)
- Descriptive statistics including socio-demographic variables, gambling participation, problem gambling and health status (section 3.2)
- Transitions, incidence and relapse (section 3.3)
- Associations with transitions (section 3.4)

3.1 Attrition analyses

Attrition analyses were conducted to assess whether the participants who remained in the study in Wave 3 differed to a significant extent from the original participant cohort at baseline (Wave 1).

The analyses indicated statistically significant differences between the samples based on demographics (age, ethnicity and area of residence), problem gambling severity, gambling participation and co-existing issues.

There was *higher attrition* (less people retained in the study) in:

- The youngest age group (18-24 years) and, to a lesser extent, the next youngest age group (25-34 years)
- People who had gambled on 10 or more activities in the past year and those who had not gambled in the past year
- People who had experienced five or more major life events in the past year.

There was *greater retention* (more people stayed in the study) in:

- European/Other ethnicity
- People living in Wellington or Christchurch
- Non-problem gamblers and problem gamblers
- People whose quality of life was above the median score.

Due to the significant differential attrition, data analyses were adjusted to account for attrition effects.

Data are presented in Appendix 3.

3.2 Descriptive statistics

This section contains descriptive analyses of socio-demographic characteristics that could have changed in the prior year (section 3.2.1); gambling participation (section 3.2.2); problem gambling including methods to stop gambling too much and help-seeking behaviour (section 3.2.3); and health status with a focus on major life events, quality of life, psychological distress and substance use/misuse (section 3.2.4).

3.2.1 *Socio-demographic variables that could have changed in the prior year*

In Wave 2 and Wave 3, participants were re-asked about socio-demographic factors that could have changed in the prior year. These were labour force status, household size, annual personal and household incomes, and individual level of deprivation. There were no major differences between the three waves in the percentages of participants for each of these socio-demographic variables. Although some minor differences were noted for some variables between Wave 1 and Wave 3, the percentages were similar for those variables between Wave 2 and Wave 3; thus, any apparent differences are considered unlikely to be of importance. In Wave 2, a decrease was noted in the percentage of people reporting four deprivation characteristics in comparison with Wave 1 (2.0% vs. 3.2%). However, in Wave 3, the percentage increased slightly to 2.3% and the confidence intervals overlapped with those of Wave 1. Therefore, this finding in Wave 2 does not appear to have been of importance.

Annual personal income of \$20,000 or less was the only variable that appeared to change over time. In Wave 1, 33% (CI 31.8, 34.7) of participants reported having a personal income of \$20,000 or less. The percentage was 31% (CI 29.0, 32.6) in Wave 2 then decreased in Wave 3 to 27% (CI 25.0, 28.9).

Data are presented in Appendix 4.

3.2.2 *Gambling participation*

Past year and past month gambling

Gambling participation was assessed as 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 the majority of forms of gambling, there were no major differences in past year gambling participation across the waves. However, for some forms of gambling, changes in participation were apparent over time.

A decrease in participation from Wave 1 to Wave 3 was also noted for horse and dog race betting (11.7% Wave 1, 10.5% Wave 2, 9.4% Wave 3). The confidence intervals overlapped between Wave 1 and 2, and Wave 2 and 3 but did not overlap between Wave 1 and Wave 3; thus, this finding is considered real.

A decrease in participation from Wave 1 to Wave 2 was noted for the following forms of gambling; the reduction was maintained in Wave 3:

- Sports betting (4.6% Wave 1, 2.7% Wave 2, 2.9% Wave 3)
- Casino gambling (table games and EGMs) in New Zealand (9.4% Wave 1, 7.2% Wave 2, 7.3% Wave 2)
- Casino EGMs (8.3% Wave 1, 6.1% Wave 2, 6.3% Wave 3)
- Pub EGMs (11.5% Wave 1, 8.9% Wave 2, 8.3% Wave 3)
- EGMs overall (17.6% Wave 1, 14.1% Wave 2, 13.6% Wave 3).

Similar to the findings in Wave 2, in Wave 3 the most popular gambling activity for past year participation was Lotto (60%), followed by raffles or lotteries (46%), Instant Kiwi or other

scratch tickets (29%), and bets with friends or workmates (13%). Participation in all the other gambling activities was less than 10%.

Past month gambling

For the majority of forms of gambling, there were no major differences in past month gambling participation across the waves. However, for some forms of gambling, changes in participation were apparent over time; some of the gambling activities were different from those where changes were noted over time for past year gambling.

A *decrease* in overall EGM participation was noted from Wave 1 to Wave 2 with 4.9% participation in Wave 1 and 3.4% participation in Wave 2; the reduction was maintained in Wave 3 (35%). A *decrease* in participation from Wave 1 to Wave 2 was noted for Casino EGMs (0.9% Wave 1, 0.4% Wave 2, 0.4% Wave 3); the reduction was maintained in Wave 3.

A *decrease* in participation from Wave 1 to Wave 3 was noted for past month participation in raffles and lotteries (10.9% Wave 1, 10.8% Wave 2, 8.7% Wave 3) and Instant Kiwi or other scratch tickets (12.0% Wave 1, 10.7% Wave 2, 9.5% Wave 3). For both these gambling activities, the confidence intervals overlapped between Wave 1 and Wave 2, and Wave 2 and Wave 3 but did not overlap between Wave 1 and Wave 3; thus, these findings are considered real.

Similar to the findings in Wave 2, in Wave 3 the most popular gambling activity for past month participation was Lotto (32%), followed by Instant Kiwi or other scratch tickets (10%), and raffles or lotteries (9%). Participation in all the other gambling activities was less than three percent.

Gambling behaviour

Across the three waves, there were no major differences for pattern of gambling participation (i.e. infrequent gambler, regular non-continuous gambler or regular continuous gambler⁴), frequency of gambling, most preferred gambling activity, who the participant gambled with, and knowing other people with a gambling problem. Data are presented in Appendix 6.

From Wave 1 to Wave 2, a slight *decrease* was noted in the percentage of people participating in 7 to 9 gambling activities in the past year (3.3% Wave 1, 2.0% Wave 2); this reduction was maintained in Wave 3 (2.1%).

From Wave 1 to Wave 3, a *decreasing* trend was noted in the percentage of people with a typical monthly gambling expenditure of \$101 to \$500 (11.0% Wave 1, 9.7% Wave 2, 8.7% Wave 3). The confidence intervals overlapped between Wave 1 and Wave 2, and Wave 2 and Wave 3 but did not overlap between Wave 1 and Wave 3; thus, this finding is considered real.

⁴ In this study, Lotto, other lotteries, raffles and making bets with friends or workmates were classified as non-continuous. All other activities were classified as continuous. Regular continuous gamblers were defined as people who took part in one or more continuous activities during the past week. They could also have taken part in non-continuous forms this or less often. Regular non-continuous gamblers were defined as people who took part weekly or more often in one or more non-continuous forms of gambling and who did not participate this often in any continuous form. They were not excluded if they participated less often than weekly. Infrequent gamblers are defined as people who participate less than weekly in any particular gambling activity.

Similar to the findings in Wave 2, in Wave 3 just less than a quarter of participants (23%) had not gambled and a fifth had participated only in either one or two activities (both 22%). Over half (57%) of the participants were infrequent gamblers. Slightly more than one-quarter (28%) had gambled at least once in the past six months, and one-fifth had gambled either at least weekly or monthly (both 20%). The greatest proportions spent between \$1 to \$10, or \$11 to \$20 on gambling in a typical month (16% and 15% respectively). The most preferred gambling activity was Lotto (16%). Half (51%) of the participants usually gambled alone.

EGM gambling

Time spent gambling on EGMs in an average day was assessed in each of the three waves by casino, pub and club venue. There were no major differences between the waves. Similar to the findings in Wave 2, in Wave 3 a higher proportion of participants gambled for more than an hour in a typical day on casino EGMs (30%) than on pub or club EGMs (both 13%). A lower proportion of participants gambled on casino EGMs for 15 minutes or less (20%) than on pub or club EGMs (35% and 34% respectively).

Data are presented in Appendix 7.

3.2.3 Problem gambling

Problem gambling risk

Problem gambling risk, assessed via the Problem Gambling Severity Index (PGSI), was similar in Waves 1, 2 and 3. Although point estimates indicated that problem gambling prevalence halved from Wave 1 (0.6%) to Wave 3 (0.3%), the confidence intervals overlapped indicating that there was probably no change over time. The point estimates for moderate-risk gambler, low-risk gambler and non-problem gambler were similar in each of the three years (Table 4).

Table 4: Prevalence and 95% confidence intervals for problem gambling risk in Waves 1, 2 and 3

PGSI	Wave 1			Wave 2			Wave 3		
	n	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)
Non-problem gambler	4535	72.5	(71.2, 73.9)	2633	70.3	(68.6, 72.0)	2186	70.0	(68.0, 72.0)
Low-risk gambler	307	4.9	(4.3, 5.6)	210	5.6	(4.8, 6.5)	155	5.0	(4.1, 5.9)
Moderate-risk gambler	108	1.7	(1.4, 2.1)	57	1.5	(1.1, 1.9)	45	1.5	(1.0, 1.9)
Problem gambler	40	0.6	(0.4, 0.9)	18	0.5	(0.3, 0.7)	10	0.3	(0.2, 0.5)
No gambling in past year	1261	20.2	(19.0, 21.4)	828	22.1	(20.5, 23.7)	727	23.3	(21.3, 25.2)

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)
Wave 1 N=6,251; Wave 2 N=3,745; Wave 3 N=3,115

By ethnicity

Problem gambling risk was also similar in Waves 1, 2 and 3 for each of the main ethnic groups (Māori, Pacific, Asian and European/Other). Although point estimates indicated that the prevalence of problem gambling decreased from Wave 1 to Wave 3 for Asian people (0.7 to 0.1) and for European/Other (0.4 to 0.1), these findings are probably due to the extremely small sample size for problem gamblers of those ethnicities in Wave 3. As the confidence intervals overlapped between the waves, it is unlikely that there was an actual change over time.

Māori and Pacific people continued to have a higher prevalence of moderate-risk and problem gambling combined, compared with European/Other.

Data are presented in Table 5.

Table 5: Prevalence and 95% confidence intervals for problem gambling risk in Waves 1, 2 and 3 by ethnicity

Ethnic group	PGSI	Wave 1			Wave 2			Wave 3		
		n	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)
Māori	Non-problem gambler	466	71.6	(68.64 - 74.51)	254	65.7	(61.33 - 70.12)	206	63.0	(56.53, 69.39)
	Low-risk gambler	51	7.8	(6.02 - 9.58)	46	11.9	(8.95 - 14.88)	31	9.5	(5.19, 13.71)
	Moderate-risk gambler	24	3.7	(2.52 - 4.89)	17	4.4	(2.37 - 6.47)	15	4.7	(2.67, 6.71)
	Problem gambler	15	2.3	(1.29, 3.29)	6	1.6	(0.72, 2.51)	5	1.6	(0.60, 2.58)
	No gambling in past year	95	14.6	(12.31, 16.95)	63	16.3	(12.82, 19.84)	70	21.3	(15.03, 27.57)
	Moderate-risk/problem gambler combined		6.0	(4.47, 7.53)		6.0	(3.82, 8.25)		6.3	(4.03, 8.53)
Pacific	Non-problem gambler	178	57.5	(53.39, 61.69)	103	55.4	(49.97, 60.83)	80	53.8	(47.53, 60.07)
	Low-risk gambler	29	9.4	(6.88, 11.87)	17	9.0	(6.10, 11.89)	15	10.2	(6.59, 13.74)
	Moderate-risk gambler	18	5.9	(3.49, 8.31)	12	6.3	(3.79, 8.74)	9	5.7	(2.73, 8.72)
	Problem gambler	5	1.5	(0.66, 2.36)	1	0.6	(0.00, 1.31)	3	1.9	(0.00, 3.87)
	No gambling in past year	79	25.7	(22.07, 29.29)	53	28.7	(23.6, 33.83)	42	28.4	(22.61, 34.16)
	Moderate-risk/problem gambler combined		7.4	(4.90, 9.93)		6.9	(4.33, 9.45)		7.6	(4.12, 11.17)
Asian	Non-problem gambler	329	51.6	(47.69, 55.49)	182	49.4	(43.97, 54.76)	160	51.5	(45.28, 57.79)
	Low-risk gambler	37	5.8	(3.80, 7.82)	19	5.1	(2.80, 7.42)	16	5.2	(2.87, 7.46)
	Moderate-risk gambler	14	2.2	(0.91, 3.39)	5	1.3	(0.19, 2.41)	4	1.4	(0.05, 2.65)
	Problem gambler	4	0.7	(0.01, 1.29)	1	0.4	(0.00, 1.08)	0	0.1	(0.00, 0.26)
	No gambling in past year	254	39.8	(35.95, 43.64)	162	43.9	(38.37, 49.35)	130	41.9	(35.58, 48.15)
	Moderate-risk/problem gambler combined		2.8	(1.41, 4.19)		1.7	(0.34, 2.99)		1.4	(0.13, 2.75)
European/Other	Non-problem gambler	3499	76.7	(75.11, 78.29)	2062	74.6	(72.46, 76.65)	1722	74.7	(72.28, 77.02)
	Low-risk gambler	189	4.1	(3.33, 4.93)	129	4.7	(3.65, 5.64)	93	4.0	(3.07, 4.98)
	Moderate-risk gambler	51	1.1	(0.73, 1.53)	23	0.9	(0.41, 1.28)	17	0.7	(0.37, 1.12)
	Problem gambler	17	0.4	(0.13, 0.59)	9	0.3	(0.07, 0.58)	1	0.1	(0.00, 0.13)
	No gambling in past year	806	17.7	(16.25, 19.10)	543	19.6	(17.71, 21.55)	473	20.5	(18.27, 22.78)
	Moderate-risk/problem gambler combined		1.5	(1.03, 1.95)		1.2	(0.67, - 1.68)		0.8	(0.42, 1.18)

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

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

Participants who gambled were asked if they used any methods to stop gambling too much. Overall, across the three waves, percentages were generally similar for each of the methods used. There were some fluctuations in Wave 2 compared with Wave 1 for setting a money limit for gambling before leaving home, and separating betting money from other money and stopping gambling when it is used. However, in Wave 3, the percentages for these methods were similar to those in Wave 1, and the fluctuations in Wave 2 are considered to be of little importance.

All participants were asked if they had sought help for gambling in the past year, both from formal (i.e. professional) and informal (e.g. family, friends and work colleagues) sources. A very low percentage had sought help; the percentage was similar across the three waves for any help seeking and for seeking help only from formal sources.

Data are presented in Table 6.

Table 6: Prevalence and 95% confidence intervals for methods used to stop gambling too much and help-seeking behaviour in Waves 1, 2 and 3

Variable	Wave 1			Wave 2			Wave 3		
	n	%	(95% CI)	n	%	(95% CI)	n	%	(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)	379	15.9	(14.2, 17.6)
Trusted person manages the money	33	0.5	(0.3, 0.7)	17	0.4	(0.2, 0.7)	13	0.5	(0.1, 1.0)
Separate betting money and stopping when used	215	3.5	(2.9, 4.0)	83	2.2	(1.7, 2.8)	65	2.7	(1.9, 3.5)
Leave ATM/credit cards at home	72	1.2	(0.8, 1.5)	42	1.1	(0.7, 1.5)	27	1.1	(0.5, 1.7)
Set a time limit	93	1.5	(1.1, 1.9)	46	1.2	(0.8, 1.7)	29	1.2	(0.7, 1.7)
Avoid betting/gambling places	116	1.9	(1.5, 2.2)	57	1.5	(1.1, 2.0)	34	1.4	(0.8, 2.0)
Sought help in past year									
Formal and informal sources	17	0.3	(0.1, 0.4)	14	0.4	(0.2, 0.6)	10	0.3	(0.1, 0.5)
Only formal sources	4	0.1	(0.0, 0.1)	5	0.1	(0.0, 0.3)	3	0.1	(0.0, 0.2)

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

[#]Calculated for participants who gambled in the last year

3.2.4 Health status

In Wave 3, participants were again asked about health-related issues. These were occurrence of major life events in the prior year, quality of life in the past two weeks, general psychological distress in the past four weeks, hazardous alcohol consumption and other drug use in the past year, and tobacco use.

Significant life events

From Wave 1 to Wave 3, a *decreasing* trend was noted in the percentage of people who had experienced four major life events in the past year (7.7% Wave 1, 5.7% Wave 2, 4.4% Wave 3).

From Wave 1 to Wave 2, a *decrease* was noted in the percentage of people who had experienced five major life events (8.6% Wave 1, 5.1% Wave 2); this reduction was maintained in Wave 3 (5.2%).

In Wave 2, an *increase* was noted in the percentage of people reporting one major life event in the prior year, in comparison with Wave 1 (30.0% vs. 26.3%). However, in Wave 3, the percentage reduced slightly to 28.5% and the confidence intervals overlapped with those of Wave 1. Therefore, this finding in Wave 2 does not appear to have been of importance.

Twenty-nine percent of participants in Wave 3 had either not experienced any major life events in the prior year or reported one event. Ten percent of participants reported experiencing four or more major events.

Data are presented in Appendix 8.

Quality of life

The quality of life experienced by participants was similar across the waves. Nine percent of the participants in Wave 3 scored the median; just less than half (49%) were above the median level, and two-fifths (42%) had a quality of life below the median. Data are presented in Appendix 8.

Psychological distress

The level of general psychological distress reported by participants was similar across the waves. In Wave 3, a low level of distress was reported by the majority of participants (74%), with one-fifth (19%) reporting a low-moderate level of distress. Two percent of participants scored in the highest level of psychological distress. Data are presented in Appendix 8.

Hazardous alcohol consumption

A slight *decrease* in the proportion of participants reporting hazardous alcohol consumption was noted from Wave 1 to Wave 3 (37% Wave 1, 35% Wave 2, 33% Wave 3). The confidence intervals overlapped between Wave 1 and Wave 2, and Wave 2 and Wave 3 but did not overlap between Wave 1 and Wave 3; thus, this finding is considered real. Consequently, this finding was mirrored by a slight increase in the proportion of people who did not report hazardous alcohol consumption (63% Wave 1, 65% Wave 2, 67% Wave 3). Data are presented in Appendix 8.

Tobacco use

Tobacco use by participants was similar across the waves. In Wave 3, slightly more than half (55%) of the participants had never smoked, and slightly more than one-quarter (28%) had given up smoking. Fourteen percent of participants reported smoking daily. Two-thirds (67%) of participants reported ever smoking in their lifetime and two-fifths (43%) had ever smoked daily. Data are presented in Appendix 8.

Other drug use

From Wave 1 to Wave 2, a *decrease* was noted in the percentage of people who reported using recreational drugs (excluding alcohol and tobacco) in the past year (14.7% Wave 1, 11.4% Wave 2). This reduction was maintained in Wave 3 (10.5%). This finding was mainly

due to decreased use of cannabis (12.1% Wave 1, 9.1% Wave 2, 8.9% Wave 3). Consequently, these findings were mirrored by a slight increase in the proportion of people who did not use recreational drugs from Wave 1 to Wave 2 (85%, 89%) which stabilised in Wave 3 (90%). Data are presented in Appendix 8.

3.3 Transitions, incidence and relapse

This section details transitions, incidence and relapse.

Transitions are defined as shifting into and out of the different PGSI categories. The results presented in this section relate to differences between the wave transitions which are:

- Wave 1 to Wave 2
- Wave 2 to Wave 3
- Total initial wave (Wave 1 or Wave 2) to total follow-up wave (Wave 2 or Wave 3).

Increased risk status indicates shifting into a higher PGSI category between the waves, whilst decreased risk status indicates shifting into a lower PGSI category between the waves. Stability relates to staying in the same risk category between waves (section 3.3.1).

The number of new occurrences of problem gambling in a population in a given time period is known as the *incidence* (section 3.3.2). This differs from *prevalence*, which is the percentage of the population with problem gambling at any given time.

Relapse relates to participants who previously had problematic gambling, but who were non-gamblers, non-problem gamblers or low-risk gamblers in Wave 1 or Wave 2 and who subsequently became moderate-risk or problem gamblers in Wave 2 or Wave 3 (section 3.3.2).

3.3.1 Transitions

The PGSI was used to measure current (past 12 month) problem gambling status in Waves 1, 2 and 3. Table 7 shows transitions from Wave 1 to Wave 2, from Wave 2 to Wave 3, and the total number of transitions across all waves. *Note that the sample size is very small for some cells. This means that the results should be interpreted with caution and should be considered indicative rather than absolute.*

Table 7: Transitions between PGSI groups between the waves

Transition from	Transition to										Total
	Non-gambler		Non-problem gambler		Low-risk gambler		Moderate-risk gambler		Problem gambler		
	n	%	n	%	n	%	n	%	n	%	
Wave 1 to Wave 2											
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
<i>Total</i>	828	22.1	2633	70.3	210	5.6	57	1.5	18	0.5	3746
Wave 2 to Wave 3											
Non-gambler	439	64.1	231	33.8	13	1.8	2	0.2	<1	0.0	685
Non-problem gambler	275	12.5	1828	83.0	82	3.7	17	0.8	0	-	2201
Low-risk gambler	4	2.4	109	61.7	49	27.8	14	7.7	1	0.5	177
Moderate-risk gambler	2	4.1	15	33.7	11	24.5	12	27.8	4	9.9	45
Problem gambler	6	44.1	3	19.4	<1	2.6	1	6.5	4	27.4	15
<i>Total</i>	727	23.3	2186	70.0	155	5.0	45	1.4	10	0.3	3123
Total transitions (combined)											
Non-gambler	924	64.5	478	33.4	28	2.0	2	0.2	1	0.1	1433
Non-problem gambler	602	12.2	4095	82.7	215	4.3	36	0.7	3	0.1	4950
Low-risk gambler	17	4.8	207	58.1	95	26.7	35	9.7	2	0.6	356
Moderate-risk gambler	6	5.6	31	32.1	24	24.9	27	27.6	10	9.7	98
Problem gambler	6	20.5	8	26.4	3	8.5	3	8.2	11	36.3	32
<i>Total</i>	1555	22.6	4820	70.2	365	5.3	102	1.5	27	0.4	6869

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

The total numbers of transitions across all waves, examined by ethnicity, are shown in Table 8.

Table 8: Total transitions between PGSI groups by ethnicity

Transition from	Transition to										Total
	Non-gambler		Non-problem gambler		Low-risk gambler		Moderate-risk gambler		Problem gambler		
	n	%	n	%	n	%	n	%	n	%	
Māori											
Non-gambler	60	51.0	52	44.5	5	4.0	0	-	1	0.5	117
Non-problem gambler	72	14.6	372	75.5	39	7.9	10	2.0	0	-	492
Low-risk gambler	1	1.4	28	43.0	25	38.8	11	16.4	<1	0.4	64
Moderate-risk gambler	<1	1.2	7	24.6	7	23.8	11	38.2	4	12.1	30
Problem gambler	0	-	1	11.5	1	12.2	1	7.9	7	68.3	10
<i>Total</i>	133	18.6	460	64.5	77	10.8	32	4.5	11	1.6	713
Pacific											
Non-gambler	65	66.3	29	30.2	2	2.4	<1	0.8	0	0.2	97
Non-problem gambler	34	16.2	145	69.6	20	9.6	9	4.4	0	0.1	208
Low-risk gambler	1	4.3	19	59.4	7	22.8	4	13.5	0	-	31
Moderate-risk gambler	1	3.2	6	28.8	5	22.5	7	30.6	3	14.9	22
Problem gambler	1	12.3	2	36.4	0	-	1	26.9	1	24.4	4
<i>Total</i>	101	27.7	201	55.3	35	9.5	22	6.1	5	1.3	364
Asian											
Non-gambler	219	75.8	64	22.2	5	1.6	1	0.4	0	-	289
Non-problem gambler	69	19.2	264	73.2	20	5.7	7	2.0	0	-	361
Low-risk gambler	6	17.9	18	55.5	7	21.6	<1	0.9	1	4.1	33
Moderate-risk gambler	0	-	3	53.1	2	41.6	0	-	0	5.3	5
Problem gambler	1	40.8	0	-	1	39.3	<1	19.9	0	-	4
<i>Total</i>	296	42.8	350	50.5	36	5.2	9	1.3	2	0.2	692
European/Other											
Non-gambler	622	62.3	357	35.7	19	1.9	0	-	0	-	999
Non-problem gambler	467	11.3	3504	84.6	155	3.7	15	0.4	3	0.1	4143
Low-risk gambler	10	3.9	156	61.4	65	25.6	22	8.7	1	0.4	254
Moderate-risk gambler	4	8.1	17	30.9	14	25.1	15	28.0	4	7.9	55
Problem gambler	4	24.2	6	35.1	<1	1.1	<1	0.8	7	38.9	18
<i>Total</i>	1108	20.3	4040	73.9	253	4.6	53	1.0	15	0.3	5469

Data weighted for 2013 Census data and attrition

Totals do not always add up due to rounding

Multiple ethnicity allowed (i.e. participants could select more than one ethnicity)

Table key

	No change
	Transition to a higher risk level
	Transition to a lower risk level

Stability

Stable groups where there were no changes across the waves are depicted in yellow in Table 7 and Table 8.

The most stable groups across the waves were non-gamblers and non-problem gamblers with a majority remaining in those categories from Wave 1 to Wave 2, from Wave 2 to Wave 3, and in total (all transitions combined). Just less than two-thirds of non-gamblers stayed as non-gamblers and about four-fifths remained as non-problem gamblers.

Problem gamblers were the next most stable group from Wave 1 to Wave 2 with 44% staying in that category. However, subsequently there was less stability with only 27% of Wave 2 problem gamblers remaining in that category in Wave 3.

Just more than one-quarter of low-risk and moderate-risk gamblers remained in those categories from Wave 1 to Wave 2, and from Wave 2 to Wave 3.

By ethnicity

A higher percentage of Māori remained problem gamblers across the waves (68%) compared with the other ethnicities. Thirty-nine percent of European/Other and 24% of Pacific people stayed as problem gamblers. No Asian people remained as problem gamblers; however, this could be an artefact of very small sample size.

Non-gamblers and non-problem gamblers were generally the most stable groups when examined by ethnicity. Although there was some variation in the actual percentages, over half of the participants in each of those groups remained in those groups across the waves.

Similarly, there were no major ethnic differences in stability of low-risk and moderate-risk gambler groups with between one-fifth and two-fifths remaining in those groups across the waves. The exception was for Asian people with none remaining as moderate-risk gamblers; however, as for the Asian problem gambler sample, the number was extremely small which could give misleading results.

Transition to increased risk status

Transitions to increased risk status were similar from Wave 1 to Wave 2, and from Wave 2 to Wave 3 and are depicted in pink in Table 7 and Table 8.

In total, one-third (33%) of non-gamblers commenced gambling and became non-problem gamblers. A very small percentage (2%) transitioned to low-risk gambling, 0.2% to moderate-risk gambling, and 0.1% transitioned into problem gambling.

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

Ten percent of low-risk gamblers became moderate-risk gamblers and 0.6% transitioned into problem gambling.

Ten percent of moderate-risk gamblers became problem gamblers.

By ethnicity

A higher percentage of Māori and Pacific moderate-risk gamblers became problem gamblers (12% and 15% respectively) compared with European/Other and Asian moderate-risk gamblers (8% and 5% respectively). However, a higher percentage of Asian low-risk gamblers became problem gamblers (4%) compared with the other ethnicities (0.4% or less).

Similarly, a higher percentage of Māori and Pacific low-risk gamblers became moderate-risk gamblers (16% and 14% respectively) compared with European/Other and Asian moderate-risk gamblers (9% and 0.9% respectively).

A higher percentage of Māori non-gamblers transitioned into low-risk gambling (4%) compared with the other ethnicities (2%). A slightly lower proportion of Asian non-gamblers commenced gambling and became non-problem gamblers (22%) than was noted for the other ethnicities (30% to 45%).

There were no major ethnic differences for other transitions to a higher risk status.

Transition to decreased risk status

Transitions to decreased risk status from Wave 1 to Wave 2, and from Wave 2 to Wave 3 are depicted in green in Table 7 and Table 8.

A major difference was noted for problem gamblers transitioning to a lower risk status from Wave 2 to Wave 3 compared with Wave 1 to Wave 2. As previously mentioned, this group was less stable from Wave 2 to Wave 3 than from Wave 1 to Wave 2 (i.e. there were more transitions to lower risk categories). From Wave 1 to Wave 2, no problem gamblers stopped gambling; however, from Wave 2 to Wave 3, 44% of problem gamblers no longer gambled; consequently, this affected percentages in the other risk status groups. The percentages transitioning to moderate-risk, low-risk and non-problem gambling from Wave 1 to Wave 2 were 10%, 14% and 33% respectively. From Wave 2 to Wave 3 they were 7%, 3% and 19% respectively.

Slightly lower proportions of moderate-risk and low-risk gamblers stopped gambling from Wave 2 to Wave 3 (4% and 2% respectively) compared with Wave 1 to Wave 2 (7% for both).

There were no major differences for other transitions to a lower risk status.

By ethnicity

As 68% of Māori remained problem gamblers across the waves, there was less transition to lower risk categories for Māori compared with other ethnicities. It is of note that no Māori and fewer Pacific (12%) problem gamblers stopped gambling, compared to 41% of Asian and 24% of European/Other problem gamblers.

Fewer Māori (1%) and Pacific (3%) moderate-risk gamblers stopped gambling compared with European/Other (8%) moderate-risk gamblers. No Asian moderate-risk gamblers stopped gambling; however, this could have been an artefact of very small sample size.

A higher proportion of Asian low-risk gamblers stopped gambling (18%) compared with the other ethnicities (1% Māori, 4% Pacific, 4% European/Other).

There were no major ethnic differences for other transitions to a lower risk status.

3.3.2 Incidence

Incidence of problem gambling for Wave 3 was calculated from problem gamblers who in Wave 2 were non-gamblers, non-problem gamblers, low-risk gamblers or moderate-risk gamblers.

In Wave 3, the number of participants who became problem gamblers was six (adjusted data) which is an incidence rate of 0.18% (CI 0.06, 0.30). Of the people who developed problem gambling, 79% (CI 58.2, 99.7) were new problem gamblers and 21% were people who had previously had problems with gambling (either in Wave 1 or previously in their lifetime⁵).

Incidence of moderate-risk gambling in Wave 3 was calculated from moderate-risk gamblers who in Wave 2 were non-gamblers, non-problem gamblers or low-risk gamblers.

The incidence rate for moderate-risk gambling in Wave 3 is estimated at 1.0% (CI 0.68, 1.35; n=32). Of these people, 85% (CI 74.3, 95.8) were new moderate-risk gamblers, two percent were moderate-risk gamblers in Wave 1 but had not reported lifetime problematic gambling, and 13% were people who had previously (in their lifetime) had problems with gambling.

The incidence rate for moderate-risk and problem gambling combined in Wave 3 is estimated at 1.1% (CI 0.72, 1.40; n=33). Of these people, 83% (CI 72.0, 93.7) were new moderate-risk or problem gamblers, four percent were moderate-risk/problem gamblers in Wave 1 but had not reported lifetime problematic gambling, and 13% were people who had previously (in their lifetime) had problems with gambling.

3.3.3 Relapse

Relapse into moderate-risk/problem gambling in Wave 3 was assessed as follows. Wave 3 moderate-risk or problem gamblers who were not in those categories in Wave 2 but who either had been in Wave 1 or who at some time prior had been classified as problem gamblers or probable pathological gamblers⁶.

In Wave 3, 17% (n=5, adjusted data) of the moderate-risk and problem gambler categories were relapse cases from past moderate-risk or problematic gambling. This is slightly less than in Wave 2 when 26% (n=12) of the moderate-risk and problem gambler categories were relapse cases. Correspondingly, 83% of Wave 3 'new' moderate-risk and problem gamblers were assessed as not having been a moderate-risk, problem or probable pathological gambler in Wave 2 or prior to that wave (Table 9).

⁵ Assessed using the South Oaks Gambling Screen-Revised (SOGS-R)

⁶ Using the South Oaks Gambling Screen-Revised (SOGS-R)

Table 9: Wave 3 moderate-risk/problem gambling among participants who were Wave 2 non-gambler/non-problem gambler/low-risk gambler

SOGS-R (Wave 1)	PGSI (Wave 1)	PGSI (Wave 2)	PGSI (Wave 3)	n	%	(95% CI)
Non-problem gambler	Non/NR/LR	Non/NR/LR	MR/PG	27	82.9	(72.0, 93.7)
	MR/PG	Non/NR/LR	MR/PG	1	4.1	(0.0, 9.9)
Past problem gambler	Non/NR/LR	Non/NR/LR	MR/PG	1	4.2	(0.0, 10.6)
	MR/PG	Non/NR/LR	MR/PG	0	-	-
Past probable pathological gambler	Non/NR/LR	Non/NR/LR	MR/PG	1	2.2	(0.0, 6.5)
	MR/PG	Non/NR/LR	MR/PG	2	6.7	(0.8, 12.7)

Data weighted for 2013 Census data (all waves) and attrition (Wave 2 and 3)

Non/NR/LR = Non-gambler in last 12 months/Non-problem gambler/Low-risk gambler

MR/PG = Moderate-risk gambler/Problem gambler

3.4 Associations with transitions

This section details associations with transitions across time. A transition relates to gambling risk status from one wave to the next wave and includes changing status (i.e. moving to lower or higher risk) and keeping the same status (i.e. persistence of risk status). *Note that all numbers in this section relate to person-transitions and not to number of participants.*

The presented data are combined for transitions from Wave 1 to Wave 2 and from Wave 2 to Wave 3 (i.e. the data have been aggregated across the three waves). This section includes the results of re-initiation of gambling across the waves for participants who in the prior wave had not gambled in the past year but who had previously gambled at some time. It also includes initiation of gambling across the waves for participants who in the prior wave had not gambled in the past year or who had never gambled (see Table 3).

3.4.1 Transition to moderate-risk/problem gambler

Aggregated across the three waves, 1.6% (n=76, adjusted data) of the transitions were into the moderate-risk gambler and problem gambler categories from the non-problem gambler or low-risk gambler categories. Ninety-eight percent (n=4,611) did not change and remained as non-problem or low-risk gamblers.

Bivariate associations

Data are presented in Appendix 9.

Similar to the findings noted from Wave 1 to Wave 2⁷, bivariate associations examined using logistic regression indicated that ethnicity was significantly associated with the transition to moderate-risk gambler or problem gambler, aggregated across the three waves. Pacific ethnicity was the highest ethnic risk factor at 8.2 times higher risk compared with European/Other. Being of Māori or Asian ethnicity was associated with 4.8 times and 3.1 times higher risk, respectively. Individual level of deprivation was also statistically significantly associated with transition to moderate-risk or problem gambler. People with two, or four or more levels of deprivation had 2.6 to 5.1 times the risk of people with no levels of deprivation; the risk level increased with increasing number of deprivation levels.

⁷ Previously reported in Abbott, Bellringer, Garrett & Mundy-McPherson (2015b)

From Wave 1 to Wave 2, people in the mid-range annual household income brackets of \$40,001 to \$60,000 and were about three times at risk for transitioning to moderate-risk or problem gambler compared with people in the lowest income bracket⁸. However, overall across the three waves, the opposite finding was noted. People in the mid-high range annual household income bracket of \$80,001 to 100,000 were associated with significantly *less* risk for transitioning to moderate-risk gambler or problem gambler from non-problem gambler or low-risk gambler (about one-quarter the risk) compared with people in the lowest income bracket of \$20,000 or less. This means that people in the lowest income bracket were at higher risk than those in the mid-high income bracket.

Gambling-related factors significantly associated with the transition to moderate-risk/problem gambler were the number of activities gambled on, pattern of gambling, gambling frequency and gambling expenditure. Associations were also noted for annual gambling on keno, housie, sports betting and overseas internet gambling; 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 card games, Instant Kiwi or other scratch tickets; time spent gambling on EGMs in a typical session (casino, pub and club); and who the participant usually gambled with on their most enjoyed activity.

People who had participated in 7 to 9, or 10 or more gambling activities in the previous 12 months were 7 and 15 times at higher 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 5.5 times higher risk than those who gambled \$10 or less per month.

People who regularly gambled on continuous forms had 2.7 times higher risk compared with people who were infrequent gamblers. Similarly, people who gambled at least weekly or at least monthly had 2.8 times and 2.2 times higher risk, respectively for transitioning to moderate-risk or problem gambling categories compared with people who gambled less frequently. 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 (8.4 times), pub EGMs (7.5 times) and club EGMs (8.8 times). Similarly, increased risk was noted with increased time spent gambling on EGMs in an average day. People who gambled on casino EGMs for more than 15 minutes were at 2.9 to 5.8 times higher risk (risk level dependent on time spent gambling) compared with people who did not gamble on casino EGMs. For club EGM gamblers, the risk was about 6 times higher. For pub EGM gamblers, the highest risk was for those gambling between 31 to 60 minutes (8.1 times); gambling for more than 60 minutes was 5.7 times more risky, compared to people who did not gamble on pub EGMs.

Significantly *less* risk was noted for people who gambled with at least one other person on their most enjoyed activity (approximately 0.4 times) in comparison with gambling alone.

Behaviour-related variables significantly associated with transitions to moderate-risk gambler or problem gambler were setting a dollar limit for gambling before leaving home (2.9 times higher), getting someone trustworthy to manage the money (9.2 times higher), separating money for gambling/betting from other money and stopping when it is spent (2.6 times higher), and avoiding places that have betting or gambling (4.6 times higher). Ever seeking formal (professional) help just failed to attain a level of statistical significance ($p=0.07$) and only one participant who transitioned to moderate-risk or problem gambler had sought formal help in the prior 12 months.

⁸ Previously reported in Abbott, Bellringer, Garrett & Mundy-McPherson (2015b)

Health-related variables significantly associated with transition to moderate-risk gambler or problem gambler included significant life events experienced in the past 12 months, quality of life, psychological distress, cannabis use and smoking. People who had experienced any significant life event in the prior 12 months had 2.2 to 3.7 times higher risk (dependent on number of events experienced) compared with people who did not experience an event. People who had a lower than median quality of life or who scored in the mid-low (score 6-11) or mid-high (score 12-19) range of psychological distress had 1.9, 2.3 and 4.6 times higher risk compared with people with a higher than median quality of life or low levels of psychological distress, respectively.

People who used cannabis had 3 times higher risk of transitioning to moderate-risk or problem gambler compared with people who did not use cannabis; similarly, people who did not use any drugs were at *lower* risk (0.3 times) than people who used drugs. People who had ever smoked had about twice the risk compared with people who had not.

Logistic regression analyses specifically by Māori, Pacific or Asian ethnicity were not possible due to small sample sizes.

Multiple logistic regression

Multiple logistic regression analyses showed that ethnicity and annual household income remained statistically significantly associated with the transition to moderate-risk gambler or problem gambler from non-problem or low-risk gambler. Being Māori or Asian was associated with 3.1 and 4.9 times the risk respectively, compared with European/Other. Pacific people had the highest risk (7.2 times higher) compared with European/Other.

Household income remained associated with significantly *less* risk for transitioning to moderate-risk gambler or problem gambler from non-problem gambler or low-risk gambler. People in the highest annual household income bracket of more than \$100,000 had almost half the risk (0.6 times) compared with people in the lowest income bracket of \$20,000 or less.

People whose typical monthly gambling expenditure was between \$101 and \$500 remained at higher risk (4.3 times) compared with those who gambled \$10 or less per month. Similarly, people who gambled monthly on EGMs overall remained at higher risk (5.0 times higher) than people who did not gamble on EGMs.

Significantly *less* risk was noted for people who gambled with at least one other person (about 0.3 times) in comparison with gambling alone. The only other behaviour-related variable to remain significantly associated with the transition to moderate-risk gambler or problem gambler was avoiding places that have betting or gambling (3.1 times higher).

The health-related variables remaining significantly associated with transition to moderate-risk gambler or problem gambler were psychological distress and not using drugs. People who scored in the mid-low (score 6-11) or mid-high (score 12-19) range of psychological distress had 2.1 and 3.2 times higher risk compared with people with low levels of psychological distress. People who did not use any drugs were at *lower* risk (0.4 times) than people who used drugs.

Data are presented in Table 10.

Table 10: Multivariate logistic regression for transition from non-problem / low-risk gambler to moderate-risk / problem gambler aggregated across the waves

Variable	Odds Ratio	(95% CI)	p-value
Ethnic group (prioritised) at Wave 1			
Māori	3.11	(1.66, 5.83)	
Pacific	7.19	(3.73, 13.85)	
Asian	4.89	(2.12, 11.28)	
European/Other	1.00		<0.0001
Household income			
<\$20,000	1.00		
\$20,001 - \$40,000	1.27	(0.63, 2.54)	
\$40,001 - \$60,000	1.00	(0.39, 2.56)	
\$60,001 - \$80,000	1.33	(0.61, 2.87)	
\$80,001 - \$100,000	0.56	(0.24, 1.30)	
>\$100,000	0.26	(0.09, 0.72)	
Not reported	0.63	(0.19, 2.12)	0.03
Typical monthly gambling expenditure			
\$1 - \$10	1.00		
\$11 - \$20	0.55	(0.19, 1.63)	
\$21 - \$30	0.67	(0.19, 2.33)	
\$31 - \$50	0.94	(0.33, 2.69)	
\$51 - \$100	2.04	(0.75, 5.50)	
\$101 - \$500	4.28	(1.61, 11.43)	
>\$500	1.61	(0.37, 6.93)	<0.0001
EGMs overall - monthly			
No	1.00		
Yes	4.95	(2.25, 10.91)	<0.0001
Who spent time with on most enjoyed activity			
Alone	1.00		
With one person	0.34	(0.15, 0.78)	
With several people/a group	0.29	(0.14, 0.60)	
Most enjoyed activity not specified	0.54	(0.26, 1.13)	0.002
Methods - Avoiding places that have betting or gambling			
No	1.00		
Yes	3.09	(1.31, 7.28)	0.01
Psychological distress (Kessler-10)			
Score 0 - 5	1.00		
Score 6 - 11	2.12	(1.14, 3.96)	
Score 12 - 19	3.09	(1.42, 6.72)	
Score 20 - 40	1.96	(0.59, 6.51)	0.01
Uses drugs			
Yes	1.00		
No	0.43	(0.23, 0.79)	0.006

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

All measures are at the initial wave (i.e. Wave 1 for transition to Wave 2, Wave 2 for transition to Wave 3) unless otherwise indicated

Multiple logistic regression analyses specifically by Māori, Pacific or Asian ethnicity were not possible due to small sample sizes.

3.4.2 Staying as moderate risk/problem gambler

Overall across the three waves, 43% (n=51, adjusted data) of moderate-risk/problem gamblers remained in that category. Fifty-seven percent (n=67) of the transitions were out of the moderate-risk gambler and problem gambler categories into low-risk or non-problem categories.

Bivariate associations

Data are presented in Appendix 10.

Bivariate associations examined using logistic regression aggregated across the three waves, showed that ethnicity was a risk factor for staying a moderate-risk or problem gambler, with Pacific people having 2.6 times the risk compared with European/Other. Religion was also significantly associated with staying as a moderate-risk/problem gambler, with people of Presbyterian or Other Christian faith at just less than 4 times higher risk than people of no religion. Ethnicity and religion had not been previously noted to be associated with staying as a moderate-risk or problem gambler in the Wave 2 bivariate analyses⁹.

Mid- to high-level annual household income (\$60,001 - \$80,000, \$80,001 - \$100,000) appeared to be associated with *lower* risk for remaining as a moderate-risk/problem gambler (about 0.2 times) compared with people on the lowest annual household income (less than \$20,000). Having a highest educational qualification at secondary school level was also associated with a lower risk (0.3 times) compared with not having any formal qualifications. Similarly, living in a household size of three or four people was associated with lower risk (0.2 and 0.1 times respectively) compared to living alone.

Gambling-related factors significantly associated with staying as a moderate-risk gambler or problem gambler were pattern, frequency and monthly expenditure on gambling; annual sports gambling; and monthly keno, horse/dog race and pub EGM gambling. People who regularly gambled on non-continuous and continuous forms had 4.7 times or 4.0 times the risk respectively, compared with people who were infrequent gamblers.

People who gambled at least weekly had 4.4 times the risk of staying as a moderate-risk or problem gambler compared with people who gambled less frequently than monthly. People who typically spent \$51 to \$100, or more than \$500 on gambling per month had 3.2 and 7.6 times the risk respectively, compared with people who spent less than \$50 per month. Of the aforementioned forms of annual or monthly gambling, the greatest risk for staying a moderate-risk or problem gambler was noted for monthly horse and dog race gambling at 5.2 times the risk; this was followed by annual sports gambling and monthly keno gambling at almost 4 times the risk. The increased risk for monthly pub EGM gambling was 2.2 times.

Significantly *less* risk of staying as a moderate-risk gambler or problem gambler was noted for people who gambled with one person (0.3 times) or with several people (0.4 times) on their most enjoyed activity, compared with people who gambled alone.

Behaviour-related variables significantly associated staying as a moderate-risk gambler or problem gambler were ever seeking help¹⁰ (from formal and informal sources combined) (2.7 times higher) and ever seeking help from formal (professional) sources (8 times higher), compared with people who had never sought help. These findings probably reflect the fact that the highest risk gamblers are those who are likely to have tried to get help. Seeking formal help in the past 12 months just failed to attain a level of statistical significance ($p=0.07$).

No health-related variables were statistically significantly associated with staying as a moderate-risk gambler or problem gambler, aggregated across the waves.

Logistic regression analyses specifically by Māori, Pacific or Asian ethnicity were not possible due to small sample sizes.

⁹ Previously reported in Abbott, Bellringer, Garrett & Mundy-McPherson (2015b).

¹⁰ Note that this relates to ever seeking help prior to Wave 1.

Multiple logistic regression

In the multiple logistic regression analyses, aggregated across the three waves, the only factors which remained associated with staying as a moderate-risk or problem gambler were gambling frequency and ever seeking help from formal sources¹¹. People who gambled at least weekly had 5.9 times the risk of staying as a moderate-risk or problem gambler than people who gambled less frequently than monthly (at least once in the past year). People who had ever sought help from formal (professional) sources had 15 times the risk compared with people who had never sought formal assistance (Table 11).

Table 11: Multiple logistic regression for staying as a moderate-risk / problem gambler aggregated across the waves

Variable	Odds Ratio	(95% CI)	p-value
Gambling frequency			
At least weekly	5.85	(1.41, 24.23)	
At least monthly	1.25	(0.27, 5.81)	
At least once in past year	1.00		0.002
Sought help (from formal sources) - ever			
No	1.00		
Yes	15.44	(4.24, 56.28)	<0.0001

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

All measures are at the initial wave (i.e. Wave 1 for transition to Wave 2, Wave 2 for transition to Wave 3) unless otherwise indicated

Multiple logistic regression analyses specifically by Māori, Pacific or Asian ethnicity were not possible due to small sample sizes.

3.4.3 Transition to low-risk/moderate-risk/problem gambler

Aggregated across the three waves, 5.8% (n=254, adjusted data) of the transitions were into the low-risk/moderate-risk/problem gambler categories from the non-problem category. Ninety-four percent (n=4,095) did not change and remained as non-problem gamblers.

Bivariate associations

Data are presented in Appendix 11.

Bivariate associations examined by logistic regression indicated a greater number of factors associated with transition to low-risk gambler, moderate-risk gambler or problem gambler, aggregated across the three waves than was noted from Wave 1 to Wave 2¹². Demographic factors statistically significantly associated with the transition were ethnicity, age, country of birth, religion, household size, annual personal income, area of residence and individual level of deprivation.

Being of Māori, Pacific or Asian ethnicity was associated with 2.9, 4.7 and 2.2 times the risk of transitioning to low-risk, moderate-risk or problem gambler, aggregated across the three waves, compared with being European/Other. A slightly elevated risk was noted for migrants (1.4 times) compared with people born in New Zealand. Religion was significantly associated, with people of Presbyterian or Other Christian faith at about twice the risk compared with people of no religion. People living in large households of five or more had 1.8 times the risk of people living alone. People with two or more levels of deprivation were at higher risk

¹¹ Note that this relates to ever seeking help prior to Wave 1

¹² Previously reported in Abbott, Bellringer, Garrett & Mundy-McPherson (2015b)

compared with people with no levels of deprivation; the risk level generally increased with increasing number of deprivation levels from 1.3 times to 3.7 times.

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 (about 0.4 times) than people in the youngest age group (18-24 years). People on mid-level (\$60,001 - \$80,000) and high (more than \$100,000) annual personal incomes were also less likely to transition (0.6 and 0.3 times respectively) compared with people on the lowest annual income (less than \$20,000). Area of residence also appeared to be protective against transitioning to low-risk, moderate-risk or problem gambler status with people living in Christchurch or the rest of New Zealand¹³ having 0.4 and 0.7 times the risk respectively, compared with people living in Auckland. People living in Wellington also had a lower risk (0.6 times) although the confidence intervals spanned 1, so this finding could be an artefact of confounding factors.

Although a level of statistical significance was attained for highest educational level, all the confidence intervals overlapped 1. Therefore, this finding is considered spurious and likely to be due to confounding factors.

Similar to the findings noted from Wave 1 to Wave 2¹⁴, gambling-related factors significantly associated with the transition, aggregated across the three waves, 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 on EGMs (casino and non-casino), who gambled with on most enjoyed gambling activity, and knowing people with gambling problems.

People who had participated in two, four to six, seven to nine and 10 or more gambling activities in the previous 12 months were at higher risk of transitioning to low-risk, moderate-risk or problem gambler status than people who had only participated in one gambling activity. The risk ranged from 1.8 to 15 times higher, increasing with increasing number of activities. People whose typical monthly gambling expenditure was \$31 or higher had 2.2 to 4.7 times the risk of those who gambled \$10 or less; generally the risk increased with increasing expenditure. The exception was for the highest expenditure of \$500 or more with a risk level of just 2.8 times; the confidence intervals also spanned 1, which could be due to the relatively small sample size.

People who gambled regularly on continuous forms had 2.9 times the risk compared with people who were infrequent gamblers, with an increased risk (about 2.5 times higher) noted for people who gambled at least weekly or at least monthly compared, with people who gambled at least once in the past year. This was also evident in the increased risk noted for most of the forms of gambling participated in annually or monthly, with the greatest risk noted for monthly gambling on casino table games (20 times), and monthly gambling in New Zealand casinos (table games and EGMs, 11 times). Increased risk was also noted with increased time spent gambling on EGMs in a typical day. People who gambled on casino EGMs for more than 15 minutes had about three times the risk compared with people who did not gamble on casino EGMs. For pub and club EGM gamblers, the risk increased to 12 times and 9 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 twice the risk compared with people who did not gamble on pub EGMs.

Although a level of statistical significance was noted for people who gambled with at least one other person on their most enjoyed activity in comparison with gambling alone, the odds ratios

¹³ “The rest of New Zealand’ includes everywhere except Auckland, Wellington and Christchurch.

¹⁴ Previously reported in Abbott, Bellringer, Garrett & Mundy-McPherson (2015b)

were close to 1 and the confidence intervals overlapped 1. This finding is an artefact of the large number of responses where the most enjoyed activity was not reported.

A slightly increased risk (1.6 times) of transitioning to low-risk, moderate-risk or problem gambler status was noted for people who knew other people with gambling problems.

Similar to the findings noted from Wave 1 to Wave 2, behaviour-related variables significantly associated with the transitions were setting a dollar limit for gambling before leaving home (twice as high), separating money for gambling from other money and stopping gambling when the money is used (three times as high), and setting a time limit for gambling (2.8 times as high). Ever seeking help¹⁵ (from formal and informal sources combined) was also associated with the transition (3.6 times higher), compared with people who had never sought help.

People who had experienced one, two or three major life events in the past 12 months had 1.7, 1.6 and 1.8 times the risk respectively, 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 3.2 times the risk. Similarly, people whose quality of life was below or at the median score were at about twice the risk compared to people whose quality of life was above the median score.

Health-related variables significantly associated with the transition to low-risk, moderate-risk or problem gambler, aggregated across the three waves, included psychological distress, drug use and tobacco use. People who had some level of psychological distress, compared to people with low levels, had 1.8 to 4.4 times the risk, increasing with increasing levels of distress. People who used cannabis had 2.4 times the risk compared with people who did not use cannabis; similarly, people who did not use any drugs were at *lower* risk (0.4 times) than people who used drugs. People who smoked tobacco at least once a week had 1.7 times the risk compared with people who never smoked.

Logistic regression analyses specifically by Māori and Pacific ethnicity are detailed below. Logistic regression analyses by Asian ethnicity were not possible due to small sample sizes.

By ethnicity - Māori and Pacific people

Aggregated across the three waves, 11.5% (n=49, adjusted data) of the transitions for Māori and 17% (n=30) of the transitions for Pacific people were into the low-risk/moderate-risk/problem gambler categories from the non-problem category. These percentages were substantially higher than the 5.8% noted for the total population.

Demographic factors statistically significantly associated with the transition to low-risk, moderate-risk or problem gambler status for Māori, aggregated across the three waves, were age and annual personal income. For Pacific people, only personal income was statistically significantly associated.

Māori in the mid age groups (35-64 years) were at *lower* risk of transitioning to low-risk, moderate-risk or problem gambler status (about 0.2 times) than Māori in the youngest age group (18-24 years). These findings were generally comparable with those noted for the total population.

Māori on mid-high level personal incomes (\$40,001 or more) were also *less* likely to transition (0.2 - 0.3 times respectively), compared with Māori on the lowest annual income (less than \$20,000). A similar finding was noted for Pacific people with a *lower* risk noted for those in

¹⁵ Note that this relates to ever seeking help prior to Wave 1.

the \$40,001 - \$60,000 annual personal income bracket (0.03 times). These findings were generally comparable with those noted for the total population.

Gambling-related factors significantly associated with the transition across the three waves for Māori were the number of activities gambled on; pattern of gambling; annual or monthly gambling on Instant Kiwi or other scratch cards, New Zealand casino table games and EGMs, and pub EGMs; and time spent gambling on pub EGMs. There were no statistically significant gambling-related factors associated with transitioning to low-risk, moderate-risk or problem gambler categories amongst Pacific people.

Māori who had participated in four to six, or seven to nine gambling activities in the previous 12 months were at higher risk (2.9 times and 6.2 times respectively) of transitioning to low-risk, moderate-risk or problem gambler categories than Māori who had only participated in one gambling activity. This finding is generally comparable with that noted for the total population.

The forms of gambling participated in annually or monthly with the greatest risk for Māori to transition into the low-risk, moderate-risk or problem gambler categories were annual and monthly gambling on New Zealand casino table games and EGMs (4.3 times and 116 times respectively) and pub EGMs (3.7 times and 8.5 times respectively). Note that due to small sample size for monthly casino gambling, that the risk level should be considered indicative rather than absolute. Increased risk was also noted with increased time spent gambling on pub EGMs in a typical day. Māori who gambled on pub EGMs for more than 15 minutes had 3.2 to 8.8 times the risk (increasing risk with increasing time) compared with Māori who did not gamble on pub EGMs.

Although a level of statistical significance was noted for Māori who gambled with at least one other person on their most enjoyed activity in comparison with gambling alone, the confidence intervals overlapped 1. This finding is an artefact of the large number of responses where the most enjoyed activity was not reported.

Behaviour-related variables significantly associated with the transitions for Māori were setting a dollar limit for gambling before leaving home (2.4 times higher) and setting a time limit for gambling (6.3 times higher). These findings are similar to those for the total population. There were no statistically significant behaviour-related variables associated with the transitions amongst Pacific people.

Psychological distress was significantly associated for Māori with increased risk (2.9 to 5.6 times higher, increasing with increasing levels of distress) for transitioning to low-risk, moderate-risk or problem gambler across the three waves, compared to Māori with low levels of distress. This finding was similar to that for the total population but was not noted amongst Pacific people.

Quality of life was significantly associated with the transition to low-risk, moderate-risk or problem gambler status for Pacific people whose quality of life was below the median score (2.4 times the risk), compared to Pacific people whose quality of life was above the median score.

Although a level of statistical significance was attained for frequency of gambling and quality of life for Māori, the confidence intervals overlapped 1; these findings are considered likely to be due to confounding factors.

Statistically significant associations are presented in Appendix 12 and Appendix 13.

Multiple logistic regression

Multiple logistic regression analyses showed that ethnicity remained statistically significantly associated with the transition to low-risk gambler, moderate-risk gambler or problem gambler from non-problem gambler, aggregated across the three waves. Compared to European/Other, Pacific people were associated with the greatest risk (4.8 times higher), followed by Asian people (2.9 times higher) and Māori (2.3 times).

Frequency of gambling also remained a risk factor with people gambling at least weekly or at least monthly having about twice the risk of transitioning into the at-risk gambling categories, compared with people who gambled less often than monthly (who gambled at least once in the past year).

Monthly gambling on New Zealand casino table games or EGMs and monthly gambling on pub EGMs remained associated with increased risk for transitioning to low-risk, moderate-risk or problem gambler status (7.4 and 2.7 times higher respectively) compared with people who did not gamble monthly on those forms. Similarly, length of time gambling on pub EGMs also continued to be statistically significantly associated with the transition; people who gambled for 16 to 30 minutes, or more than 60 minutes in a typical day had 2.0 and 7.4 times higher risk, respectively, compared with people who did not gamble on pub EGMs.

Having experienced one, two or three major life events in the past 12 months remained associated with transitioning to low-risk, moderate-risk or problem gambler compared with people who had not experienced any major life events (1.7, 1.7 and 2.0 times higher respectively). People who experienced five or more life events had 2.8 times the risk. Similarly, people whose quality of life was below or at the median score remained at increased risk (just less than twice the risk) compared to people whose quality of life was above the median score.

Health-related variables that remained significantly associated with the transition to low-risk, moderate-risk or problem gambler across the three waves in the multiple logistic regression analyses were psychological distress and drug use. People who had the highest level of psychological distress, compared to people with low levels, had 3.6 times the risk. People who used cannabis had 1.7 times the risk compared with people who did not use cannabis.

Data are presented in Table 12.

Table 12: Multiple logistic regression for transition from non-problem gambler to low-risk / moderate-risk / problem gambler aggregated across the waves

Variable	Odds Ratio	(95% CI)	p-value
Ethnic group (prioritised) at Wave 1			
Māori	2.34	(1.59, 3.45)	
Pacific	4.75	(3.09, 7.28)	
Asian	2.89	(1.79, 4.68)	
European/Other	1.00		<0.0001
Gambling frequency			
At least weekly	2.22	(1.51, 3.25)	
At least monthly	2.12	(1.45, 3.11)	
At least once in past year	1.00		<0.0001
Casino table games or EGMs (NZ) - monthly			
No	1.00		
Yes	7.44	(1.18, 46.99)	0.03
Pub EGMs - monthly			
No	1.00		
Yes	2.71	(1.31, 5.59)	0.007
Time spent playing EGMs in an average day (pub)			
No time	1.00		
Up to 15 minutes	1.22	(0.57, 2.65)	
16 to 30 minutes	2.03	(1.04, 3.99)	
31 to 60 minutes	1.93	(0.87, 4.29)	
>60 minutes	7.44	(3.11, 17.80)	0.0002
Number of significant life events			
0	1.00		
1	1.69	(1.09, 2.60)	
2	1.67	(1.05, 2.67)	
3	1.96	(1.15, 3.35)	
4	1.27	(0.62, 2.59)	
5+	2.84	(1.62, 4.97)	0.008
Quality of life (WHOQoL-8)			
Below median (Score 0 - 24)	1.72	(1.21, 2.44)	
Median score (Score 25)	1.79	(1.06, 3.02)	
Above median (Score 26 - 32)	1.00		0.007
Psychological distress (Kessler-10)			
Score 0 - 5	1.00		
Score 6 - 11	1.44	(0.97, 2.12)	
Score 12 - 19	1.70	(0.94, 3.09)	
Score 20 - 40	3.61	(1.25, 10.44)	0.02
Cannabis			
No	1.00		
Yes	1.66	(1.06, 2.62)	0.03

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

All measures are at the initial wave (i.e. Wave 1 for transition to Wave 2, Wave 2 for transition to Wave 3) unless otherwise indicated

Multiple logistic regression analyses specifically by Māori and Pacific ethnicity are presented below. Multiple logistic regression analyses by Asian ethnicity were not possible due to small sample sizes.

By ethnicity - Māori and Pacific people

The only demographic factor that remained statistically significantly associated with the transition to low-risk, moderate-risk or problem gambler status for Māori, aggregated across the three waves, was age. Māori in the mid age groups (35-64 years) were at *lower* risk of transitioning to low-risk, moderate-risk or problem gambler status (about 0.1 times) than Māori in the youngest age group (18-24 years).

The gambling-related factor remaining significantly associated with the transition, aggregated across the three waves, for Māori was time spent gambling on pub EGMs in a typical day.

Māori who gambled on pub EGMs for more than 15 minutes had 2.8 to 14.7 times the risk (increasing risk with increasing time) compared with Māori who did not gamble on pub EGMs.

Setting a dollar limit for gambling before leaving home was the only behaviour-related variable that remained significantly associated with the transition for Māori (2.3 times higher) compared with Māori who did not do this.

Psychological distress also remained significantly associated with transitioning to low-risk, moderate-risk or problem gambler across the three waves for Māori. Increased risk was noted for Māori reporting low-mid and high-mid levels of distress (3.2 and 3.8 times higher, respectively), compared to Māori with low levels of distress.

Quality of life remained significantly associated with the transition to low-risk, moderate-risk or problem gambler categories in the multiple logistic regression analyses for Pacific people whose quality of life was below the median score (2.4 times higher), compared to Pacific people whose quality of life was above the median score. A similarly increased risk (2.8 times higher) appeared to be noted for Pacific people whose quality of life was at the median score. However, the confidence interval was large and overlapped 1. This finding is likely to be an artefact of the small sample size and, therefore, is considered unimportant.

Data are presented in Table 13 and Table 14.

Table 13: Multiple logistic regression for transition from non-problem gambler to low-risk / moderate-risk / problem gambler aggregated across the waves for Māori

Variable	Odds Ratio	(95% CI)	p-value
Age group (years) at Wave 1			
18 - 24	1.00		
25 - 34	0.30	(0.09, 1.03)	
35 - 44	0.16	(0.04, 0.61)	
45 - 54	0.11	(0.03, 0.40)	
55 - 64	0.14	(0.04, 0.53)	
65+	0.43	(0.11, 1.74)	0.005
Time spent playing EGMs in an average day (pub)			
No time	1.00		
Up to 15 minutes	0.73	(0.18, 2.92)	
16 to 30 minutes	2.77	(1.03, 7.44)	
31 to 60 minutes	11.32	(3.32, 38.60)	
>60 minutes	14.71	(3.01, 71.86)	<0.0001
Methods - Setting a dollar limit before leaving home			
No	1.00		
Yes	2.33	(1.17, 4.62)	0.02
Psychological distress (Kessler-10)			
Score 0 - 5	1.00		
Score 6 - 11	3.23	(1.44, 7.26)	
Score 12 - 19	3.76	(1.33, 10.60)	
Score 20 - 40	6.20	(0.98, 39.43)	0.003

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

All measures are at the initial wave (i.e. Wave 1 for transition to Wave 2, Wave 2 for transition to Wave 3) unless otherwise indicated

Table 14: Multiple logistic regression for transition from non-problem gambler to low-risk / moderate-risk / problem gambler aggregated across the waves for Pacific people

Variable	Odds Ratio	(95% CI)	p-value
Quality of life (WHOQoL-8)			
Below median (Score 0 - 24)	2.39	(1.29, 4.45)	
Median score (Score 25)	2.82	(0.99, 7.98)	
Above median (Score 26 - 32)	1.00		0.015

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

All measures are at the initial wave (i.e. Wave 1 for transition to Wave 2, Wave 2 for transition to Wave 3) unless otherwise indicated

3.4.4 Staying as low-risk/moderate-risk/problem gambler

Aggregated across the three waves, 46% (n=210, adjusted data) of low-risk/moderate-risk/problem gamblers remained in that category. Fifty-four percent (n=247) of the transitions were out of the low-risk, moderate-risk and problem gambler categories into the non-problem gambler category.

Bivariate associations

Data are presented in Appendix 14.

Similar to the findings noted from Wave 1 to Wave 2¹⁶, bivariate associations examined using logistic regression indicated that ethnicity and annual personal income were the demographic variables that were statistically significantly associated with staying as a low-risk gambler, moderate-risk gambler or problem gambler, aggregated across the three waves. Māori had 2.9 times the risk compared to European/Other. People in the \$80,001 to \$100,000 personal income bracket had 4.7 times the risk compared to people in the lowest income bracket of \$20,000 or less.

People who lived in household sizes of two, three, or five or more people had a *lower* risk of staying as a low-risk, moderate-risk or problem gambler (0.5, 0.6 and 0.4 times respectively) compared with people who lived alone. People whose highest educational qualification was a secondary school qualification or a university degree or higher were at *lower* risk (about 0.5 times) of staying as a low-risk/moderate-risk/problem gambler than people without formal qualifications. However, this latter finding just failed to attain a level of statistical significance (P=0.07).

Gambling-related factors statistically significantly associated with staying as a low-risk gambler, moderate-risk gambler or problem gambler were number of gambling activities participated in, pattern and frequency of gambling, typical monthly expenditure on gambling, participating in most forms of gambling either annually or monthly, time spent gambling on EGMs (casino and non-casino), and knowing people with gambling problems.

People who gambled on 10 or more activities in the past 12 months had a substantially elevated risk (41 times higher) of staying as a low-risk/moderate-risk/problem gambler, aggregated across the three waves, than people who had only gambled on one activity. However, due to small sample size, this level of risk should be considered indicative rather than absolute. People who gambled regularly on non-continuous and continuous forms had 1.7 and 3.5 times the risk respectively, compared with people who were infrequent gamblers. This was also evident in the increased risk noted for people who gambled at least weekly or at least monthly (4.7 times and 2.4 times higher respectively) compared with people who gambled less frequently. People whose typical monthly gambling expenditure was \$101 to \$500, or more than \$500 were at 3.7 and 8.5 times the risk compared to people who gambled \$10 or less.

Of the various forms of annual or monthly gambling, the greatest risk for staying a low-risk, moderate-risk or problem gambler was noted for annual overseas internet gambling (4.6 times), monthly card gambling (4.2 times), monthly keno gambling (4.5 times), monthly horse and dog race gambling (4.8 times), monthly pub EGM gambling (5.1 times), and monthly overall EGM gambling (5.3 times). People who gambled for longer periods on pub and club EGMs were also at increased risk. Gambling on pub EGMs for 30 minutes or longer was associated with

¹⁶ Previously reported in Abbott, Bellringer, Garrett & Mundy-McPherson (2015b)

about four times the risk, whilst gambling on club or casino EGMs for greater than 60 minutes in a typical session was associated with 5.1 and 3.3 times the risk respectively, compared with people who did not gamble on these EGMs. Knowing someone with a gambling problem was associated with 1.6 times higher risk of staying a low-risk, moderate-risk or problem gambler compared with not knowing anyone with a gambling problem.

Behaviour-related variables statistically significantly associated with the transition were setting a dollar limit for gambling before leaving home (1.7 times higher), and separating money for gambling from other money and stopping gambling when the money is used (1.9 times higher). Seeking help from formal (professional) sources in the past 12 months was also associated with the transition (18.7 times higher), compared with people who had not sought formal help in the past year. Due to the small sample size for people who had sought help, the risk factor should be considered indicative rather than absolute.

No health-related variables were statistically significantly associated with staying as a low-risk gambler, moderate-risk gambler or problem gambler across the waves.

Logistic regression analyses specifically by Māori and Pacific ethnicity are detailed below. Logistic regression analyses by Asian ethnicity were not possible due to small sample sizes.

By ethnicity - Māori and Pacific people

Aggregated across the three waves, 65% (n=67, adjusted data) of the transitions for Māori and 52% (n=29) of the transitions for Pacific people were those that remained in the low-risk/moderate-risk/problem gambler categories. The Pacific percentage is similar to the 46% noted for the total population; however, a higher proportion of Māori remained in a risk category than the total population.

Different from total population findings, no demographic factors were statistically significantly associated with staying as a low-risk, moderate-risk or problem gambler for Māori or Pacific people across the three waves.

Gambling-related factors significantly associated with staying as a low-risk, moderate-risk or problem gambler, aggregated across the three waves, for Māori were the number of activities gambled on; typical monthly expenditure on gambling; annual gambling on New Zealand casino table games and/or EGMs, monthly gambling on keno, and annual or monthly gambling on club and/or pub EGMs; and time spent gambling on pub EGMs. For Pacific people, the statistically significant association was noted for annual betting with friends or workmates, sports betting and gambling on casino table EGMs.

Māori who had participated in four to six, or seven or more gambling activities in the previous 12 months were at higher risk (4.7 times and 11.8 times respectively) of staying as a low-risk, moderate-risk or problem gambler than Māori who had only participated in one gambling activity. For the total population, a significant association was only noted for gambling on 10 or more activities, indicating that Māori were more likely to remain an at-risk gambler with participation in a lower number of gambling activities. Māori whose typical monthly gambling expenditure was \$51 or more, were at 13 to 38 times the risk (increasing with increasing expenditure) compared to Māori who gambled \$10 or less. Again, this indicates that Māori had a higher likelihood of remaining at-risk compared with the total population, where associations were noted with expenditure from \$101 and with lower odds ratios (3.7 to 8.5 times higher).

The forms of gambling participated in annually or monthly with the greatest risk for Māori staying in the low-risk, moderate-risk or problem gambler categories were monthly keno gambling (14.5 times higher) and monthly gambling on EGMs overall (5.4 times higher). For Pacific people the greatest risk was annual sports betting (11.7 times higher). However, due to small sample sizes, these risk levels should be considered indicative rather than absolute. Increased risk was also noted for Māori who spent a longer time gambling on pub EGMs in a typical day. Māori who gambled on pub EGMs for more than 30 minutes had 4.4 to 9.4 times the risk (increasing risk with increasing time) compared with Māori who did not gamble on pub EGMs.

Māori who set a dollar limit for gambling before leaving home had 2.4 times the risk of staying as a low-risk, moderate-risk or problem gambler compared with Māori who did not use this method. This finding is similar to that for the total population and was not noted for Pacific people.

Different from total population findings, Māori who consumed alcohol in a hazardous manner or who used cannabis were 4.1 and 5.0 times at risk of remaining a low-risk, moderate-risk or problem gambler than Māori who did not consume those substances. Similarly, Māori who did not use any drugs were at lower risk (0.2 times) than Māori who used drugs. These findings were not noted amongst Pacific people.

Statistically significant associations are presented in Appendix 15 and Appendix 16.

Multiple logistic regression

In the multiple logistic regression analyses, the only demographic factor that remained statistically significantly associated with staying as a low-risk, moderate-risk or problem gambler, aggregated across the waves was ethnicity. Māori had 3.3 times the risk compared to European/Other and Pacific people were at 1.9 times higher risk. This finding for Pacific people had not been noted in the bivariate associations, which did not control for confounding factors.

Gambling-related factors that remained statistically significantly associated with staying as a low-risk gambler, moderate-risk gambler or problem gambler were frequency of gambling, and annual or monthly participation in some forms of gambling.

Increased risk was noted for people who gambled at least weekly (2.3 times higher) compared with people who gambled less frequently than monthly (i.e. at least once in the past year). Increased risk was also noted for people who gambled annually in overseas casinos (table games and EGMs, 2.8 times higher), or monthly gambling on horse/dog races (4.3 times higher), pub EGMs (3.0 times higher) and club EGMs (2.6 times higher), compared with people who did not gamble on those forms.

Data are presented in Table 15.

Table 15: Multiple logistic regression for staying a low-risk / moderate-risk / problem gambler aggregated across the waves

Variable	Odds Ratio	(95% CI)	p-value
Ethnic group (prioritised) at Wave 1			
Māori	3.25	(1.80, 5.86)	
Pacific	1.89	(1.02, 3.49)	
Asian	1.88	(0.76, 4.63)	
European/Other	1.00		0.001
Gambling frequency			
At least weekly	2.34	(1.18, 4.62)	
At least monthly	1.59	(0.75, 3.38)	
At least once in the past year	1.00		0.04
Casino table games or EGMs (overseas) - annual			
No	1.00		
Yes	2.75	(1.06, 7.15)	0.04
Horse/dog race betting - monthly			
No	1.00		
Yes	4.28	(1.65, 11.09)	0.003
Pub EGMs - monthly			
No	1.00		
Yes	2.98	(1.60, 5.53)	0.001
Club EGMs - monthly			
No	1.00		
Yes	2.64	(1.10, 6.39)	0.03

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

All measures are at the initial wave (i.e. Wave 1 for transition to Wave 2, Wave 2 for transition to Wave 3) unless otherwise indicated

Multiple logistic regression analyses specifically by Māori and Pacific ethnicity are presented below. Multiple logistic regression analyses by Asian ethnicity were not possible due to small sample sizes.

By ethnicity - Māori and Pacific people

In the multiple logistic regression analyses, a longer time gambling on pub EGMs in a typical day remained a risk factor for Māori staying as a low-risk, moderate-risk or problem gambler, aggregated across the three waves. Māori who gambled on pub EGMs for more than 60 minutes in a typical day had 7.1 times the risk compared with Māori who did not gamble on pub EGMs. Although a lower risk appeared to be noted for Māori who gambled on pub EGMs for 16 to 30 minutes, the sample size for this group was very low and this finding is likely to be an artefact of the small sample.

The only other risk factor for staying as a low-risk, moderate-risk or problem gambler that remained in the multiple logistic regression analyses for Māori was for those who set a dollar limit for gambling before leaving home (4.9 times higher) compared with Māori who did not use this method.

For Pacific people, the only factor in the multiple logistic regression analyses was annual gambling on casino EGMs, which did not achieve a level of statistical significance in the bivariate association analyses. Pacific people who gambled annually on casino EGMs had 2.7 times higher risk of remaining as a low-risk, moderate-risk or problem gambler than Pacific people who did not gamble annually on casino EGMs.

It is of note that all Māori who remained in the low-risk/moderate-risk/problem gambling categories gambled on casino EGMs at least monthly, and all Pacific people who remained in the low-risk/moderate-risk/problem gambling categories gambled on horse/dog race betting and casino table games at least monthly. Logistic regression analysis on these variables was not possible because of this.

Data are presented in Table 16 and Table 17.

Table 16: Multiple logistic regression for staying a low-risk / moderate-risk / problem gambler aggregated across the waves for Māori

Variable	Odds Ratio	(95% CI)	p-value
Time spent playing EGMs in an average day (pub)			
No time	1.00		
Up to 15 minutes	1.02	(0.22, 4.78)	
16 to 30 minutes	0.15	(0.03, 0.64)	
31 to 60 minutes	3.49	(0.89, 13.60)	
>60 minutes	7.12	(2.22, 22.84)	<0.0001
Methods - Setting a dollar limit before leaving home			
No	1.00		
Yes	4.90	(2.07, 11.60)	0.0003

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

All measures are at the initial wave (i.e. Wave 1 for transition to Wave 2, Wave 2 for transition to Wave 3) unless otherwise indicated

Note: All Māori who remained in the low-risk/moderate-risk/problem gambling categories gambled on casino EGMs at least monthly; therefore, logistic regression analysis was not possible for this variable

Table 17: Multiple logistic regression for staying a low-risk / moderate-risk / problem gambler aggregated across the waves for Pacific people

Variable	Odds Ratio	(95% CI)	p-value
Casino EGMs (NZ) - annual			
No	1.00		
Yes	2.73	(1.08, 6.91)	0.03

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

All measures are at the initial wave (i.e. Wave 1 for transition to Wave 2, Wave 2 for transition to Wave 3) unless otherwise indicated

Note: All Pacific people who remained in the low-risk/moderate-risk/problem gambling categories gambled on horse/dog race betting and casino table games at least monthly; therefore, logistic regression analysis was not possible for these variables

3.4.5 Initiation of gambling in Wave 2 or Wave 3 from the prior wave

Aggregated across the three waves, 29% (n=234, adjusted data) of the transitions were for participants who started gambling in Wave 2 or Wave 3 from not gambling in the prior wave (or never having gambled). Seventy-one percent (n=578) of the transitions related to continuing not to gamble in Wave 2 or Wave 3.

Bivariate associations

Data are presented in Appendix 17.

Bivariate associations examined by logistic regression indicated that ethnicity, country of birth, date of arrival in New Zealand, religion and area of residence were the socio-demographic factors significantly associated with starting gambling in Wave 2 or Wave 3, aggregated across the waves.

Asian people had a *lower* risk of starting gambling (0.6 times) compared with European/Other. Migrants also had a lower risk (0.7 times), particularly recent migrants arriving after 2008 (0.4 times), in comparison with people born in New Zealand. A lower risk (about 0.4 times) was similarly noted for people of Other Christian religion (i.e. not Anglican, Catholic or Presbyterian) or Other religion (i.e. not Christian) compared with people who were not religious.

Area of residence was associated with a statistically significant higher risk for starting gambling with people residing in Christchurch or the rest of New Zealand¹⁷ at 2.9 and 1.5 times higher risk than people living in Auckland.

People in the low-mid range of psychological distress (score 6-11) had a *lower* risk of starting gambling (0.5 times) in Wave 2 or Wave 3, aggregated across the waves, when compared with people who had the lowest level of psychological distress (score 0-5). However, people in the high-mid range (score 12-19) had a *higher* risk (2.6 times) compared with people who had the lowest level.

Concurrent use of alcohol and tobacco were also significantly associated with starting gambling in Wave 2 or Wave 3, aggregated across the waves. People who were hazardous alcohol drinkers had 1.7 times higher risk than people who were not hazardous alcohol drinkers. People who currently smoked tobacco at least once a week and people who did not currently smoke (i.e. past smokers) were at about twice the risk of people who had never smoked. 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 not smoked at these levels.

Logistic regression analyses specifically by Māori, Pacific or Asian ethnicity were not possible due to small sample sizes.

Multiple logistic regression

Multiple logistic regression analyses showed that religion, psychological distress and ever having smoked tobacco daily remained statistically significantly associated with starting gambling in Wave 2 or Wave 3, aggregated across the waves.

A lower risk (about 0.5 times) remained for people of Other Christian religion or Other religion compared with people who were not religious.

People who had ever smoked tobacco daily remained at higher risk (1.8 times higher) for starting gambling than people who had never smoked daily.

People in the low-mid range of psychological distress (score 6-11) remained at *lower* risk of starting gambling (0.5 times) and people in the high-mid range (score 12-19) remained at *higher* risk (2.2 times), compared with people who had the lowest level of psychological distress (score 0-5).

Data are presented in Table 18

¹⁷ “The rest of New Zealand’ includes everywhere except Auckland, Wellington and Christchurch.

Table 18: Multiple logistic regression for initiation of gambling, aggregated across the waves

Variable	Odds Ratio	(95% CI)	p-value
Religion			
No religion	1.00		
Anglican	1.05	(0.54, 2.04)	
Catholic	1.33	(0.69, 2.58)	
Presbyterian	0.80	(0.39, 1.63)	
Other Christian	0.53	(0.30, 0.95)	
Other religion	0.50	(0.27, 0.93)	0.04
Psychological distress (Kessler-10)			
Score 0 - 5	1.00		
Score 6 - 11	0.49	(0.28, 0.84)	
Score 12 - 19	2.24	(1.09, 4.59)	
Score 20 - 40	0.83	(0.22, 3.16)	0.003
Ever smoked daily for a period of time			
No	1.00		
Yes	1.78	(1.16, 2.74)	0.01

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

All measures are at the initial wave (i.e. Wave 1 for transition to Wave 2, Wave 2 for transition to Wave 3) unless otherwise indicated

Multiple logistic regression analyses specifically by Māori, Pacific or Asian ethnicity were not possible due to small sample sizes.

3.4.6 Re-initiation of gambling in Wave 2 or Wave 3 from the prior wave

Aggregated across the three waves, 44% (n=275, adjusted data) of the transitions were for participants who had not gambled in the year prior to Wave 1 or Wave 2 (aggregated), but who had previously gambled at some time in the past, who then started gambling again in Wave 2 or Wave 3 (aggregated). Fifty-six percent (n=346) of the transitions related to past gamblers who did not gamble in the prior 12 months.

Bivariate associations

Data are presented in Appendix 18.

Bivariate associations examined by logistic regression indicated that area of residence was the only socio-demographic factor significantly associated with re-initiation of gambling in Wave 2 or Wave 3, aggregated across the waves. People living in Christchurch had a *lower* risk for re-initiating gambling (0.4 times) compared with people living in Auckland.

Concurrent use of alcohol and tobacco were also significantly associated with re-initiating gambling in Wave 2 or Wave 3, aggregated across the waves. People who were hazardous alcohol drinkers had 1.5 times higher risk than people who were not hazardous alcohol drinkers. People who currently smoked tobacco at least once a week were at about twice the risk of people who had never smoked. Similarly, people who had ever smoked daily or who had ever smoked tobacco (i.e. in the past) were at 1.5 and 1.8 times the risk compared to people who had not smoked at these levels. Additionally, people who did not use drugs had about half the risk of re-initiating gambling than people who used drugs.

Logistic regression analyses specifically by Māori, Pacific or Asian ethnicity were not possible due to small sample sizes.

Multiple logistic regression

Multiple logistic regression analyses showed that area of residence and ever having smoked tobacco remained statistically significantly associated with re-initiating gambling in Wave 2 or Wave 3, aggregated across the waves.

People living in Christchurch remained at *lower* risk for re-initiating gambling (0.4 times) compared with people living in Auckland. People who had ever smoked tobacco remained at higher risk of re-initiating gambling (1.8 times higher) than people who had never smoked tobacco.

Data are presented in Table 19.

Table 19: Multiple logistic regression for re-initiation of gambling, aggregated across the waves

Variable	Odds Ratio	(95% CI)	p-value
Area of residence			
Auckland	1.00		
Wellington	1.55	(0.79, 3.04)	
Christchurch	0.35	(0.15, 0.83)	
Rest of NZ	1.04	(0.67, 1.62)	0.03
Ever smoked tobacco			
No	1.00		
Yes	1.83	(1.20, 2.79)	0.005

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

All measures are at the initial wave (i.e. Wave 1 for transition to Wave 2, Wave 2 for transition to Wave 3) unless otherwise indicated

Multiple logistic regression analyses specifically by Māori, Pacific or Asian ethnicity were not possible due to small sample sizes.

A major purpose of the National Gambling Study is to determine the incidence (rate of onset) of problem and at-risk gambling in New Zealand and to assess their persistence over time at both individual and general population levels. Other transitions including commencing gambling, re-commencing gambling and movement between non-problem gambling and gambling risk and problem gambling states are also examined. Additionally, as outlined in the results section, factors that predict problem and at-risk gambling onset and some other transitions have been identified. As relatively small numbers of people in a given year make a number of the transitions of interest, including problem onset, some analyses combined data across three waves of the study to increase statistical power. For the same purpose, categories (e.g. moderate-risk and problem gambling) were combined for some analyses. However, even with these adjustments, there was sometimes insufficient statistical power to adequately assess transitions and identify risk and protective factors. Following the final wave of the NGS and the addition of further transitions, it may be possible to shed more light on these matters.

While the main focus of the present report is on changes over time at the individual level, the third wave of the NGS also provides cross-sectional information on the national prevalence of gambling participation, at-risk gambling and problem gambling in 2014. Comparison of the results of the 2014 survey with those of the baseline 2012 survey and 2013 follow-up allow stability and change to be assessed at the general population level. As discussed in the introduction, problem gambling prevalence estimates are based on small numbers (and thus large confidence intervals) even when, as in the NGS, the total sample is large. In addition to involving small numbers of problem gamblers, prevalence studies vary methodologically and these differences have an impact on their results (Abbott et al., 2014a; Stone et al., 2015; Williams et al., 2015). Each study also has methodological limitations related to measurement error, which makes it difficult to know if change in a category is real change or measurement error. Thus, not only is the accuracy of individual surveys uncertain, it is often not clear whether apparent change or stability over time is real or an artefact of methodological differences.

It is unlikely that gambling participation and gambling-related harm would change appreciably during a 12- or 24-month period. Given this, and the use of identical methodologies in 2012, 2013 and 2014 we have, in effect, a series of replication studies with potential to increase our confidence in the accuracy of our national population estimates and research findings more generally. While the present study design has a number of strengths, the sample is not the same at each survey wave. Each year the sample aged a year. It had no 18 year olds in 2013 and no 18 and 19 year olds in 2014. The sample also reduced in size through attrition, which was non-random. These changes could influence the survey results. However, sample weighting probably largely, if not totally, corrected for these changes.

General population prevalence: 2012, 2013 and 2014

As in 2012 and 2013, in the present survey more than three-quarters of adults took part in one or more gambling activities with European/Other and Māori adults taking part more often than their Pacific and Asian counterparts. In 2014, just less than a quarter of adults were non-gamblers, over a half were infrequent gamblers, 15% were regular non-continuous gamblers and five percent were regular continuous gamblers¹⁸. The most popular past year activities

¹⁸ In this study, Lotto, other lotteries, raffles and making bets with friends or workmates were classified as non-continuous. All other activities were classified as continuous. Regular continuous gamblers were defined as people who took part in one or more continuous activities during the past week. They could

were Lotto, raffles and lotteries, Instant Kiwi or other scratch tickets, and bets with friends and workmates. Less than one-in-ten took part in any other individual form of gambling.

As anticipated, from 2012 to 2014 there was minimal or no change over time in overall past 12 months gambling participation or in the proportions of infrequent, regular non-continuous gamblers and regular continuous gamblers. The number of different gambling activities engaged in during the past 12 months, gambling frequency, overall gambling expenditure, most preferred gambling activity and who people participated with also generally stayed much the same. This was also the case for past year, and monthly or more frequent participation in most individual forms of gambling. While there was consistency over time on most measures, there were some exceptions. From 2012 to 2013, there were slight reductions in past year pub and casino EGM participation, overall EGM participation (pub, club and casino combined), and sports betting. Participation did not decrease further from 2013 to 2014. Past year overseas internet participation decreased slightly from 2012 to 2014, and was less than one percent of adults in 2014. Monthly or more frequent EGM (pub, club and casino combined) participation reduced slightly in 2013 but then stayed at the same level in 2014; in 2012, around five percent took part this often, in 2013 and 2014 participation was about three percent. In 2014 relative to 2012, there was also a slight reduction both in the proportions of people who participated in seven to nine gambling activities, and who reported typical monthly gambling expenditure of \$101 to \$500.

While there was little or no change from 2012 to 2014 on most gambling participation measures, overall participation was lower than it was during the 1990s. In the 2012 to 2014 surveys, between 77% and 80% of adults took part in one or more forms of gambling in the past year, a reduction from the 90% who took part this often during the early to mid-1990s. Over this longer time period, more substantial reductions were evident for regular (weekly and more frequent) participation, especially participation in continuous forms of gambling such as horse and dog race betting and EGMs. In the first national study in 1991, 18% of adults took part this often in one or more forms of continuous gambling. This reduced to 10% in 1999 and in the 2012 to 2014 surveys, reduced further to about five to six percent; a third what it was two decades earlier. There was also a reduction in the proportion of adults who participated regularly in non-continuous forms such as Lotto and other lotteries. In both the 1991 and 1999 surveys, 30% of adults were in this category. This reduced to about 15% to 16% in the 2012 to 2014 surveys; half what it had been during the 1990s.

As discussed earlier, these findings are at variance with the availability hypothesis that predicts increased gambling participation when new forms of gambling are introduced and overall gambling exposure and access are increased. They are consistent with the adaptation hypothesis that predicts decreased participation over time as novelty wears off and populations become familiar with new forms of gambling and their associated risks and harms (Abbott, 2006). Public policy, public health and other government and community-initiated programmes both prior to, and following, the Gambling Act 2003 were likely to have contributed. Further work is required to more fully define the components of adaptation, assess their relative importance and the factors that promote them.

For the most part, participation changes were minimal from 2012 to 2014. From 1985 to 2000, past year participation in seven or more gambling activities increased steadily from one percent

also have taken part in non-continuous forms this or less often. Regular non-continuous gamblers were defined as people who took part weekly or more often in one or more non-continuous forms of gambling and who did not participate this often in any continuous form. They were not excluded if they participated less often than weekly. Infrequent gamblers are defined as people who participate less than weekly in any particular gambling activity.

to ten percent and then declined to five percent in 2005 and four percent in 2012 (Abbott et al., 2014a). The 2013 and 2014 estimates, both two percent, suggest that this trend has continued. These findings are of interest in that participation in multiple forms of gambling is strongly associated with problem gambling and other gambling-related harms (Abbott et al., 2014b).

The 2012 gambling risk and problem gambling population prevalence estimates were initially derived using the 2006 Census (Abbott et al., 2014a; 2014b). In both the report on the 2013 survey (Abbott et al., 2015b) and the current report, more recent 2013 Census data were used. Recalculated 2012 estimates are provided to enable comparison. Very small reductions were found between the original and revised estimates for problem gambling, moderate-risk gambling and low-risk gambling. However, the confidence intervals overlapped considerably and for the problem gambling estimate (0.7% using the 2006 Census and 0.6% using the 2013 Census) the confidence intervals did not change (0.4, 0.9).

Although the problem gambling point prevalence estimates appear to have reduced from 2012 to 2014, their confidence intervals overlap. This means that it cannot be concluded that these apparent reductions are real. They also overlap with problem gambling estimates from the 2010 and 2012 New Zealand Health and Lifestyles Survey series (Gray, 2011; Tu, 2013). While involving smaller samples, this series used the same problem gambling measure as the NGS and also used household residential participant recruitment and interviewing. From what is known about the epidemiology of problem gambling, it is extremely unlikely that significant change could occur over the course of a few years. The NGS 2012, 2013 and 2014 point prevalence estimates and confidence intervals for moderate-risk and low-risk gambling are virtually identical. Given the very small numbers, caution should be exercised when interpreting problem gambling results, overall, and more so for ethnic or other demographic groups. Confidence is increased when categories are combined, for example, problem and moderate-risk gamblers. For Māori and Pacific adults, the combined problem and moderate-risk gambling point prevalence estimates are almost identical across the three surveys. Although Asian and European/Other point prevalence estimates appear to trend down from 2012 to 2014, again confidence intervals overlap and it cannot be concluded that prevalence has actually reduced in these groups.

While ethnic differences in problem gambling prevalence are not consistently found internationally (Williams et al., 2015), substantial differences have been apparent in all New Zealand surveys conducted during the past 25 years (Abbott et al., 2014b, 2015b). Furthermore, these differences persist when the effects of other demographic and gambling-related factors are taken account of in multiple logistic regression analyses. The 2012 baseline findings are consistent with those of previous New Zealand surveys, indicating that problem gambling and gambling-related harm more generally disproportionately affect Māori and Pacific people as well as people from some other groups. As mentioned in the introduction, gambling problems are strongly associated with numerous financial, educational, social and health problems. While some of these problems contribute to the development of problem gambling, gambling problems also undoubtedly generate and increase a variety of personal and wider social morbidities. It is highly probable that gambling problems and related harm further widen social and health inequities.

The 2014 findings, consistent with those of the preceding 2012 and 2013 surveys, indicate very large ethnic differences. The consistency of these findings increase our confidence in their validity. In 2014, it was estimated that 6.3% of Māori and 7.6% of Pacific adults were moderate-risk or problem gamblers, substantially more than the European/Other (0.8%) and Asian (1.4%) estimates. Māori and Pacific adults also had higher rates of low-risk gambling (respectively 9.5% and 10.2%) than Europeans/Other (4.0%). The confidence intervals for the Asian estimate (5.2%) overlapped with those of the other three ethnic groups.

Pacific and Asian people in New Zealand are groups that have a 'bi-modal' pattern of gambling participation with a relatively low proportion taking part in gambling activities and a relatively high proportion experiencing harm. In other words, people in these groups who participate in gambling activities have a particularly high risk of developing problems. This is more evident for Pacific people than for Asian people. While less so than problem gamblers and moderate-risk gamblers, low-risk gamblers experience some degree of loss of control and/or adverse consequences of gambling. Pacific adults had a lower rate of past year gambling participation (70.8%) than Māori (78.8%) and European/Other (79.5%). Asian adults had the lowest rate (60.4%). Of the Pacific adults who participated in gambling during the past year, a quarter experienced at least some loss of control or adverse consequences (combined problem, moderate and low-risk gambling). This compares with six percent for European/Other. Māori participants, while having similar past-year participation to European/Other, also had a high rate of harm with a fifth reporting loss of control and/or adverse consequences. Just over one-in-ten Asian participants were in this category, around double the European/Other rate and half the Māori rate.

Among other things, the foregoing findings suggest that factors other than gambling participation per se play a substantial role in developing and maintaining ethnic differences in gambling-related harm. As mentioned earlier, the combined availability/adaptation model predicts that populations and population sectors are at elevated risk for harm when they are first exposed to continuous forms of gambling such as EGMs and casino games. A substantial proportion of Pacific people are migrants from countries that have low exposure to gambling. Many belong to churches that are opposed to gambling. However, a number of Pacific churches promote gambling for fund-raising purposes and some Pacific people see gambling as a way to obtain money to pay church tithes and fulfil traditional gifting obligations (Bellringer et al., 2013; Urale, Bellringer, Landon & Abbott, 2015). Further research is required to understand more fully the cultural and other factors that contribute to the very high rates of gambling-related harm among Pacific people. This will require consideration of the diversity of Pacific cultures and their acculturation experiences. The Asian grouping is very broad, including people from a variety of countries and cultures. Many are recent migrants. Like Pacific people, some come from societies where forms of gambling that are widespread in New Zealand are either lacking or not readily accessible. Some belong to religious groups that do not condone gambling. Combining these diverse groups very likely obscures the identification of potentially important differences.

A multiple logistic regression analysis of sociodemographic risk factors for problem and moderate-risk gambling found that Pacific and Māori ethnicity were the strongest, followed by unemployment and living in the most deprived fifth of neighbourhoods. Younger age, lack of formal qualifications, membership of Christian religions other than Anglican, Catholic and Presbyterian, and membership of non-Christian religions were additional independent risk factors (Abbott et al., 2014b). Multiple logistic regression analyses of gambling participation risk factors for problem and moderate-risk gambling found a strong dose response relationship with number of gambling activities participated in during the past year. Other significant predictors included preferences for non-casino EGMs and casino gambling; monthly or more frequent participation in pub EGMs, casino EGMs, card games and housie or bingo; large gambling expenditure; and long periods of EGM participation in a typical day. More than two-thirds of people who reported typical daily pub EGM participation of three hours or more, and more than a third of casino EGM participants with this duration of play were problem and moderate-risk gamblers. These findings underline the strong link between involvement in continuous forms of gambling, especially EGMs, and problem gambling and gambling-related harm more generally. They are consistent with gambling involvement reported by clients seeking treatment for gambling in New Zealand. The proportion of clients reporting EGMs as

their most problematic gambling activity has reduced somewhat in recent years. However, it remains the most common form mentioned in this regard (Ministry of Health, 2015).

In New Zealand, EGM venues and TABs are heavily concentrated in high deprivation communities (Allen & Clarke, 2015). Research has shown that residential proximity to EGM venues is associated with problem gambling (Ministry of Health, 2008). People in the most at-risk groups for problem and moderate-risk gambling, including Māori and Pacific people, are over-represented in high deprivation neighbourhoods. Further research is required to understand more fully the relationships between sociodemographic factors, gambling exposure, participation and harm. It appears likely that disparities between ethnic and various other groups are largely a consequence of vulnerable groups being exposed to high densities of EGM and other gambling venues.

As previously discussed, the cross-sectional nature of prevalence surveys makes it very difficult to determine temporal relationships between factors of interest or to infer causation. However, the results of the baseline NGS survey and previous studies have provided much useful information and helped in the design of prospective extensions of the study.

Incidence and transitions

The main focus of the present report is on determining how many people are developing problem and at-risk gambling patterns for the first time and how many are relapsing. Some other transitions including commencing or re-commencing gambling are also examined, along with factors that precede and predict problem onset and other changes in gambling participation and harm.

The past 12 months incidence of problem gambling was 0.18% (CI 0.06, 0.30), approximately two-in-a-thousand adults or 5,942 people. While apparently lower than the previous 2013 estimate of 0.28% (CI 0.10, 0.45), the confidence intervals for the two estimates overlap considerably. This means it is very unlikely that there was a change in problem gambling incidence from 2013 to 2014. The incidence rate for moderate-risk gamblers was 1.0% (CI 0.7, 1.4), approximately one-in-a-hundred or 32,386 people. This is virtually the same as in 2013 (1.1%; CI 0.7, 1.5). These incidence figures provide an estimate of the annual 'inflow' of new problem and moderate-risk gamblers. As the 2014 problem and moderate-risk gambling point prevalence estimates were 0.3% and 1.5% respectively, this means that around a half of the total number of problem gamblers and two-thirds of moderate-risk gamblers were people who had moved into these categories during the past 12 months.

To date only two other studies provide general population problem gambling incidence estimates (Billi et al., 2014; Statens folkhälsoinstitut, 2012). The first study, conducted in Victoria, Australia, obtained a problem gambling incidence estimate of 0.36%. The second, a Swedish national study, obtained an estimate of 0.18%, identical to the 2014 NGS estimate. The Swedish combined problem and moderate-risk incidence was 1.4%, the same as the 2013 NGS estimate and similar to the 2014 estimate of 1.2%. A combined rate was not provided for Victoria. Confidence intervals for corresponding estimates from the Australian, Swedish and New Zealand studies overlap. Consequently, it seems likely that the annual rates of problem and moderate-risk gambling onset are fairly similar across the three jurisdictions.

As mentioned in the introduction and reported in a previous NGS report (Abbott et al., 2015b) approximately a half of 'new' problem gamblers in 2013 were actually new and a half were people who reported that they had experienced gambling problems at some time previously in their lives. In 2014, it was estimated that 79% were new problem gamblers and 21% were

people who were relapsing. This apparent difference is probably a chance fluctuation. In both years, the study samples had very small numbers of incident cases. Reflecting the small numbers, the confidence intervals for the estimates overlap. This means that it is unlikely that the change is real. Additionally, although very little is currently known about the incidence of problem gambling including changes over time, it seems most unlikely that more than minor change in a total population would take place during two years. However, more rapid change might occur in some population groups such as recent migrants with limited prior exposure to high risk forms of gambling. Very large samples will be required to assess potential changes in different population sectors.

In 2014, it was estimated that 85% of people who became moderate-risk gamblers had not previously experienced moderate or more severe gambling problems earlier in their lives. This is fairly similar to the corresponding 2013 estimate of 71%. When the problem and moderate-risk categories are combined in both 2014 and 2013, respectively 83% and 74% of incident cases are new. In Sweden, the corresponding estimate was 80% (Statens folkhälsoinstitut, 2012). Combined estimates were not provided in the Victorian study, however, in that study two-thirds of 'new' problem gamblers reported a previous history of problem gambling (Billi et al., 2014). This is higher than the New Zealand estimates of 48% and 21%. The Swedish and New Zealand studies used the same instrument (SOGS-R) to assess lifetime problem gambling. Consequently, the findings can be more readily compared. The Victorian study used a different measure and it is uncertain whether a higher proportion of problem gamblers are relapsing there than in New Zealand.

The lifetime SOGS-R measure is conservative; it fails to identify a substantial proportion of people who experience past problems (Abbott and Volberg, 2006; Abbott, Williams & Volberg, 1999, 2004). When the same people were re-assessed seven years apart, it was found that only around a quarter of lifetime probable pathological gamblers retained this status. More than a third moved into the less severe problem gambling category (similar to the moderate-risk categorisation used in the present study). A third scored in the non-problem gambling range (Abbott, Williams & Volberg, 1999). For baseline lifetime problem gambling, it was found that around a fifth moved into the more serious lifetime probable pathological category. This was expected. However, contrary to expectation, only 13% scored as lifetime problem gamblers seven years later. Also contrary to expectation the remainder, more than two-thirds, scored as lifetime non-problem gamblers. While change of this magnitude could be expected over relatively long time periods with current problems, this should not occur for lifetime problems. While the lifetime SOGS-R has satisfactory test-retest reliability over a short time-span, this study showed that the lifetime SOGS-R has very low test-retest reliability over seven years. It appears that most serious problem gamblers downplay, forget or fail to report past problems. This under-reporting is even more evident for people with less serious problems.

Lifetime problem gambling measures were included in the New Zealand, Swedish and Victorian longitudinal surveys because the investigators sought to obtain an indication of the relative proportions of new as opposed to relapsing problem and moderate-risk gamblers. They were aware that retrospective lifetime measures are a poor proxy for assessment and prospective re-assessment of people over decades. The Abbott, Williams & Volberg study (1999, 2004), to our knowledge, has yet to be replicated. However, based on that study's findings, it seems highly probable that the lifetime SOGS-R estimates for New Zealand and Sweden are highly conservative. This means that larger proportions of 'new' incident cases of problem and moderate-risk gambling will have experienced past problems than appears to be the case. The Victorian estimate of two-thirds for problem gamblers may be closer to the actual situation in New Zealand and Sweden. While less certain, the situation for moderate-risk gambling could be over a quarter and perhaps closer to half. The three studies mentioned provide some additional information on this matter in that the trajectories of individuals are

examined prospectively. However, this is only for periods of a few years, not decades. Valliant (1995) concluded after reviewing relevant literature in the alcohol field:

Because we lack longitudinal studies of both treated and untreated alcoholics, the current student of alcoholism can go no further than to agree with Cahalan (1970), who pointed out that with the passage of time some alcoholics will die, some will become abstinent, some will return to social drinking and some will be unchanged. The proportion of alcoholics following any single route is unknown (p.5).

This is the situation today with respect to problem gambling, albeit that the present study and a few others referred to in this report shed some light on this matter.

To reiterate, as previously mentioned, gambling participation in New Zealand, especially in high-risk continuous gambling activities, declined significantly since the early to mid-1990s. For a few activities, further reductions appear to have taken place from 2012 to 2014. During the 1990s, gambling participation and problem gambling prevalence both declined (Abbott & Volberg 2000; Abbott, 2001). Since that time, despite continued decline in participation in most forms of gambling, the prevalence of problem gambling and related harm appears to have been stable. Similar results have been obtained in Sweden and Victoria (Abbott, Romild & Volberg, 2014; Abbott, Stone, Billi & Yeung 2015c) and elsewhere (Abbott et al., 2015b). These findings are at variance with both the availability and adaptation hypotheses that predict a reduction in harm when participation falls.

Current prevalence is a function of inflow (incidence), duration and outflow (from recovery, remission, migration and death). Lowering incidence often leads to a reduction in prevalence. For this reason, prevention programmes seek to reduce the onset of disorders or problems. However, there are situations where current prevalence can plateau or even increase when incidence falls, for example when people live longer with chronic problems. It has been suggested (Abbott et al., 2015b) that at least part of the explanation for gambling problems levelling out may be because there has been an accumulation of people with past problems who remain prone to relapse. Their concentration in neighbourhoods with high exposure to EGMs and other types of high-risk gambling activity may contribute to this. It is not known whether earlier decreases in prevalence in New Zealand and elsewhere were a consequence of declining incidence. However, it seems most unlikely that changes of the magnitude observed could result from reductions in problem duration and increased recovery and remission. It appears probable that incidence fell in New Zealand during the 1990s. While probable that overall first-time incidence has reduced, it may have remained unchanged or increased in some population sectors. These possibilities require further investigation.

The PGSI classifies people as problem gamblers, moderate-risk gamblers, low-risk gamblers and non-problem gamblers. While the risk categories can be regarded as direct measures of aspects of gambling behaviour including lower level problems, they are intended to provide an indication of the likelihood of future problem gambling development. However, the predictive validity of the PGSI was not assessed at the time of its development. Averaged across the three waves of the NGS, in a 12 month period one-in-ten moderate-risk gamblers became problem gamblers and a similar proportion of low-risk gamblers moved into the moderate-risk category. Of non-problem gamblers, only 0.1% became problem gamblers and 0.7% became moderate-risk gamblers. A higher proportion, 4.3%, became low-risk gamblers. These findings, and very similar findings from the Swedish and Victorian studies, provide a degree of construct validation for the PGSI as a predictor of future problems. Following the final wave of the NGS, it will be possible to determine how many people move into the risk and problem categories over the course of three years.

Additional to the categories mentioned in the preceding paragraph, a third of non-gamblers became non-problem gamblers, 2.0% became low-risk gamblers, 0.2% became moderate-risk gamblers and 0.1% became problem gamblers. This means that during a 12 month period, moderate-risk gamblers are sixteen times more likely than low-risk gamblers of becoming problem gamblers. They are nearly a hundred times more likely than non-problem and non-gamblers to become problem gamblers. However, as non-gamblers, non-problem gamblers and low-risk gamblers comprise around 98% of the adult population, a significant minority of new problem gamblers (approximately a quarter) come from these groups. Similarly, low-risk gamblers are approximately twenty-two times more likely than non-problem gamblers, and fifty times more likely than non-gamblers to become moderate-risk gamblers. In this case, over a half of new moderate-risk gamblers come from the non-gambler and non-problem gambler groups. The foregoing is an example of the prevention paradox whereby substantial proportions, sometime majorities, of new cases come from population sectors that have a very low probability of developing the condition of interest. While it is generally more efficient to focus prevention or early intervention on identified high-risk groups, this often excludes many people who will subsequently develop a problem or health disorder. In this situation, both targeted interventions with high-risk groups and whole population prevention programmes have roles to play.

New Zealand prevalence studies have consistently found that ethnicity is the strongest demographic risk factor for problem and moderate-risk gambling (Abbott et al., 2014b, 2015b). Māori and Pacific adults have particularly high prevalence rates. In the second wave of the NGS, it was found that ethnicity is also the strongest demographic risk factor for incidence. Māori, Pacific and Asian adults are at much higher risk of problem gambling incidence than European/Other adults. Although Asians have not been found to have significantly higher problem and moderate-risk prevalence rates, the incidence findings suggest that this could change in future. The information from the third wave of the NGS has cast additional light on this. Using data aggregated across the three surveys, Pacific adults were over eight times more likely than European/Other adults to move from the non-problem and low-risk gambling categories into the combined problem and moderate-risk gambling category. Māori and Pacific adults were respectively around five and three times more likely to make this transition. Similar ethnic differences were found for the transition into the larger low-risk/ moderate-risk/problem gambling category and these differences held up when ethnicity was considered alongside other risk factors in multiple logistic regression analyses.

While varying proportions of people in the PGSI categories moved into higher risk and problem categories, much larger proportions moved in the opposite direction, into the lower risk, non-problem and non-gambling categories. Of problem gamblers, averaged across the three surveys, a third remained problem gamblers, an eighth moved into the moderate or low-risk categories and just less than half became non-problem gamblers or non-gamblers. Around a quarter of both moderate-risk and low-risk gamblers remained in these categories. As previously mentioned, about one-in-ten moderate-risk gamblers became problem gamblers and a similar proportion of low-risk gamblers became moderate-risk or problem gamblers. Around two-thirds of people in both of these risk categories became non-problem or non-gamblers or, in the case of moderate-risk gamblers, became low-risk gamblers. Additionally, a little over one-in-ten non-problem gamblers stopped gambling.

As with incidence, there were also ethnic differences in problem cessation and movement generally into lower risk, non-problem and non-gambling categories. Whereas slightly more than a third of problem gamblers overall remained problem gamblers, more than two-thirds of Māori problem gamblers did. A similar pattern applied to low-risk gamblers with relatively more Maori low-risk gamblers remaining in this category and fewer becoming non-problem or non-gamblers. Of moderate-risk gamblers, similar proportions of Māori, Pacific and European/

Other adults remained in this category. Interestingly, almost no Asian low-risk gamblers remained in this category and all shifts were into the non-problem or non-gambling categories. Relative to the other ethnic groups, more Asian non-problem gamblers also became non-gamblers.

As previously mentioned, very little is known about the natural history of problem gambling, let alone possible ethnic differences in this regard. Abbott, Williams and Volberg (1999, 2004) conducted the first prospective adult general population study that, among other things, identified predictors of change over time. It was found, in a sample of problem gamblers and regular non-problem gamblers, that adults of non-European ethnicity were nearly five times more likely than Europeans to have gambling problems seven years later. Most people in the non-European group were Māori or Pacific. However, when only those who had a gambling problem at baseline were included in a multiple logistic regression analysis, ethnicity did not emerge as a significant predictor. Baseline preference for betting on horse or dog races, more serious gambling problems and alcohol misuse were the only predictors retained in the analysis. The study findings suggested that there might be differences between ethnic groups in problem chronicity and that such differences could perhaps arise from other factors including problem severity, comorbidities and aspects of gambling behaviour.

Although they should be treated with considerable caution owing to the relatively small sample size, the findings of the present study suggest that Māori might have more persistent problems than other major ethnic groups in New Zealand. As they also have high incidence relative to European/Other adults, unless ways are found to reduce problem onset and duration, long-standing disparities may increase. Even greater caution should be exercised in relation to the Pacific and Asian findings. It will be recalled that Pacific and, more so, Asian people have lower gambling participation rates than Māori and European/Other people. As for Māori, however, those who take part in gambling have a relatively high probability of developing problems. This is especially so for Pacific people. Small sample size means that it is unclear whether people in these groups, like Māori, have problems that are more persistent. This requires further investigation. Based on information to date, it seems likely that high Pacific prevalence will persist and that Asian prevalence may increase. As relatively high proportions of Asian and Pacific adults do not currently gamble there is potential for even greater prevalence increases if more of these people take up gambling in future.

From the foregoing, it is evident that while there was considerable stability in gambling behaviour for adults generally from 2012 to 2014, at the individual level there was substantial change from one year to the next. The proportions of people in the various categories generally stayed much the same but the individuals within them, to varying degrees, did not. People in the non-problem gambler and non-gambler groups were much more likely to remain in them than people in the moderate-risk and low-risk groups. The latter were both very unstable. The problem gambling category was somewhat more stable. These results are similar to those from Sweden and Victoria. When data from the fourth NGS survey are available, it will be possible to examine transitions across three years and assess relapse. It is likely that variable numbers will cycle back into groups they left, including the problem gambling category, over time.

Problem, at-risk and gambling participation predictors and risk factors

Analyses were conducted on combined data from transitions across the three study waves. As previously mentioned, some categories were combined to increase statistical power and facilitate the identification of risk and protective factors. This included the moderate-risk and problem gambling categories. Collapsing these and some other variables also facilitated comparison of the findings with findings from recent research conducted elsewhere. Given the

inter-relationships between many of these factors, multiple logistic regression analyses were conducted where appropriate and where possible.

At-risk and problem gambling onset

Across the three study waves, 1.6% of total transitions were into the problem or moderate-risk gambling category from the non-problem or low-risk categories. Somewhat more, 5.8%, were from the non-problem category into the combined problem, moderate-risk and low-risk category. As mentioned previously, having been a problem or moderate-risk gambler was a very strong predictor of being a current problem gambler. Similarly, albeit to a lesser extent, past at-risk and problem gambling predicted future moderate-risk gambling. As outlined in the results section, a number of other gambling measures were also strong predictors of the two transitions considered. The strongest and most robust predictors of one or both of these transitions, including those retained in multiple logistic regression analyses, included regular overall gambling participation and high average expenditure, regular pub and casino EGM participation, high average time playing pub EGMs and regular casino table games participation. Avoiding gambling venues and outlets was an additional risk factor for progression to problem and moderate-risk gambling while gambling with other people was protective.

These findings are broadly consistent with those of both previous New Zealand and international prevalence studies (Abbott et al., 2014b) and recent prospective studies summarised in the introduction and in Abbott et al. (2015b). Findings from the present and previous phases of the NGS are important in that they demonstrate and increase our confidence that these aspects of gambling participation precede, predict and probably play a causal role in the development and onset of problem gambling in New Zealand. Most are potential targets for prevention programmes. While avoiding gambling venues was a predictor of at-risk and problem gambling it is unlikely to contribute to problem development. The association probably arises because people who start to experience loss of control and become concerned about it increase their use of strategies to help moderate their gambling involvement and expenditure. While less strongly linked than venue avoidance, a number of other strategies including setting time and expenditure limits, separating gambling money from other money and seeking help were also mentioned more often by people who moved into higher risk and problem categories. More research is required to advance understanding of the early development of gambling problems including the extent to which people are aware of changes in their behaviour and the measures they take to address them. Gambling with others rather than alone appears to be protective and requires further investigation.

As previously discussed, ethnicity was a major predictor of increased gambling risk and problem gambling. A number of additional demographic factors also predicted one or both of the transitions examined, albeit that they were not as strong as ethnicity. Younger age, migrant status, large household size, Presbyterian and non-Christian religion were risk factors. High income, university education and residence outside Auckland were protective. When these and a variety of other factors were considered together in multiple logistic regression analyses, of the demographic factors only ethnicity remained along with high income as a protective factor in one analysis. This is because the other demographic predictors are moderately to strongly associated with ethnicity. While gender, along with ethnicity, was a major risk factor for at-risk and problem gambling prevalence in the NGS (Abbott et al., 2014b) gender differences were not evident for incidence. Unless males have more persistent problems, this finding suggests that, other things being equal, current gender prevalence differences will diminish over time.

As found in Wave 2 of the NGS (Abbott et al., 2015), a third grouping of factors also predicted at-risk and problem gambling development and some of these remained in multiple logistic regression analyses including gambling participation and demographic factors. Those retained in one or more of the multiple logistic regression analyses included significant life events, moderate and high psychological distress, lower quality of life, and tobacco, alcohol and other drug use. This means that they remained risk factors even when their overlapping variance with other risk factors was taken into account. Policies and interventions that assist people to cope with major life events and transitions, prevent and treat common mental health and substance use disorders and enhance quality of life are also likely to reduce the incidence and prevalence of problem gambling and related harm.

Other than the importance of ethnicity in the NGS, the factors implicated in the problem gambling development are consistent with the findings of the recent Canadian studies mentioned in the introduction (Williams et al., 2015). In these studies and the NGS, past gambling problems, a range of gambling participation measures, drug use and misuse, and mental health problems including depression are the strongest risk factors. Impulsivity was also implicated in the Canadian studies. This was not assessed in the NGS. As in the NGS, of the participation measures, frequent EGM and casino table game involvement were particularly important. In the Canadian studies, in addition to considering problem onset overall, separate predictive models were developed for first-time problem onset, chronicity and relapse. Mostly, predictors were similar although their relative strength sometimes varied. One interesting example, mentioned earlier, was the finding that being an at-risk gambler and living close to EGM venues was more strongly predictive of relapse than first-time onset. Given the importance of EGMs with respect to gambling problems and harm in New Zealand, and the high proportion of problem gamblers who are relapsing, it would be of interest to see if this is also the case here. EGM venues are heavily concentrated in higher deprivation communities. The high risk ethnic and other social groups are greatly over-represented in these communities. New Zealand research has found that proximity to EGM venues is associated with both gambling participation and problem gambling (Ministry of Health, 2008). Further research is required to increase understanding of the relationships between individual risk and protective factor and environmental factors including differential exposure to EGMs and other gambling activities.

Whereas just less than six percent of adults overall, averaged across the study waves, moved from the non-problem gambling category into the combined problem and at-risk gambling categories, relatively more Māori (11.5%) and Pacific (17%) adults moved. Analyses were constrained by small sample size. The risk factors identified for these groups were also found for the population as a whole. It is unclear to what extent this was a consequence of Māori and Pacific participants making up a moderately large part of the total sample. Following the final study wave, separate analyses will be conducted for the European/Other group. It appears that proportionately more young Māori adults develop problem and at-risk gambling. For Māori, age was retained in the multiple logistic regression analysis along with time spent playing pub EGMs in an average day, setting a dollar limit and high psychological distress. For Pacific adults, only lower quality of life remained in the multiple logistic regression analysis.

At-risk and problem gambling chronicity

Across the three waves, 43% of moderate-risk and problem gamblers remained moderate-risk and problem gamblers. Similarly, 46% of adults in the low-risk/moderate-risk/problem gambling group remained there. As with problem development, a number of gambling participation measures were particularly strong predictors of remaining in the at-risk and problem gambling categories. In the multiple logistic regression analysis examining predictors

of ongoing problem and moderate-risk gambling, only two variables were retained, weekly or more frequent gambling participation and having ever sought help for problem gambling. Weekly or more frequent participation was also retained in the multiple logistic regression analysis involving the larger low-risk/moderate-risk/problem gambling group. Additional participation measures retained included regular pub and club EGM participation and horse and dog race betting, and past year casino table games or EGM participation. A number of demographic predictors were identified but only Māori and Pacific identity were retained in the multiple logistic regression analysis of risk factors for remaining in the combined low-risk/moderate-risk/problem gambling group.

While not retained in the multiple logistic regression analysis, having sought formal help for gambling in the past year was a very strong predictor when considered on its own. The help-seeking measures probably reflect past, longer-term and more serious gambling problems. It seems likely that people with this background more often remain at-risk of being problem gamblers. Earlier past problem gambling was discussed in relation to its important role in relapse. With gambling, as with many other behaviours, it appears that the best predictor of future problems is past problems. Not surprisingly, gambling participation, particularly frequent participation in high risk continuous forms including EGMs, is also a strong risk factor for ongoing problem and at-risk gambling. Retention of Māori and Pacific ethnicity in the multiple logistic regression analysis is consistent with other findings discussed earlier. The present findings provide further support for the hypothesis that these groups are at higher risk for the development of gambling problems and more often have persistent problems. It appears that both higher inflow and lower outflow are responsible for the high prevalence rates in these groups.

Māori and Pacific participants were also considered separately to see if different factors are involved in the persistence of at-risk and problem gambling in these groups. The Asian sample was not sufficiently large to consider it on its own. Across the three waves, 65% of Māori and 52% of Pacific low-risk/moderate-risk/problem gamblers remained in this category. As for the adult population as a whole, gambling participation measures were the strongest predictors for both groups. However, there were some interesting differences. Casino EGM participation was the strongest risk factor for Pacific adults and the only factor retained in the multiple logistic regression analysis. For Māori, longer pub EGM sessions was a strong predictor and, along with setting a dollar limit for gambling, were the only variables remaining in the multiple logistic regression analysis. These findings are consistent with ethnic differences in gambling participation preferences. Relative to other ethnic groups, Māori more often gamble on pub EGMs and Pacific people more often gamble on casino EGMs (Abbott et al., 2014a).

Starting and re-starting gambling

Across the study waves, 29% of transitions were for people who started gambling in Wave 2 or Wave 3 from not gambling in the prior wave. There were no significant differences for many demographic measures including gender, age, education, occupational status, income and household size. Māori and European/Other adults had higher rates of commencing gambling than Pacific and Asian adults. Of the various demographic factors examined, migrants, especially recent migrants, Other Christians and people of Other Religions had low rates of gambling uptake. People resident in Christchurch or outside the three largest cities had higher uptake. Moderately high psychological distress, hazardous alcohol use, and past and current smoking were additional predictors of starting gambling. When included together in a multiple logistic regression analysis only religion, psychological distress and one of the smoking measures (ever smoked daily for a period of time) were retained. While some of these factors, for example Pacific and Asian ethnicity, recent migrants and membership of some religions,

apparently reduce the probability of starting gambling, they are also risk factors for problem and at-risk gambling. This was discussed earlier in relation to exposure and adaptation models. People in these groups are predicted to be at elevated risk because they have been relatively recently exposed to high concentrations of EGMs and other continuous gambling activities and have not adapted and built resistance. Māori, however, while having longer exposure to these forms of gambling, remain at high risk for problem gambling development. Psychological distress and smoking, given their retention in the multiple logistic regression analysis, are likely to be additional important independent risk factors.

Across the study waves, 44% of transitions were for people who did not gamble in the past year but who had previously gambled and re-commenced gambling in Wave 2 or Wave 3. Christchurch residence was the only statistically significant demographic risk factor. However, in contrast to the situation with commencing gambling, people living in Christchurch were less likely to re-start gambling after having stopped for a year or more. Drug use was an additional risk factor as was hazardous alcohol consumption, and past and current smoking. Christchurch residence and ever having smoked tobacco were the only factors retained in the multiple logistic regression analysis. It appears that while some demographic factors increase the risk of starting gambling, few if any contribute to re-starting gambling after having stopped. It is not known why Christchurch residence is associated with both starting and not re-starting gambling. Tobacco, drug and alcohol use or misuse increase risk for both commencing and re-initiating gambling.

Gambling participation is a necessary condition for the development of at-risk and problem gambling. However, as found in the present study among others, and discussed earlier, some types of gambling are much more important in this regard than others. Number of activities engaged in, frequency and duration are some of the other gambling participation factors associated with problem gambling. The measures used in the present study, namely starting or re-starting gambling, are crude. It would be helpful if future research examined different forms of gambling in this regard, especially EGMs and other high-risk forms, and identified factors that contribute to, and inhibit, progression to more frequent and intensive engagement in them.

Conclusions

The 2014 gambling participation, at-risk and problem gambling estimates are mostly unchanged from the earlier 2012 and 2013 waves of the NGS. This increases confidence in their validity. While there was no change over two years, on most measures there were some minor changes. While the three waves of the NGS used identical methodologies, the sample aged by two years, and there was differential attrition. While the data were weighted to adjust for attrition, it remains possible that there was some bias from this source.

The third wave of the NGS has increased our understanding of the incidence of problem and at-risk gambling and some other transitions of interest. Sweden is the only other country to have information of this type at the national level. Both studies, along with recent Victorian and Canadian studies, indicate that while there is consistency in the proportions of non-gamblers, non-problem gamblers, at-risk gamblers and problem gamblers, at the individual level there is substantial change from one year to the next. In all studies, the at-risk groups are the least stable, the non-problem gambling and non-gambling groups the most stable, and the problem gambling group is in the middle. Over the first two years of the NGS, prevalence did not change because people leaving the various groups were matched by new entrants.

While there is some uncertainty about the actual proportions, it appears likely that substantial numbers of 'new' problem gamblers are actually people who have previously experienced

problems and are relapsing. To a somewhat lesser degree, this is also the case for people who develop moderate-risk gambling patterns. Many were previously moderate-risk or problem gamblers. A number of earlier prospective studies, usually involving very small numbers of serious problem gamblers (Abbott & Clark, 2007; Abbott et al., 2004), found that gambling problems are often transitory. These findings challenge the conceptualisation of problem gambling as a chronic or chronically relapsing mental health disorder. However, no studies have re-assessed problem gamblers over very long periods of time. It now appears likely that more than half and perhaps two-thirds or more of adults who become problem gamblers during a 12 month period are relapsing. It is proposed that this proportion expands as populations adapt to increased gambling availability and is a major reason why problem gambling prevalence did not decline with substantially decreased participation during the past decade in New Zealand. It is likely that sub-sectors of the population more recently exposed to high concentrations of continuous gambling forms (e.g. some migrant groups and people from ethnic, religious and other groups with low participation rates), will have high incidence rates with larger proportions of new, as opposed to relapsing, problem gamblers.

This phase of the NGS added further information about factors that predict starting gambling, re-initiating gambling after having stopped, developing problem and at-risk gambling and experiencing more persistent problem and at-risk gambling behaviours. A number of the risk factors for these transitions are common. For problem and at-risk gambling onset, the strongest predictors were having previously had a gambling problem, a variety of measures of gambling intensity, ethnicity and some other demographic factors. Significant life events, psychological distress, lower quality of life, and substance use and misuse also contributed. Māori and Pacific adults have had substantially higher prevalence rates in New Zealand since the first national survey in 1990. The present study found that these groups also have both higher incidence and more persistent problem and at-risk gambling. This means that, unless something is done to change this, current ethnic disparities are likely to increase. The Asian incidence rate was also higher than the European/Other rate, which means prevalence may also increase relatively for this group in future. Current gender prevalence differences, however, may reduce as male and female incidence rates were similar.

The study findings have implications for policy and practice in public health and treatment. As a substantial minority of problem and at-risk gamblers come from non-problem and non-gambler sectors of the population, both whole-of-population public and targeted prevention strategies are likely to be required. These interventions will need to take account of ethnic and other differences. The high proportion of people in the general population who are relapsing rather than developing problems for the first time means that greater attention could be given to relapse prevention through public policy and education. Relapse could also be considered in treatment programmes, although the relapse rates for clients attending treatment services is likely to be different from the general population. Further research is required to advance understanding of connections between exposure to high densities of EGMs and other gambling activities in high deprivation communities; ethnicity; personal and social vulnerabilities and resilience; and gambling-related harm.



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APPENDIX 1:
Categorical values 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 formal help 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:
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 in last 12 months
 - Type of help received
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 3 attrition from Wave 1 (unweighted numbers)

Baseline variables	Description	Wave 1	Wave 2	Wave 3	% Retained (Wave 1-3)	p-value[#]
Gender	Male	2642	1603	1316	49.8	0.97
	Female	3609	2142	1799	49.8	
Age group (years)	18 - 24	571	259	188	32.9	<0.0001
	25 - 34	1069	574	453	42.4	
	35 - 44	1261	783	650	51.5	
	45 - 54	1195	758	650	54.4	
	55 - 64	922	591	517	56.1	
	65+	1226	779	656	53.5	
	Not reported	7	1	1	14.3	
Ethnic group (prioritised)	Māori	1164	656	520	44.7	<0.0001
	Pacific	778	439	350	45.0	
	Asian	798	403	322	40.4	
	European/Other	3448	2209	1892	54.9	
	Not reported	63	38	31	49.2	
Area of residence	Auckland	2101	1225	1012	48.2	0.008
	Wellington	632	420	338	53.5	
	Christchurch	342	230	193	56.4	
	Rest of NZ	3176	1870	1572	49.5	
Problem Gambling Severity Index score (PGSI)	No gambling in last year	1301	705	576	44.3	<0.0001
	Non-problem	4434	2759	2310	52.1	
	Low-risk	325	181	143	44.0	
	Moderate-risk	133	67	56	42.1	
	Problem gambler	58	33	30	51.7	
Number of gambling activities participated in	0	1301	705	576	44.3	0.0002
	1	1353	789	668	49.4	
	2	1342	828	695	51.8	
	3	954	602	507	53.1	
	4-6	1069	689	560	52.4	
	7-9	204	116	98	48.0	
	10+	28	16	11	39.3	
Gambling frequency	At least weekly	1487	935	788	53.0	<0.0001
	At least monthly	1411	842	689	48.8	
	At least 6 monthly	1601	1007	841	52.5	
	At least once in past year	441	249	214	48.5	
	No gambling in last year	1301	705	576	44.3	
	Not reported	10	7	7	70.0	
Pattern of participation	Not in last year	1301	705	576	44.3	<0.0001
	Infrequent gambler	3482	2118	1761	50.6	
	Regular non-continuous	1059	675	577	54.5	
	Regular continuous	409	247	201	49.1	
Number of significant life events	0	1774	1040	859	48.4	0.003
	1	1620	982	824	50.9	
	2	1139	705	590	51.8	
	3	706	449	376	53.3	
	4	456	274	227	49.8	
	5+	554	294	238	43.0	
	Not reported	2	1	1	50.0	

Baseline variables	Description	Wave 1	Wave 2	Wave 3	% Retained	
					(Wave 1-3)	p-value#
Quality of life (WHOQoL-8)	Below median (0 - 24)	2841	1641	1368	48.2	
	Median score (25)	616	377	307	49.8	
	Above median (26 - 32)	2786	1723	1436	51.5	0.04
	Not reported	8	4	4	50.0	
Psychological distress (Kessler-10)	0 - 5	4494	2712	2251	50.1	
	6 - 11	1196	736	610	51.0	
	12 - 19	414	221	188	45.4	
	20 - 40	142	75	65	45.8	0.18
	Not reported	5	1	1	20.0	
<i>Total</i>		<i>2506</i>	<i>3745</i>	<i>3115</i>	<i>59.9</i>	

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 repeated
across the waves**

Demographic variables	Wave 1			Wave 2			Wave 3		
	n	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)
Labour force status									
Employed	4004	64.1	(62.7, 65.5)	2472	66.0	(64.2, 67.8)	2079	66.6	(64.6, 68.5)
Unemployed	504	8.1	(7.3, 8.8)	274	7.3	(6.3, 8.4)	191	6.1	(5.2, 7.0)
Student/Homemaker/Retired	1705	27.3	(26.0, 28.6)	987	26.4	(24.7, 28.0)	842	27.0	(25.2, 28.8)
Other	36	0.6	(0.3, 0.8)	12	0.3	(0.2, 0.5)	11	0.4	(0.1, 0.6)
Not reported	2	-		0	-		0	-	
Household size									
1	606	9.7	(9.1, 10.3)	361	9.6	(8.8, 10.5)	326	10.4	(9.4, 11.4)
2	2168	34.7	(33.3, 36.1)	1310	35.0	(33.2, 36.8)	1063	34.1	(32.1, 36.0)
3	1087	17.4	(16.3, 18.5)	712	19.0	(17.5, 20.6)	559	17.9	(16.2, 19.6)
4	1286	20.6	(19.3, 21.8)	699	18.7	(17.1, 20.2)	614	19.7	(17.9, 21.4)
5+	1097	17.6	(16.3, 18.8)	664	17.7	(16.1, 19.3)	561	18.0	(16.1, 19.8)
Not reported	5	0.1	(0.00, 0.20)	0	-		0	-	
Personal Income (\$)									
Up to 20,000	1954	33.2	(31.8, 34.7)	1112	30.8	(29.0, 32.6)	798	26.9	(25.0, 28.9)
20,001 - 40,000	1601	27.2	(25.9, 28.6)	949	26.3	(24.6, 28.0)	808	27.3	(25.3, 29.2)
40,001 - 60,000	1032	17.5	(16.4, 18.7)	719	19.9	(18.3, 21.5)	583	19.7	(17.9, 21.4)
60,001 - 80,000	620	10.5	(9.6, 11.5)	378	10.5	(9.3, 11.6)	381	12.9	(11.4, 14.3)
80,001 - 100,000	293	5.0	(4.3, 5.6)	196	5.4	(4.6, 6.3)	171	5.8	(4.7, 6.8)
Over 100,000	383	6.5	(5.7, 7.3)	255	7.1	(6.0, 8.1)	224	7.5	(6.4, 8.7)
Missing	379			137			159		
Household Income (\$)									
Up to 20,000	861	15.5	(14.5, 16.4)	497	14.1	(13.0, 15.2)	390	13.8	(12.5, 15.0)
20,001 - 40,000	899	16.1	(15.0, 17.2)	552	15.7	(14.2, 17.1)	413	14.6	(12.9, 16.2)
40,001 - 60,000	761	13.7	(12.6, 14.7)	482	13.7	(12.3, 15.0)	356	12.6	(11.1, 14.0)
60,001 - 80,000	764	13.7	(12.6, 14.8)	446	12.7	(11.3, 14.0)	375	13.2	(11.7, 14.8)
80,001 - 100,000	746	13.4	(12.3, 14.5)	493	14.0	(12.6, 15.4)	387	13.7	(12.1, 15.2)
Over 100,000	1538	27.6	(26.2, 29.1)	1053	29.9	(28.0, 31.7)	913	32.2	(30.1, 34.3)
Missing	681			222			290		
NZ Individual Deprivation Index									
0	3540	56.6	(55.2, 58.1)	2275	60.8	(58.9, 62.6)	1998	64.0	(61.8, 66.1)
1	1348	21.6	(20.3, 22.8)	752	20.1	(18.5, 21.7)	560	17.9	(16.2, 19.7)
2	683	10.9	(10.0, 11.9)	336	9.0	(7.9, 10.1)	262	8.4	(7.1, 9.7)
3	271	4.3	(3.8, 4.9)	184	4.9	(4.1, 5.8)	153	4.9	(3.9, 5.9)
4	201	3.2	(2.7, 3.7)	74	2.0	(1.5, 2.4)	72	2.3	(1.5, 3.1)
5	106	1.7	(1.4, 2.0)	75	2.0	(1.3, 2.7)	40	1.3	(0.9, 1.7)
6	61	1.0	(0.7, 1.2)	35	0.9	(0.6, 1.2)	20	0.6	(0.4, 0.9)
7	30	0.5	(0.3, 0.6)	9	0.3	(0.1, 0.4)	14	0.4	(0.2, 0.6)
8	9	0.1	(0.1, 0.2)	3	0.1	(0.0, 0.2)	4	0.1	(0.0, 0.2)
Missing	1			1			0		

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)
Wave 1 N=6,251; Wave 2 N=3,745; Wave 3 N=3,115

APPENDIX 5:
Prevalence and 95% confidence intervals for past year and past month gambling in
Waves 1, 2 and 3

Gambling activity	Wave 1			Wave 2			Wave 3		
	n	%	(95% CI)	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)	100	3.2	(2.2, 4.2)
Bets with friends/workmates	914	14.6	(13.6, 15.7)	458	12.2	(11.0, 13.5)	407	13.0	(11.6, 14.4)
Text game or competition	169	2.7	(2.2, 3.2)	68	1.8	(1.2, 2.4)	57	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)	1429	45.7	(43.6, 47.9)
Lotto	3893	62.3	(60.8, 63.7)	2237	59.7	(57.8, 61.6)	1861	59.6	(57.4, 61.7)
Keno	178	2.8	(2.4, 3.3)	95	2.5	(2.0, 3.0)	75	2.4	(1.8, 3.0)
Instant Kiwi/other scratch tickets	2026	32.4	(31.0, 33.8)	1118	29.8	(28.1, 31.6)	910	29.1	(27.2, 31.1)
Housie or bingo	104	1.7	(1.3, 2.0)	49	1.3	(1.0, 1.7)	37	1.2	(0.8, 1.6)
Horse/dog race betting	732	11.7	(10.7, 12.7)	394	10.5	(9.3, 11.7)	294	9.4	(8.2, 10.6)
Sports betting	287	4.6	(3.9, 5.3)	103	2.7	(2.1, 3.4)	91	2.9	(2.2, 3.7)
Casino table games or EGMS (overseas)	228	3.6	(3.1, 4.2)	94	2.5	(1.9, 3.1)	83	2.7	(1.9, 3.4)
Casino table games or EGMS (NZ)	590	9.4	(8.5, 10.4)	270	7.2	(6.1, 8.3)	227	7.3	(6.1, 8.5)
Casino table games (NZ)	232	3.7	(3.1, 4.3)	113	3.0	(2.2, 3.8)	91	2.9	(2.1, 3.8)
Casino EGMs (NZ)	517	8.3	(7.4, 9.1)	227	6.1	(5.1, 7.0)	198	6.3	(5.3, 7.4)
Pub EGMs	717	11.5	(10.5, 12.5)	332	8.9	(7.7, 10.0)	259	8.3	(7.1, 9.5)
Club EGMs	349	5.6	(4.9, 6.3)	154	4.1	(3.4, 4.9)	129	4.1	(3.3, 5.0)
EGMs overall	1100	17.6	(16.4, 18.8)	528	14.1	(12.7, 15.5)	424	13.6	(12.1, 15.0)
Short-term spec. investments	59	0.9	(0.7, 1.2)	55	1.5	(0.9, 2.0)	41	1.3	(0.8, 1.8)
Overseas internet gambling [†]	39	0.6	(0.4, 0.9)	16	0.4	(0.2, 0.6)	10	0.3	(0.1, 0.5)
Overseas internet gambling overall [‡]	104	1.7	(1.2, 2.1)	42	1.2	(0.8, 1.7)	28	0.9	(0.5, 1.3)
In past month									
Card games	82	1.3	(1.0, 1.7)	36	1.0	(0.6, 1.3)	25	0.8	(0.4, 1.2)
Bets with friends/workmates	97	1.5	(1.2, 1.9)	62	1.7	(1.1, 2.2)	38	1.2	(0.8, 1.6)
Text game or competition	39	0.6	(0.4, 0.9)	14	0.4	(0.1, 0.7)	10	0.3	(0.1, 0.5)
Raffle/lottery (NZ or overseas)	684	10.9	(10.1, 11.8)	4.4	10.8	(9.7, 11.9)	271	8.7	(7.6, 9.8)
Lotto	2200	35.2	(33.8, 36.6)	1224	32.7	(30.9, 34.4)	1013	32.4	(30.5, 34.4)
Keno	86	1.4	(1.1, 1.7)	45	1.2	(0.8, 1.6)	24	0.8	(0.5, 1.1)
Instant Kiwi/other scratch tickets	750	12.0	(11.0, 13.0)	4.2	10.7	(9.6, 11.9)	296	9.5	(8.3, 10.7)
Housie or bingo	34	0.5	(0.4, 0.7)	17	0.5	(0.3, 0.6)	16	0.5	(0.3, 0.7)
Horse/dog race betting	176	2.8	(2.3, 3.3)	88	2.3	(1.8, 2.9)	70	2.3	(1.7, 2.8)
Sports betting	83	1.3	(1.0, 1.7)	35	0.9	(0.6, 1.3)	28	0.9	(0.5, 1.3)
Casino table games or EGMS (overseas)	5	0.1	(0.0, 0.1)	1	0.0	(0.0, 0.1)	0	0.0	-
Casino table games or EGMS (NZ)	59	0.9	(0.6, 1.2)	26	0.7	(0.2, 1.2)	19	0.6	(0.2, 1.0)
Casino table games (NZ)	13	0.2	(0.0, 0.4)	15	0.4	(0.0, 0.9)	6	0.2	(0.0, 0.5)
Casino EGMs (NZ)	55	0.9	(0.6, 1.2)	16	0.4	(0.2, 0.6)	11	0.4	(0.1, 0.6)
Pub EGMs	213	3.4	(2.9, 3.9)	91	2.4	(1.9, 3.0)	74	2.4	(1.8, 3.0)
Club EGMs	94	1.5	(1.2, 1.9)	42	1.1	(0.7, 1.5)	30	0.9	(0.6, 1.3)
EGMs overall	309	4.9	(4.3, 5.6)	127	3.4	(2.8, 4.0)	110	3.5	(2.8, 4.2)
Short-term spec. investments	19	0.3	(0.1, 0.5)	14	0.4	(0.1, 0.6)	10	0.3	(0.1, 0.6)
Overseas internet gambling [†]	16	0.2	(0.1, 0.4)	8	0.2	(0.0, 0.4)	6	0.2	(0.1, 0.4)
Overseas internet gambling overall [‡]	41	0.6	(0.4, 0.9)	20	0.5	(0.2, 0.8)	9	0.3	(0.1, 0.5)

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

Wave 1 N=6,251; Wave 2 N=3,745; Wave 3 N=3,115

[†] Not included in other overseas categories

[‡] Excludes overseas raffles/lotteries

APPENDIX 6:
Prevalence and 95% confidence intervals for gambling behaviour in Waves 1, 2 and 3

Gambling participation-related variables	Wave 1			Wave 2			Wave 3		
	n	%	(95% CI)	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)	727	23.3	(21.3, 25.2)
1	1376	22.0	(20.8, 23.2)	805	21.5	(19.9, 23.0)	693	22.2	(20.4, 24.0)
2	1318	21.1	(19.9, 22.7)	828	22.1	(20.5, 23.7)	684	21.9	(20.1, 23.7)
3	964	15.4	(14.4, 16.5)	627	16.7	(15.3, 18.2)	464	14.9	(13.4, 16.3)
4 - 6	1097	17.6	(16.4, 18.7)	580	15.5	(14.1, 16.9)	488	15.6	(14.1, 17.2)
7 - 9	206	3.3	(2.8, 3.8)	73	2.0	(1.4, 2.5)	65	2.1	(1.5, 2.6)
10+	28	0.4	(0.2, 0.7)	5	0.1	(0.0, 0.3)	3	0.1	(0.0, 0.2)
Pattern of participation									
No gambling in past year	1261	20.2	(19.0, 21.4)	828	22.1	(20.5, 23.7)	728	23.3	(21.4, 25.2)
Infrequent gambler	3590	57.4	(56.0, 58.9)	2141	57.1	(55.3, 59.0)	1765	56.5	(54.4, 58.7)
Regular non-continuous gambler	1007	16.1	(15.1, 17.1)	548	14.6	(13.4, 15.9)	477	15.3	(13.8, 16.7)
Regular continuous gambler	393	6.3	(5.6, 7.0)	229	6.1	(5.2, 7.0)	154	4.9	(4.1, 5.8)
Gambling frequency									
No gambling in past year	1261	20.2	(19.0, 21.4)	828	22.2	(20.6, 23.8)	728	23.3	(21.4, 25.2)
At least weekly	1425	22.8	(21.6, 24.0)	787	21.1	(19.6, 22.6)	635	20.4	(18.8, 22.0)
At least monthly	1368	21.9	(20.7, 23.1)	786	21.0	(19.5, 22.6)	632	20.3	(18.5, 22.0)
At least 6 monthly	1704	27.3	(26.0, 28.6)	1067	28.6	(26.8, 30.3)	884	28.3	(26.4, 30.2)
At least once in past year	483	7.7	(6.9, 8.6)	268	7.2	(6.2, 8.2)	240	7.7	(6.4, 9.0)
Missing	10			12			4		
Typical monthly gambling expenditure									
No gambling in past year	1278	20.4	(19.3, 21.6)	838	22.4	(20.8, 24.0)	735	23.5	(21.6, 25.5)
\$1 - \$10	1019	16.3	(15.2, 17.4)	654	17.5	(16.0, 18.9)	511	16.4	(14.9, 17.9)
\$11 - \$20	1003	16.0	(15.0, 17.1)	592	15.8	(14.4, 17.2)	477	15.3	(13.7, 16.8)
\$21 - \$30	625	10.0	(9.1, 10.9)	364	9.7	(8.6, 10.8)	337	10.8	(9.3, 12.2)
\$31 - \$50	709	11.3	(10.4, 12.3)	394	10.5	(9.4, 11.7)	344	11.0	(9.7, 12.3)
\$51 - \$100	798	12.8	(11.8, 13.8)	473	12.6	(11.3, 13.9)	391	12.5	(11.2, 13.9)
\$101 - \$500	688	11.0	(10.1, 11.9)	364	9.7	(8.5, 10.9)	272	8.7	(7.6, 9.8)
>\$500	129	2.1	(1.7, 2.5)	64	1.7	(1.2, 2.2)	55	1.8	(1.2, 2.3)
Not reported	2	0.0	(0.0, 0.1)	2	0.1	(0.0, 0.2)	0	-	
Most preferred activity									
No gambling in past year	1261	20.2	(19.0, 21.4)	828	22.1	(20.5, 23.7)	728	23.3	(21.4, 25.2)
Cards games	126	2.0	(1.6, 2.5)	65	1.7	(1.1, 2.4)	56	1.8	(1.0, 2.5)
Bets with friends/workmates	288	4.6	(4.0, 5.2)	147	3.9	(3.2, 4.7)	147	4.7	(3.9, 5.5)
Text game or competition	15	0.2	(0.1, 0.4)	8	0.2	(0.0, 0.4)	5	0.2	(0.0, 0.3)
Raffle/lottery (NZ or overseas)	575	9.2	(8.4, 10.1)	380	10.1	(9.0, 11.2)	328	10.5	(9.3, 11.7)
Lotto	1105	17.7	(16.6, 18.7)	605	16.1	(14.8, 17.5)	516	16.5	(14.9, 18.1)
Keno	17	0.3	(0.1, 0.4)	11	0.3	(0.1, 0.5)	4	0.1	(0.0, 0.2)
Bullseye	13	0.2	(0.1, 0.3)	3	0.1	(0.0, 0.2)	4	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)	250	8.0	(6.7, 9.3)
Housie or bingo	44	0.7	(0.5, 0.9)	27	0.7	(0.5, 1.0)	23	0.7	(0.4, 1.0)
Horse/dog race betting	362	5.8	(5.1, 6.5)	204	5.4	(4.6, 6.3)	147	4.7	(3.8, 5.6)
Sports betting	74	1.2	(0.8, 1.6)	34	0.9	(0.5, 1.3)	26	0.8	(0.4, 1.3)
Casino table games or EGMS (NZ and overseas)	254	4.1	(3.4, 4.7)	127	3.4	(2.6, 4.2)	99	3.2	(2.4, 4.0)
Non-casino EGMS	219	3.5	(2.9, 4.1)	130	3.5	(2.7, 4.2)	119	3.8	(3.0, 4.6)
Short-term spec. investments	25	0.4	(0.2, 0.6)	24	0.6	(0.3, 1.0)	27	0.9	(0.5, 1.3)
Overseas internet gambling	4	0.1	(0.0, 0.1)	4	0.1	(0.0, 0.2)	1	0.0	(0.0, 0.1)
Other activities	35	0.6	(0.3, 0.8)	23	0.6	(0.4, 0.9)	27	0.9	(0.4, 1.3)
No preference	397	6.4	(5.6, 7.1)	266	7.1	(6.2, 8.0)	208	6.7	(5.7, 7.6)
No/none	847	13.5	(12.6, 14.5)	538	14.4	(13.0, 15.7)	394	12.6	(11.3, 13.9)
Refused/Don't know	40	0.6	(0.4, 0.9)	24	0.7	(0.4, 0.9)	14	0.5	(0.2, 0.7)

Gambling participation-related variables	Wave 1			Wave 2			Wave 3		
	n	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)
Who gambled with									
Alone	1869	50.4	(48.5, 52.4)	1070	51.2	(48.6, 53.8)	909	51.1	(48.2, 54.0)
With one person	865	23.3	(21.7, 25.0)	434	20.8	(18.7, 22.9)	387	21.8	(19.2, 24.3)
With several people/a group	972	26.2	(24.5, 28.0)	586	28.0	(25.6, 30.4)	483	27.2	(24.6, 29.7)
Missing	2580			1624			1343		
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 (all waves) and attrition (Waves 2 and 3)

Wave 1 N=6,251; Wave 2 N=3,745; Wave 3 N=3,115

† Not included in other overseas categories

Question not asked in Wave 3

APPENDIX 7:
Prevalence and 95% confidence intervals for time spent gambling on EGMs in an average day in Waves 1, 2 and 3

Venue and time	Wave 1			Wave 2			Wave 3		
	n	%	(95% CI)	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)	39	19.7	(12.7, 26.7)
16 - 30 minutes	118	23.1	(18.1, 28.0)	54	23.9	(16.5, 31.3)	52	26.4	(18.0, 34.8)
31 - 60 minutes	113	22.1	(17.7, 26.4)	47	20.7	(14.8, 26.5)	47	23.6	(16.4, 30.7)
> 60 minutes	161	31.5	(26.7, 36.2)	83	36.5	(29.2, 43.8)	60	30.4	(22.9, 37.9)
Pub									
Up to 15 minutes	253	35.5	(30.9, 40.1)	119	35.8	(29.2, 42.4)	90	34.7	(27.4, 42.0)
16 - 30 minutes	209	29.3	(25.0, 33.7)	97	29.2	(23.0, 35.4)	81	31.4	(24.4, 38.5)
31 - 60 minutes	148	20.7	(17.2, 24.2)	75	22.6	(15.9, 29.2)	53	20.5	(14.8, 26.2)
> 60 minutes	103	14.4	(11.5, 17.3)	41	12.4	(8.7, 16.2)	35	13.3	(8.8, 17.8)
Club									
Up to 15 minutes	88	25.5	(19.7, 31.2)	59	38.1	(28.5, 47.7)	44	34.2	(23.6, 44.7)
16 - 30 minutes	125	36.3	(30.2, 42.4)	42	27.4	(19.3, 35.6)	36	28.2	(19.1, 37.2)
31 - 60 minutes	89	25.7	(20.3, 31.1)	34	22.2	(14.5, 29.9)	32	25.0	(15.6, 34.4)
> 60 minutes	43	12.5	(8.8, 16.3)	19	12.3	(6.8, 17.8)	16	12.7	(6.8, 18.6)

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)
Wave 1 N=6,251; Wave 2 N=3,745; Wave 3 N=3,115

APPENDIX 8:
Prevalence and 95% confidence intervals by health status in Waves 1, 2 and 3

Health variable	Wave 1			Wave 2			Wave 3		
	n	%	(95% CI)	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)	907	29.0	(27.1, 30.9)
1	1645	26.3	(25.0, 27.6)	1125	30.0	(28.2, 31.8)	890	28.5	(26.6, 30.4)
2	1151	18.4	(17.3, 19.6)	701	18.7	(17.2, 20.2)	618	19.8	(18.0, 21.6)
3	727	11.6	(10.7, 12.6)	433	11.6	(10.3, 12.8)	405	13.0	(11.5, 14.5)
4	479	7.7	(6.8, 8.5)	215	5.7	(4.8, 6.6)	138	4.4	(3.6, 5.2)
5+	536	8.6	(7.7, 9.4)	190	5.1	(4.2, 5.9)	164	5.2	(4.1, 6.4)
Missing	2	-		0	-		0	-	
Quality of life (WHOQoL-8)									
Below median (Score 0 - 24)	2635	42.2	(40.7, 43.6)	1534	41.0	(39.1, 42.9)	1312	42.0	(39.9, 44.2)
Median (Score 25)	648	10.4	(9.5, 11.3)	369	9.9	(8.8, 11.0)	294	9.4	(8.2, 10.6)
Above median (Score 26 - 32)	2962	47.4	(46.0, 48.9)	1840	49.2	(47.2, 51.1)	1515	48.5	(46.3, 50.7)
Missing	8	-		3	-		0	-	
Psychological distress (Kessler-10)									
Score 0 - 5	4597	73.6	(72.3, 74.9)	2831	75.6	(73.9, 77.2)	2307	73.9	(71.9, 75.9)
Score 6 - 11	1204	19.3	(18.1, 20.5)	659	17.6	(16.1, 19.1)	602	19.3	(17.4, 21.2)
Score 12 - 19	339	5.4	(4.8, 6.1)	207	5.5	(4.7, 6.4)	162	5.2	(4.3, 6.1)
Score 20 - 40	107	1.7	(1.4, 2.6)	48	1.3	(0.9, 1.7)	52	1.7	(1.1, 2.3)
Missing	5	-		-	-		-	-	
Hazardous alcohol consumption (AUDIT-C)									
No	3925	62.9	(61.4, 64.3)	2437	65.1	(63.2, 66.9)	2087	66.9	(64.8, 69.0)
Yes	2319	37.1	(35.7, 38.6)	1309	34.9	(33.1, 36.8)	1033	33.1	(31.0, 35.2)
Missing	10	-		-	-		3	-	
Other drug use									
Yes	916	14.7	(13.5, 15.8)	427	11.4	(10.0, 12.8)	328	10.5	(8.8, 12.2)
No	5334	85.3	(84.2, 86.5)	3319	88.6	(87.2, 90.0)	2795	89.5	(87.8, 91.2)
Cannabis	757	12.1	(11.1, 13.2)	342	9.1	(7.8, 10.4)	277	8.9	(7.4, 10.4)
Tobacco use									
Ever smoked	4109	65.7	(64.4, 67.1)	2449	65.4	(63.6, 67.2)	2088	66.8	(64.8, 68.9)
Smoked more than 100 cigarettes in lifetime	2779	44.5	(43.0, 45.9)	1670	44.6	(42.7, 46.5)	1412	45.2	(43.1, 47.4)
Ever smoked daily	2594	41.5	(40.1, 42.9)	2187	41.6	(39.7, 43.5)	1333	42.7	(40.6, 44.8)
How often currently smoke tobacco									
Does not smoke now	1616	25.9	(24.6, 27.1)	1023	27.3	(25.6, 29.0)	880	28.2	(26.3, 30.1)
At least once a day	985	15.8	(14.7, 16.8)	543	14.5	(13.1, 15.9)	433	13.9	(12.3, 15.4)
At least once a week	88	1.4	(1.0, 1.8)	56	1.5	(1.0, 2.0)	47	1.5	(0.9, 2.1)
At least once a month	32	0.5	(0.3, 0.7)	13	0.4	(0.2, 0.5)	18	0.6	(0.3, 0.9)
Less than once a month	57	0.9	(0.6, 1.2)	35	0.9	(0.6, 1.3)	33	1.1	(0.6, 1.5)
Never smoked	3470	55.5	(54.1, 57.0)	2075	55.4	(53.5, 57.3)	1711	54.8	(52.6, 56.9)
Missing	3	-		-	-		-	-	

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)
Wave 1 N=6,251; Wave 2 N=3,745; Wave 3 N=3,115

APPENDIX 9:
Bivariate associations for transition from non-problem / low-risk gambler to moderate-risk / problem gambler, aggregated across the waves

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Age group (years) at Wave 1					
18 - 24	400	0.6	1.00		
25 - 34	742	3.2	5.56	(1.30, 23.80)	
35 - 44	872	1.6	2.76	(0.66, 11.55)	
45 - 54	989	1.8	3.03	(0.68, 13.42)	
55 - 64	773	1.4	2.41	(0.49, 11.80)	
65+	905	1.5	2.51	(0.56, 11.19)	0.27
Gender at Wave 1					
Male	2285	1.7	1.11	(0.69, 1.79)	
Female	2402	1.5	1.00		0.66
Ethnic group (prioritised) at Wave 1					
Māori	484	4.2	4.78	(2.66, 8.61)	
Pacific	190	7.0	8.21	(4.56, 14.77)	
Asian	311	2.7	3.05	(1.36, 6.85)	
European/Other	3658	0.9	1.00		<0.0001
Arrival in NZ					
NZ born	3582	1.5	1.00		
before 2008	982	2.1	1.44	(0.86, 2.40)	
since 2008	123	1.4	0.96	(0.27, 3.39)	0.37
Country of birth					
NZ	3582	1.5	1.00		
Other	1105	2.0	1.38	(0.84, 2.27)	0.20
Religion					
No religion	1859	1.1	1.00		
Anglican	843	1.7	1.53	(0.73, 3.23)	
Catholic	662	1.9	1.72	(0.76, 3.90)	
Presbyterian	503	1.9	1.70	(0.80, 3.61)	
Other Christian	568	1.8	1.60	(0.81, 3.17)	
Other religion	250	3.3	2.98	(1.31, 6.77)	0.19
Highest qualification					
No formal qualification	664	1.7	1.00		
Secondary school qualification	1050	1.7	0.99	(0.47, 2.10)	
Vocational or Trade qualification	1184	2.2	1.28	(0.65, 2.52)	
University degree or higher	1788	1.1	0.65	(0.33, 1.28)	0.18
Labour force status					
Employed	3208	1.6	1.00		
Unemployed	311	2.8	0.77	(0.43, 1.40)	
Student/Homemaker/Retired	1146	1.3	1.75	(0.91, 3.38)	0.11
Household size					
1	433	1.3	1.00		
2	1742	1.3	1.02	(0.48, 2.18)	
3	798	2.5	1.93	(0.88, 1.20)	
4	940	1.7	1.29	(0.57, 2.92)	
5+	771	1.4	1.05	(0.46, 2.36)	0.32
Personal income					
<\$20,000	1242	1.9	1.00		
\$20,001 - \$40,000	1177	2.3	1.23	(0.69, 2.18)	
\$40,001 - \$60,000	941	1.6	0.85	(0.41, 1.72)	
\$60,001 - \$80,000	525	1.1	0.58	(0.24, 1.41)	
\$80,001 - \$100,000	259	0.5	0.26	(0.07, 0.96)	
>\$100,000	341	0.3	0.17	(0.02, 1.27)	
Not reported	201	0.7	0.37	(0.07, 1.99)	0.08
Household income					
<\$20,000	576	1.8	1.00		
\$20,001 - \$40,000	642	2.7	1.48	(0.78, 2.83)	
\$40,001 - \$60,000	574	2.1	1.17	(0.53, 2.59)	
\$60,001 - \$80,000	588	3.1	1.76	(0.84, 3.68)	
\$80,001 - \$100,000	622	1.3	0.71	(0.31, 1.61)	
>\$100,000	1370	0.4	0.22	(0.08, 0.59)	
Not reported	315	1.3	0.71	(0.24, 2.10)	0.004

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Area of residence					
Auckland	1300	1.9	1.00		
Wellington	526	1.1	0.58	(0.22, 1.57)	
Christchurch	355	0.9	0.48	(0.20, 1.17)	
Rest of NZ	2507	1.6	0.85	(0.50, 1.44)	0.36
New Zealand Individual Deprivation Index					
0	2864	1.1	1.00		
1	963	1.7	1.55	(0.76, 3.15)	
2	452	2.9	2.64	(1.34, 5.19)	
3	177	2.3	2.03	(0.78, 5.30)	
4	111	3.2	2.90	(1.23, 6.84)	
5	64	4.7	4.36	(1.53, 12.45)	
6+	55	5.5	5.08	(1.58, 16.40)	0.002
Number of gambling activities participated in at Wave 1					
1	1089	1.0	1.00		
2	1314	1.2	1.28	(0.56, 2.95)	
3	1029	1.7	1.82	(0.81, 4.08)	
4-6	1087	1.8	1.90	(0.91, 3.97)	
7-9	154	6.3	6.98	(2.75, 17.72)	
10+	14	12.6	14.86	(1.68, 131.13)	0.0003
Pattern of participation					
Infrequent gambler	3334	1.4	1.00		
Regular non-continuous gambler	996	1.7	1.23	(0.70, 2.17)	
Regular continuous gambler	357	3.8	2.87	(1.53, 5.36)	0.004
Gambling frequency					
At least weekly	1377	2.4	2.79	(1.47, 5.28)	
At least monthly	1347	1.9	2.18	(1.10, 4.33)	0.007
At least once in past year	1953	0.9	1.00		
Typical monthly gambling expenditure					
\$1 - \$10	829	1.0	1.00		
\$11 - \$20	979	0.5	0.54	(0.19, 1.55)	
\$21 - \$30	598	0.7	0.68	(0.21, 2.22)	
\$31 - \$50	718	0.9	0.94	(0.35, 2.53)	
\$51 - \$100	851	2.2	2.32	(0.92, 5.84)	
\$101 - \$500	605	5.1	5.49	(2.27, 13.31)	
>\$500	92	2.0	2.11	(0.60, 7.45)	<0.0001
Cards games - annual					
No	4469	1.5	1.00		
Yes	218	3.2	2.11	(0.96, 4.64)	0.06
Bets with friends/workmates - annual					
No	3873	1.7	1.00		
Yes	814	1.2	0.69	(0.35, 1.38)	0.30
Text game or competition - annual					
No	4558	1.6	1.00		
Yes	129	0.6	0.38	(0.09, 1.60)	0.19
Raffle/lottery (NZ/overseas) - annual					
No	1769	2.0	1.00		
Yes	2918	1.4	0.69	(0.43, 1.12)	0.13
Lotto - annual					
No	849	2.1	1.00		
Yes	3837	1.5	0.73	(0.40, 1.35)	0.32
Keno overall - annual					
No	4506	1.5	1.00		
Yes	180	3.8	2.55	(1.25, 5.18)	0.01
Instant Kiwi/other scratch tickets - annual					
No	2713	1.5	1.00		
Yes	1973	1.8	1.26	(0.78, 2.04)	0.35
Housie or bingo - annual					
No	4610	1.5	1.00		
Yes	76	5.7	3.84	(1.66, 8.91)	0.002
Horse/dog race betting - annual					
No	4389	1.6	1.00		
Yes	298	2.3	1.49	(0.60, 3.74)	0.39

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Sports betting - annual					
No	4473	1.5	1.00		
Yes	214	3.5	2.37	(1.03, 5.45)	0.04
Casino table games or EGMs (overseas) - annual					
No	4507	1.5	1.00		
Yes	180	5.3	3.80	(1.48, 9.73)	0.006
Casino table games or EGMs (NZ) - annual					
No	4201	1.2	1.00		
Yes	486	5.1	4.43	(2.56, 7.57)	<0.0001
Casino table games (NZ) - annual					
No	4491	1.5	1.00		
Yes	196	4.8	3.39	(1.29, 8.88)	0.01
Casino EGMs (NZ) - annual					
No	4266	1.3	1.00		
Yes	421	5.0	4.00	(2.30, 6.94)	<0.0001
Pub EGMs - annual					
No	4106	1.2	1.00		
Yes	581	4.3	3.64	(2.18, 6.07)	<0.0001
Club EGMs - annual					
No	4390	1.4	1.00		
Yes	296	5.5	4.26	(2.30, 7.90)	<0.0001
EGMs overall - annual					
No	4404	1.2	1.00		
Yes	283	7.6	6.63	(3.79, 11.61)	<0.0001
Short-term speculative investments - annual					
No	4623	1.6	1.00		
Yes	64	0.8	0.51	(0.12, 2.15)	0.36
Overseas internet gambling - annual					
No	4616	1.6	1.00		
Yes	71	4.3	2.78	(1.00, 7.70)	0.05
Card games - monthly					
No	4628	1.5	1.00		
Yes	59	9.4	6.70	(2.58, 17.39)	<0.0001
Bets with friends/workmates - monthly					
No	4609	1.6	1.00		
Yes	78	1.8	1.09	(0.26, 4.55)	0.91
Text game or competition - monthly					
No	4662	1.6	1.00		
Yes	25	3.2	2.06	(0.46, 9.19)	0.35
Raffle/lottery (NZ/overseas) - monthly					
No	4006	1.5	1.00		
Yes	681	2.4	1.59	(0.89, 2.84)	0.12
Lotto - monthly					
No	2493	1.4	1.00		
Yes	2194	1.9	1.36	(0.84, 2.21)	0.22
Keno - monthly					
No	4603	1.6	1.00		
Yes	84	3.8	2.46	(0.82, 7.42)	0.11
Instant Kiwi/other scratch tickets - monthly					
No	3970	1.4	1.00		
Yes	716	3.0	2.25	(1.32, 3.82)	0.003
Housie or bingo - monthly					
No	4662	1.6	1.00		
Yes	25	4.8	3.10	(0.81, 11.86)	0.10
Horse/dog race betting - monthly					
No	4592	1.6	1.00		
Yes	95	3.2	2.04	(0.51, 8.19)	0.31
Sports betting - monthly					
No	4633	1.6	1.00		
Yes	54	4.3	2.82	(0.60, 13.32)	0.19
Casino table games or EGMs (overseas) - monthly					
No	4685	1.6	-		
Yes	2	0.0	-		

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Casino table games or EGMs (NZ) - monthly					
No	4653	1.6	1.00		
Yes	34	6.3	4.20	(1.35, 13.07)	0.01
Casino table games (NZ) - monthly					
No	4677	1.6	-		
Yes	10	0.0	-		
Casino EGMs (NZ) - monthly					
No	4657	1.6	1.00		
Yes	29	11.7	8.42	(2.30, 30.89)	0.001
Pub EGMs - monthly					
No	4549	1.4	1.00		
Yes	138	9.5	7.54	(3.91, 14.57)	<0.0001
Club EGMs - monthly					
No	4611	1.5	1.00		
Yes	76	11.5	8.77	(3.56, 21.61)	<0.0001
EGMs overall - monthly					
No	4580	1.3	1.00		
Yes	106	13.4	11.32	(5.64, 22.72)	<0.0001
Short-term speculative investments - monthly					
No	4669	1.6	1.00		
Yes	18	3.0	1.88	(0.41, 8.58)	0.42
Overseas internet gambling - monthly					
No	4663	1.6	1.00		
Yes	24	2.3	1.45	(0.19, 11.00)	0.72
Time spent playing EGMs in an average day (casino)					
No time	4267	1.3	1.00		
Up to 15 minutes	95	3.7	2.92	(0.74, 11.52)	
16 to 30 minutes	110	4.1	3.30	(1.09, 9.97)	
31 to 60 minutes	90	7.0	5.79	(2.36, 14.19)	
>60 minutes	124	5.2	4.22	(1.91, 9.34)	<0.0001
Time spent playing EGMs in an average day (pub)					
No time	4108	1.2	1.00		
Up to 15 minutes	217	2.8	2.30	(0.84, 6.28)	
16 to 30 minutes	184	2.3	1.92	(0.78, 4.70)	
31 to 60 minutes	118	9.2	8.13	(3.81, 17.33)	
>60 minutes	60	6.7	5.73	(2.36, 13.92)	<0.0001
Time spent playing EGMs in an average day (club)					
No time	4391	1.4	1.00		
Up to 15 minutes	96	1.4	1.04	(0.14, 7.62)	
16 to 30 minutes	93	7.4	5.86	(2.28, 15.06)	
31 to 60 minutes	75	7.9	6.22	(2.30, 16.86)	
>60 minutes	31	7.0	5.51	(1.84, 16.47)	<0.0001
Who spent time with on most enjoyed activity					
Alone	1781	2.6	1.00		
With one person	772	1.1	0.41	(0.18, 0.92)	
With several people/a group	947	1.1	0.42	(0.22, 0.78)	
Most enjoyed activity not specified	1186	0.9	0.35	(0.17, 0.71)	0.002
Know people with gambling problems					
No	3022	1.3	1.00		
Yes	1665	2.1	1.57	(0.97, 2.54)	0.07
Methods - Setting a dollar limit before leaving home					
No	3739	1.2	1.00		
Yes	919	3.4	2.92	(1.78, 4.77)	<0.0001
Methods - Getting someone you trust to manage the money					
No	4634	1.6	1.00		
Yes	24	12.7	9.15	(2.59, 32.36)	0.0006
Methods - Separating money for betting from other money and stopping					
No	4494	1.5	1.00		
Yes	164	3.9	2.61	(1.20, 5.69)	0.02
Methods - Leaving ATM and credit cards at home					
No	4605	1.6	1.00		
Yes	53	4.1	2.61	(0.76, 8.95)	0.13
Methods - Setting a time limit					
No	4590	1.6	1.00		
Yes	69	2.7	1.72	(0.54, 5.50)	0.36

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Methods - Avoiding places that have betting or gambling					
No	4563	1.5	1.00		
Yes	96	6.6	4.60	(1.95, 10.85)	0.0005
Sought help (from formal and informal sources) - ever					
No	4646	1.6	1.00		
Yes	41	5.1	6.62	(0.72, 60.84)	0.09
Sought help (from formal sources) - ever					
No	4679	1.6	1.00		
Yes	8	7.2	4.73	(0.89, 25.28)	0.07
Sought help (from formal and informal sources) in last year					
No	4684	1.6	1.00		
Yes	3	9.8	6.62	(0.72, 60.84)	0.09
Sought help (from formal sources) in last year					
No	4686	1.6	-		
Yes	1	0.0	-		
Number of significant life events					
0	1273	0.7	1.00		
1	1304	1.6	2.19	(1.09, 4.40)	
2	923	2.1	2.92	(1.39, 6.16)	
3	536	2.4	3.37	(1.48, 7.67)	
4	314	2.6	3.65	(1.24, 10.73)	
5+	336	1.9	2.70	(1.06, 6.83)	0.03
Quality of life (WHOQoL-8)					
Below median (Score 0 - 24)	1911	2.3	1.91	(1.12, 3.24)	
Median score (Score 25)	482	1.0	0.79	(0.30, 2.10)	
Above median (Score 26 - 32)	2293	1.2	1.00		0.02
Psychological distress (Kessler-10)					
Score 0 - 5	3574	1.2	1.00		
Score 6 - 11	852	2.6	2.28	(1.27, 4.09)	
Score 12 - 19	205	5.1	4.55	(2.27, 9.14)	
Score 20 - 40	55	2.2	1.93	(0.63, 5.88)	<0.0001
Hazardous alcohol consumption (AUDIT-C)					
No	2810	1.6	1.00		
Yes	1875	1.6	1.00	(0.62, 1.62)	1.00
Uses drugs					
Yes	584	3.8	1.00		
No	4102	1.3	0.34	(0.19, 0.60)	0.0003
Cannabis					
No	4191	1.3	1.00		
Yes	496	3.9	3.00	(1.64, 5.51)	0.0004
Ever smoked tobacco					
Yes	3276	1.7	1.17	(0.71, 1.94)	
No	1411	1.4	1.00		0.54
Ever smoked more than 100 cigarettes in lifetime					
Yes	2229	2.0	1.67	(1.03, 2.69)	
No	2458	1.2	1.00		0.04
Ever smoked daily for a period of time					
Yes	2101	2.1	1.68	(1.04, 2.70)	
No	2586	1.2	1.00		0.03
Current tobacco use					
Does not smoke now	1391	1.5	1.25	(0.67, 2.34)	
Current smoker	838	2.9	2.36	(1.38, 4.05)	
Never smoked	2458	1.2	1.00		0.007

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

All measures are at the initial wave (i.e. Wave 1 for transition to Wave 2, Wave 2 for transition to Wave 3) unless otherwise indicated

APPENDIX 10:
**Bivariate associations for staying as a moderate-risk / problem gambler, aggregated
across the waves**

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Age group (years) at Wave 1					
18 - 24	15	35.2	1.00		
25 - 34	31	33.0	0.91	(0.23, 3.62)	
35 - 44	24	45.7	1.55	(0.38, 6.38)	
45 - 54	20	37.2	1.09	(0.28, 4.34)	
55 - 64	27	61.3	2.93	(0.71, 12.07)	
65+	15	35.2	0.91	(0.23, 3.62)	0.28
Gender at Wave 1					
Male	61	45.5	1.11	(0.69, 1.79)	
Female	56	40.5	1.00		0.59
Ethnic group (prioritised) at Wave 1					
Māori	40	57.4	0.31	(0.05, 2.10)	
Pacific	21	48.1	2.63	(1.09, 6.32)	
Asian	7	13.8	0.31	(0.05, 2.10)	
European/Other	50	33.9	1.00		0.04
Arrival in NZ					
NZ born	91	46.6	-		
before 2008	22	38.2	-		
since 2008	5	0.0	-		
Country of birth					
NZ	91	46.6	1.00		
Other	27	31.4	0.53	(0.23, 1.22)	0.13
Religion					
No religion	39	33.3	1.00		
Anglican	12	30.9	0.90	(0.19, 4.34)	
Catholic	18	34.6	1.06	(0.31, 3.60)	
Presbyterian	15	65.2	3.76	(1.04, 13.60)	
Other Christian	24	63.3	3.45	(1.32, 9.00)	
Other religion	10	30.4	0.88	(0.24, 3.26)	0.04
Highest qualification					
No formal qualification	30	56.5	1.00		
Secondary school qualification	29	25.5	0.27	(0.09, 0.78)	
Vocational or Trade qualification	30	53.3	0.88	(0.29, 2.65)	
University degree or higher	29	36.0	0.43	(0.14, 1.31)	0.04
Labour force status					
Employed	65	38.5	1.00		
Unemployed	28	51.7	1.71	(0.65, 4.51)	
Student/Homemaker/Retired	24	45.1	1.31	(0.51, 3.39)	0.54
Household size					
1	9	73.4	1.00		
2	33	51.5	0.39	(0.11, 1.36)	
3	23	34.9	0.20	(0.05, 0.84)	
4	24	25.6	0.13	(0.03, 0.52)	
5+	29	45.4	0.30	(0.09, 1.06)	0.05
Personal income					
<\$20,000	41	54.8	1.00		
\$20,001 - \$40,000	36	43.9	0.65	(0.25, 1.64)	
\$40,001 - \$60,000	23	24.9	0.27	(0.09, 0.84)	
\$60,001 - \$80,000	13	28.9	0.34	(0.08, 1.38)	
\$80,001 - \$100,000	4	52.1	0.90	(0.13, 6.18)	
>\$100,000	0	-			
Not reported	2	75.2	2.51	(0.18, 34.56)	0.18
Household income					
<\$20,000	13	68.9	1.00		
\$20,001 - \$40,000	21	61.4	0.24	(0.05, 1.27)	
\$40,001 - \$60,000	24	25.8	0.72	(0.21, 2.50)	
\$60,001 - \$80,000	23	31.6	0.16	(0.05, 0.55)	
\$80,001 - \$100,000	13	39.2	0.21	(0.06, 0.69)	
>\$100,000	16	48.2	0.29	(0.08, 1.11)	
Not reported	8	34.9	0.42	(0.12, 1.48)	0.04

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Area of residence					
Auckland	38	40.9	1.00		
Wellington	15	24.2	1.30	(0.22, 7.75)	
Christchurch	8	47.3	1.38	(0.61, 3.15)	
Rest of NZ	56	48.9	0.46	(0.10, 2.19)	0.52
New Zealand Individual Deprivation Index					
0	36	45.5	1.00	-	
1	35	28.6	0.48	(0.18, 1.28)	
2	16	52.7	1.33	(0.43, 4.14)	
3	11	34.3	0.62	(0.19, 2.07)	
4	5	39.2	0.77	(0.20, 3.00)	
5	10	68.8	2.63	(0.46, 15.06)	
6+	3	77.5	4.13	(0.64, 26.47)	0.18
Number of gambling activities participated in at Wave 1					
1	6	19.7	1.00		
2	15	42.2	2.98	(0.45, 19.76)	
3	19	26.9	1.50	(0.25, 9.00)	
4-6	49	50.9	6.57	(0.71, 60.73)	
7-9	21	40.5	4.23	(0.78, 22.93)	
10+	7	61.7	2.77	(0.46, 16.70)	0.28
Pattern of participation					
Infrequent gambler	46	22.5	1.00		
Regular non-continuous gambler	25	53.8	4.01	(1.59, 10.08)	
Regular continuous gambler	47	57.4	4.65	(1.81, 11.91)	0.002
Gambling frequency					
At least weekly	57	2.4	4.36	(1.04, 18.33)	
At least monthly	18	1.9	0.73	(0.16, 3.44)	
At least once in past year	23	0.9	1.00		0.0001
Typical monthly gambling expenditure					
<\$50	20	20.6	1.00		
\$51 - \$100	15	34.1	3.20	(1.15, 8.88)	
\$101 - \$500	63	45.4	1.99	(0.50, 7.96)	
>\$500	19	66.4	7.58	(2.02, 28.49)	0.02
Cards games - annual					
No	95	45.8	1.00		
Yes	22	31.8	0.55	(0.22, 1.37)	0.20
Bets with friends/workmates - annual					
No	81	38.3	1.00		
Yes	37	53.8	1.87	(0.85, 4.13)	0.12
Text game or competition - annual					
No	108	42.8	1.00		
Yes	10	47.1	1.19	(0.32, 4.42)	0.79
Raffle/lottery (NZ/overseas) - annual					
No	41	49.2	1.00		
Yes	77	39.9	0.69	(0.30, 1.57)	0.37
Lotto - annual					
No	19	51.8	1.00		
Yes	99	41.5	0.66	(0.22, 2.00)	0.46
Keno overall - annual					
No	105	41.7	1.00		
Yes	13	54.9	1.70	(0.61, 4.74)	0.31
Instant Kiwi/other scratch tickets - annual					
No	48	47.5	1.00		
Yes	70	40.1	0.74	(0.35, 1.56)	0.43
Housie or bingo - annual					
No	105	43.4	1.00		
Yes	12	41.0	0.91	(0.27, 3.03)	0.87
Horse/dog race betting - annual					
No	100	39.7	1.00		
Yes	17	62.9	2.58	(0.94, 7.12)	0.07

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Sports betting - annual					
No	99	38.2	1.00		
Yes	19	69.2	3.63	(1.25, 10.58)	0.02
Casino table games or EGMs (overseas) - annual					
No	106	42.3	1.00		
Yes	12	50.0	1.36	(0.41, 4.57)	0.62
Casino table games or EGMs (NZ) - annual					
No	71	43.9	1.00		
Yes	47	42.0	0.93	(0.43, 2.01)	0.84
Casino table games (NZ) - annual					
No	104	44.5	1.00		
Yes	13	32.5	0.60	(0.17, 2.09)	0.43
Casino EGMs (NZ) - annual					
No	72	43.4	1.00		
Yes	45	42.7	0.97	(0.45, 2.12)	0.94
Pub EGMs - annual					
No	49	39.6	1.00		
Yes	69	45.6	1.28	(0.61, 2.67)	0.51
Club EGMs - annual					
No	91	42.5	1.00		
Yes	26	45.3	1.12	(0.47, 2.65)	0.80
EGMs overall - annual					
No	71	43.3	1.00		
Yes	46	42.9	0.98	(0.47, 2.07)	0.96
Short-term speculative investments - annual					
No	117	43.3	-		
Yes	1	0.0	-		
Overseas internet gambling - annual					
No	106	43.6	1.00		
Yes	11	38.3	0.80	(0.23, 2.77)	0.72
Card games - monthly					
No	104	44.0	1.00		
Yes	14	36.6	0.73	(0.23, 2.32)	0.60
Bets with friends/workmates - monthly					
No	105	42.0	1.00		
Yes	13	52.0	1.49	(0.46, 4.85)	0.51
Text game or competition - monthly					
No	115	43.2	1.00		
Yes	3	38.6	0.83	(0.16, 4.21)	0.82
Raffle/lottery (NZ/overseas) - monthly					
No	92	45.6	1.00		
Yes	26	34.5	0.63	(0.28, 1.44)	0.27
Lotto - monthly					
No	51	38.0	1.00		
Yes	67	47.0	1.45	(0.67, 3.11)	0.34
Keno - monthly					
No	112	41.6	1.00		
Yes	6	73.7	3.94	(1.10, 14.17)	0.04
Instant Kiwi/other scratch tickets - monthly					
No	84	41.9	1.00		
Yes	33	46.2	1.19	(0.55, 2.58)	0.66
Housie or bingo - monthly					
No	113	43.0	1.00		
Yes	4	46.3	1.14	(0.16, 7.99)	0.89
Horse/dog race betting - monthly					
No	105	39.1	1.00		
Yes	12	76.8	5.16	(1.20, 22.17)	0.03
Sports betting - monthly					
No	108	40.5	1.00		
Yes	9	74.0	4.19	(0.97, 18.16)	0.06
Casino table games or EGMs (overseas) - monthly					
No	118	43.1	-		
Yes	-	-	-		

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Casino table games or EGMs (NZ) - monthly					
No	113	42.2	1.00		
Yes	5	62.5	2.28	(0.46, 11.28)	0.31
Casino table games (NZ) - monthly					
No	118	43.1	-		
Yes	-	-	-		
Casino EGMs (NZ) - monthly					
No	113	42.2	1.00		
Yes	5	62.5	2.28	(0.46, 11.28)	0.31
Pub EGMs - monthly					
No	68	35.0	1.00		
Yes	50	54.2	2.19	(1.02, 4.74)	0.05
Club EGMs - monthly					
No	104	41.1	1.00		
Yes	14	58.0	1.98	(0.64, 6.16)	0.24
EGMs overall - monthly					
No	81	38.6	1.00		
Yes	36	53.2	1.81	(0.83, 3.94)	0.14
Short-term speculative investments - monthly					
No	117	43.2	-		
Yes	0	-	-		
Overseas internet gambling - monthly					
No	110	44.1	1.00		
Yes	8	30.3	0.55	(0.13, 2.30)	0.41
Time spent playing EGMs in an average day (casino)					
No time	72	43.4	1.00		
Up to 15 minutes	6	24.2	0.42	(0.05, 3.87)	
16 to 30 minutes	1	70.4	3.11	(0.18, 53.17)	
31 to 60 minutes	6	64.8	2.41	(0.48, 12.01)	
>60 minutes	31	41.1	0.91	(0.37, 2.22)	0.63
Time spent playing EGMs in an average day (pub)					
No time	49	39.6	1.00		
Up to 15 minutes	5	32.3	0.73	(0.14, 3.82)	
16 to 30 minutes	16	37.9	0.93	(0.28, 3.12)	
31 to 60 minutes	14	47.2	1.37	(0.42, 4.40)	
>60 minutes	33	50.8	1.58	(0.66, 3.79)	0.81
Time spent playing EGMs in an average day (club)					
No time	91	42.5	1.00		
Up to 15 minutes	4	28.9	0.55	(0.11, 2.85)	
16 to 30 minutes	8	55.8	1.71	(0.44, 6.72)	
31 to 60 minutes	14	44.1	1.07	(0.31, 3.65)	
>60 minutes	0	0.0	-		0.76
Who spent time with on most enjoyed activity					
Alone	50	55.5	1.00		
With one person	32	28.1	0.31	(0.11, 0.88)	
With several people/a group	29	33.2	0.40	(0.16, 1.00)	
Most enjoyed activity not specified	6	68.1	1.71	(0.35, 8.37)	0.05
Know people with gambling problems					
No	40	40.4	1.00		
Yes	77	44.5	1.18	(0.57, 2.48)	0.66
Methods - Setting a dollar limit before leaving home					
No	72	42.4	1.00		
Yes	46	44.3	1.08	(0.51, 2.27)	0.84
Methods - Getting someone you trust to manage the money					
No	112	43.1	1.00		
Yes	6	43.9	1.03	(0.24, 4.53)	0.97
Methods - Separating money for betting from other money and stopping					
No	96	43.3	1.00		
Yes	22	42.3	0.96	(0.36, 2.56)	0.93
Methods - Leaving ATM and credit cards at home					
No	101	44.3	1.00		
Yes	17	35.8	0.70	(0.28, 1.76)	0.45
Methods - Setting a time limit					
No	106	40.7	1.00		
Yes	12	63.7	2.56	(0.68, 9.58)	0.16

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Methods - Avoiding places that have betting or gambling					
No	101	43.6	1.00		
Yes	17	40.1	0.86	(0.35, 2.13)	0.75
Sought help (from formal and informal sources) - ever					
No	92	37.8	1.00		
Yes	25	62.4	2.74	(1.15, 6.50)	0.02
Sought help (from formal sources) - ever					
No	109	40.0	1.00		
Yes	8	84.2	7.98	(2.51, 25.41)	0.0004
Sought help (from formal and informal sources) in last year					
No	106	40.5	1.00		
Yes	12	66.9	2.97	(0.87, 10.20)	0.08
Sought help (from formal sources) in last year					
No	114	41.9	1.00		
Yes	4	81.6	6.15	(0.86, 44.16)	0.07
Number of significant life events					
0	24	63.7	1.00		
1	29	30.4	0.25	(0.08, 0.75)	
2	24	35.4	0.31	(0.09, 1.06)	
3	18	53.6	0.66	(0.18, 2.39)	
4	13	31.0	0.26	(0.06, 1.08)	
5+	9	46.7	0.50	(0.13, 1.93)	0.14
Quality of life (WHOQoL-8)					
Below median (Score 0 - 24)	82	46.8	1.70	(0.64, 4.48)	
Median score (Score 25)	10	35.9	1.08	(0.25, 4.61)	
Above median (Score 26 - 32)	26	34.2	1.00		0.48
Psychological distress (Kessler-10)					
Score 0 - 5	49	41.7	1.00		
Score 6 - 11	35	37.7	0.85	(0.34, 2.11)	
Score 12 - 19	23	51.3	1.48	(0.53, 4.12)	
Score 20 - 40	11	49.7	1.38	(0.36, 5.38)	0.77
Hazardous alcohol consumption (AUDIT-C)					
No	59	41.9	1.00		
Yes	59	44.4	1.11	(0.52, 2.35)	0.79
Uses drugs					
Yes	32	49.9	1.00		
No	86	40.6	0.69	(0.29, 1.66)	0.40
Cannabis					
No	92	40.2	1.00		
Yes	25	53.5	1.71	(0.65, 4.54)	0.28
Ever smoked tobacco					
Yes	90	45.5	1.52	(0.67, 3.41)	
No	28	35.5	1.00		0.32
Ever smoked more than 100 cigarettes in lifetime					
Yes	73	44.7	1.19	(0.56, 2.54)	
No	45	40.5	1.00		0.65
Ever smoked daily for a period of time					
Yes	64	42.9	0.98	(0.46, 2.07)	
No	54	43.4	1.00		0.95
Current tobacco use					
Does not smoke now	31	36.5	0.84	(0.32, 2.23)	
Current smoker	2	57.5	1.53	(0.65, 3.58)	
Never smoked	45	40.5	1.00		0.45

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

All measures are at the initial wave (i.e. Wave 1 for transition to Wave 2, Wave 2 for transition to Wave 3) unless otherwise indicated

APPENDIX 11:
Bivariate associations for transition from non-problem gambler to low-risk / moderate-risk / problem gambler, aggregated across the waves

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Age group (years) at Wave 1					
18 - 24	349	9.2	1.00		
25 - 34	655	9.1	0.99	(0.52, 1.87)	
35 - 44	817	6.4	0.67	(0.36, 1.24)	
45 - 54	925	5.4	0.56	(0.29, 1.06)	
55 - 64	734	3.4	0.35	(0.18, 0.70)	
65+	863	4.0	0.41	(0.22, 0.79)	0.0001
Gender at Wave 1					
Male	2114	5.7	0.94	(0.71, 1.26)	
Female	2234	6.0	1.00		0.68
Ethnic group (prioritised) at Wave 1					
Māori	420	11.5	2.86	(1.95, 4.19)	
Pacific	161	17.5	4.65	(3.26, 6.64)	
Asian	286	9.3	2.24	(1.44, 3.49)	
European/Other	3437	4.4	1.00		<0.0001
Arrival in NZ					
NZ born	3319	5.4	1.00		
before 2008	917	7.0	1.30	(0.96, 1.78)	
since 2008	112	8.8	1.68	(0.84, 3.36)	0.11
Country of birth					
NZ	3319	5.4	1.00		
Other	1029	7.2	1.35	(1.00, 1.81)	0.05
Religion					
No religion	1730	4.7	1.00		
Anglican	789	4.7	1.01	(0.64, 1.59)	
Catholic	601	6.5	1.40	(0.89, 2.18)	
Presbyterian	480	5.5	2.07	(1.37, 3.13)	
Other Christian	520	9.3	1.98	(1.15, 3.43)	
Other religion	225	8.9	1.19	(0.72, 1.95)	0.004
Highest qualification					
No formal qualification	618	6.1	1.00		
Secondary school qualification	955	7.6	1.26	(0.81, 1.96)	
Vocational or Trade qualification	1085	6.2	1.01	(0.67, 1.54)	
University degree or higher	1691	4.5	0.72	(0.48, 1.09)	0.04
Labour force status					
Employed	2987	5.6	1.00		
Unemployed	274	7.9	1.43	(0.90, 2.27)	
Student/Homemaker/Retired	1065	5.8	1.04	(0.74, 1.45)	0.31
Household size					
1	408	6.0	1.00		
2	1642	4.4	0.72	(0.47, 1.10)	
3	739	6.2	1.05	(0.66, 1.67)	
4	863	4.8	0.79	(0.50, 1.27)	
5+	693	10.0	1.76	(1.12, 2.76)	0.0005
Personal income					
<\$20,000	1134	7.6	1.00		
\$20,001 - \$40,000	1102	6.3	0.83	(0.57, 1.18)	
\$40,001 - \$60,000	855	5.9	0.76	(0.50, 1.17)	
\$60,001 - \$80,000	502	4.5	0.58	(0.35, 0.96)	
\$80,001 - \$100,000	244	4.3	0.55	(0.24, 1.25)	
>\$100,000	333	2.1	0.27	(0.11, 0.65)	
Not reported	178	4.0	0.51	(0.24, 1.09)	0.03
Household income					
<\$20,000	534	7.2	1.00		
\$20,001 - \$40,000	577	5.6	0.76	(0.50, 1.18)	
\$40,001 - \$60,000	538	8.3	1.16	(0.74, 1.82)	
\$60,001 - \$80,000	526	6.7	0.93	(0.57, 1.49)	
\$80,001 - \$100,000	578	5.2	0.70	(0.43, 1.15)	
>\$100,000	1306	4.3	0.57	(0.36, 0.91)	
Not reported	289	5.9	0.80	(0.41, 1.59)	0.11

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Area of residence					
Auckland	1181	7.6	1.00		
Wellington	490	5.0	0.64	(0.39, 1.07)	
Christchurch	327	2.9	0.37	(0.19, 0.71)	
Rest of NZ	2350	5.5	0.72	(0.52, 0.99)	0.01
New Zealand Individual Deprivation Index					
0	2725	4.7	1.00		
1	877	6.1	1.32	(0.91, 1.91)	
2	392	8.4	1.87	(1.18, 2.95)	
3	158	8.7	1.94	(1.08, 3.49)	
4	87	11.8	2.71	(1.47, 5.01)	
5	60	15.3	3.66	(1.35, 9.90)	
6+	49	11.4	2.62	(1.15, 5.98)	0.0004
Number of gambling activities participated in at Wave 1					
1	1048	3.3	1.00		
2	1264	5.9	1.84	(1.17, 2.88)	
3	945	4.6	1.42	(0.89, 2.26)	
4-6	967	8.5	2.75	(1.81, 4.18)	
7-9	115	13.7	4.66	(2.25, 9.63)	
10+	9	33.7	14.99	(2.75, 81.66)	<0.0001
Pattern of participation					
Infrequent gambler	3148	5.2	1.00		
Regular non-continuous gambler	918	5.7	1.11	(0.79, 1.56)	
Regular continuous gambler	282	13.5	2.86	(1.87, 4.38)	<0.0001
Gambling frequency					
At least weekly	1221	7.8	2.57	(1.79, 3.68)	
At least monthly	1246	7.8	2.55	(1.76, 3.71)	
At least once in past year	1871	3.2	1.00		<0.0001
Typical monthly gambling expenditure					
\$1 - \$10	802	3.0	1.00		
\$11 - \$20	942	4.0	1.34	(0.71, 2.53)	
\$21 - \$30	569	3.3	1.11	(0.57, 2.15)	
\$31 - \$50	681	6.5	2.24	(1.24, 4.05)	
\$51 - \$100	777	7.5	2.59	(1.47, 4.55)	
\$101 - \$500	497	12.8	4.68	(2.67, 8.19)	
>\$500	68	8.1	2.81	(0.84, 9.45)	<0.0001
Cards games - annual					
No	4172	5.7	1.00		
Yes	176	9.8	1.82	(0.99, 3.35)	0.06
Bets with friends/workmates - annual					
No	3605	5.6	1.00		
Yes	743	7.0	1.27	(0.89, 1.82)	0.19
Text game or competition - annual					
No	4236	5.9	1.00		
Yes	113	3.4	0.57	(0.23, 1.41)	0.22
Raffle/lottery (NZ/overseas) - annual					
No	1633	6.2	1.00		
Yes	2716	5.6	0.89	(0.66, 1.21)	0.47
Lotto - annual					
No	804	5.8	1.00		
Yes	3544	5.8	1.01	(0.66, 1.54)	0.98
Keno overall - annual					
No	4200	5.7	1.00		
Yes	149	10.9	2.05	(1.21, 3.48)	0.01
Instant Kiwi/other scratch tickets - annual					
No	2560	4.7	1.00		
Yes	1788	7.4	1.62	(1.22, 2.16)	0.001
Housie or bingo - annual					
No	4288	5.7	1.00		
Yes	60	14.7	2.86	(1.50, 5.43)	0.001
Horse/dog race betting - annual					
No	4094	5.5	1.00		
Yes	254	10.7	2.06	(1.29, 3.28)	0.002

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Sports betting - annual					
No	4157	5.5	1.00		
Yes	192	13.9	2.80	(1.64, 4.76)	0.0001
Casino table games or EGMs (overseas) - annual					
No	4199	5.8	1.00		
Yes	150	6.5	1.12	(0.52, 2.45)	0.77
Casino table games or EGMs (NZ) - annual					
No	3955	5.2	1.00		
Yes	394	12.0	2.47	(1.60, 3.80)	<0.0001
Casino table games (NZ) - annual					
No	4190	5.5	1.00		
Yes	159	14.3	2.86	(1.42, 5.76)	0.00
Casino EGMs (NZ) - annual					
No	4008	5.4	1.00		
Yes	340	11.0	2.17	(1.41, 3.35)	0.0004
Pub EGMs - annual					
No	3875	4.8	1.00		
Yes	473	14.6	3.41	(2.40, 4.84)	<0.0001
Club EGMs - annual					
No	4105	5.5	1.00		
Yes	243	11.9	2.35	(1.48, 3.73)	0.0003
EGMs overall - annual					
No	4126	5.2	1.00		
Yes	222	16.7	3.61	(2.30, 5.67)	<0.0001
Short-term speculative investments - annual					
No	4290	5.9	1.00		
Yes	58	1.0	0.17	(0.04, 0.70)	0.01
Overseas internet gambling - annual					
No	4291	5.7	1.00		
Yes	57	12.7	2.40	(0.91, 6.37)	0.08
Card games - monthly					
No	4304	5.7	1.00		
Yes	44	17.9	3.59	(1.63, 7.91)	0.002
Bets with friends/workmates - monthly					
No	4284	5.8	1.00		
Yes	64	9.7	1.76	(0.69, 4.46)	0.23
Text game or competition - monthly					
No	4329	5.8	1.00		
Yes	19	2.3	0.39	(0.05, 2.96)	0.36
Raffle/lottery (NZ/overseas) - monthly					
No	3734	5.5	1.00		
Yes	614	7.8	1.45	(1.03, 2.05)	0.03
Lotto - monthly					
No	2338	4.8	1.00		
Yes	2010	7.1	1.53	(1.14, 2.04)	0.004
Keno - monthly					
No	4275	5.8	1.00		
Yes	73	8.6	1.53	(0.65, 3.59)	0.33
Instant Kiwi/other scratch tickets - monthly					
No	3720	5.2	1.00		
Yes	629	9.4	1.88	(1.34, 2.64)	0.0003
Housie or bingo - monthly					
No	4332	5.8	1.00		
Yes	16	24.4	5.26	(2.05, 13.55)	0.001
Horse/dog race betting - monthly					
No	4279	5.6	1.00		
Yes	69	20.7	4.42	(2.19, 8.94)	<0.0001
Sports betting - monthly					
No	4304	5.7	1.00		
Yes	44	22.6	4.88	(1.93, 12.34)	0.001
Casino table games or EGMs (overseas) - monthly					
No	4347	5.8	-		
Yes	1	0.0	-		

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Casino table games or EGMs (NZ) - monthly					
No	4324	5.6	1.00		
Yes	24	40.0	11.17	(3.00, 41.50)	0.0003
Casino table games (NZ) - monthly					
No	4339	5.7	1.00		
Yes	10	54.9	20.08	(2.09, 192.82)	0.009
Casino EGMs (NZ) - monthly					
No	4329	5.7	1.00		
Yes	19	29.7	6.97	(2.11, 23.06)	0.002
Pub EGMs - monthly					
No	4253	5.3	1.00		
Yes	95	29.7	7.57	(4.45, 12.87)	<0.0001
Club EGMs - monthly					
No	4296	5.6	1.00		
Yes	53	24.6	5.49	(2.64, 11.44)	<0.0001
EGMs overall - monthly					
No	4276	5.4	1.00		
Yes	72	30.0	7.49	(4.04, 13.89)	<0.0001
Short-term speculative investments - monthly					
No	4335	5.8	-		
Yes	13	0.0	-		
Overseas internet gambling - monthly					
No	4332	5.8	1.00		
Yes	16	8.7	1.54	(0.20, 11.97)	0.68
Time spent playing EGMs in an average day (casino)					
No time	4008	5.4	1.00		
Up to 15 minutes	85	3.8	0.69	(0.20, 2.36)	
16 to 30 minutes	93	12.6	2.52	(1.14, 5.58)	
31 to 60 minutes	73	12.8	2.59	(1.14, 5.85)	
>60 minutes	90	14.7	3.03	(1.52, 6.06)	0.001
Time spent playing EGMs in an average day (pub)					
No time	3875	4.8	1.00		
Up to 15 minutes	187	9.4	2.08	(1.06, 4.09)	
16 to 30 minutes	157	15.4	3.63	(2.06, 6.38)	
31 to 60 minutes	93	14.4	3.36	(1.71, 6.63)	
>60 minutes	36	38.3	12.40	(5.71, 26.92)	<0.0001
Time spent playing EGMs in an average day (club)					
No time	4105	5.5	1.00		
Up to 15 minutes	86	2.3	0.41	(0.11, 1.51)	
16 to 30 minutes	84	13.0	2.58	(1.25, 5.30)	
31 to 60 minutes	60	19.3	4.13	(1.91, 8.91)	
>60 minutes	14	33.9	8.87	(2.76, 28.48)	<0.0001
Who spent time with on most enjoyed activity					
Alone	1653	6.7	1.00		
With one person	700	6.3	0.94	(0.63, 1.40)	
With several people/a group	854	6.6	0.99	(0.66, 1.47)	
Most enjoyed activity not specified	1142	3.7	0.53	(0.36, 0.78)	0.01
Know people with gambling problems					
No	2857	4.9	1.00		
Yes	1491	7.6	1.61	(1.21, 2.14)	0.001
Methods - Setting a dollar limit before leaving home					
No	3523	5.0	1.00		
Yes	799	9.6	2.01	(1.46, 2.76)	<0.0001
Methods - Getting someone you trust to manage the money					
No	4305	5.9	1.00		
Yes	17	8.8	1.55	(0.34, 7.00)	0.57
Methods - Separating money for betting from other money and stopping					
No	4196	5.6	1.00		
Yes	126	14.9	2.96	(1.63, 5.37)	0.0004
Methods - Leaving ATM and credit cards at home					
No	4288	5.8	1.00		
Yes	34	13.8	2.61	(0.86, 7.92)	0.09
Methods - Setting a time limit					
No	4277	5.8	1.00		
Yes	45	14.8	2.84	(1.22, 6.63)	0.02

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Methods - Avoiding places that have betting or gambling					
No	4248	5.8	1.00		
Yes	74	8.2	1.45	(0.57, 3.73)	0.44
Sought help (from formal and informal sources) - ever					
No	4323	5.8	1.00		
Yes	26	18.1	3.62	(1.27, 10.34)	0.02
Sought help (from formal sources) - ever					
No	4345	5.8	1.00		
Yes	3	19.3	3.88	(0.59, 25.58)	0.16
Sought help (from formal and informal sources) in last year					
No	4347	5.8			
Yes	1	100.0			
Sought help (from formal sources) in last year					
No	4348	5.8			
Yes	-	-			
Number of significant life events					
0	1214	3.8	1.00		
1	1231	6.2	1.69	(1.08, 2.63)	
2	849	5.9	1.61	(1.01, 2.58)	
3	485	6.7	1.83	(1.07, 3.12)	
4	273	6.0	1.65	(0.87, 3.12)	
5+	295	11.1	3.20	(1.80, 5.69)	0.01
Quality of life (WHOQoL-8)					
Below median (Score 0 - 24)	1752	8.0	2.15	(1.56, 2.95)	
Median score (Score 25)	439	6.8	1.79	(1.07, 3.00)	
Above median (Score 26 - 32)	2156	3.9	1.00		<0.0001
Psychological distress (Kessler-10)					
Score 0 - 5	3375	4.8	1.00		
Score 6 - 11	761	8.5	1.83	(1.29, 2.62)	
Score 12 - 19	168	11.0	2.44	(1.46, 4.09)	
Score 20 - 40	45	18.1	4.37	(1.55, 12.36)	<0.0001
Hazardous alcohol consumption (AUDIT-C)					
No	2640	5.3	1.00		
Yes	1707	6.6	1.27	(0.95, 1.70)	0.11
Uses drugs					
Yes	492	11.0	1.00		
No	3856	5.2	0.44	(0.30, 0.66)	<0.0001
Cannabis					
No	3933	5.2	1.00		
Yes	415	11.8	2.43	(1.59, 3.73)	<0.0001
Ever smoked tobacco					
Yes	3029	6.1	1.15	(0.84, 1.56)	
No	1319	5.3	1.00		0.39
Ever smoked more than 100 cigarettes in lifetime					
Yes	2055	5.9	1.03	(0.78, 1.37)	
No	2294	5.8	1.00		0.83
Ever smoked daily for a period of time					
Yes	1930	6.0	1.05	(0.79, 1.40)	
No	2418	5.7	1.00		0.74
Current tobacco use					
Does not smoke now	1318	4.1	0.70	(0.49, 1.01)	
Current smoker	737	9.2	1.65	(1.18, 2.32)	
Never smoked	2294	5.8	1.00		0.0001

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

All measures are at the initial wave (i.e. Wave 1 for transition to Wave 2, Wave 2 for transition to Wave 3) unless otherwise indicated

APPENDIX 12:
Bivariate associations for transition from non-problem gambler to low-risk / moderate-risk / problem gambler for Māori, aggregated across the waves

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Age group (years) at Wave 1					
18 - 24	42	27.7	1.00		
25 - 34	82	15.5	0.48	(0.14, 1.67)	
35 - 44	104	7.6	0.22	(0.06, 0.76)	
45 - 54	87	6.2	0.17	(0.05, 0.65)	
55 - 64	60	6.6	0.18	(0.05, 0.70)	
65+	45	15.3	0.47	(0.13, 1.78)	0.01
Personal income					
<\$20,000	145	18.5	1.00		
\$20,001 - \$40,000	101	10.7	0.53	(0.26, 1.10)	
\$40,001 - \$60,000	82	6.6	0.31	(0.12, 0.79)	
>\$60,000	82	3.9	0.18	(0.07, 0.50)	
Not reported	11	21.5	1.21	(0.28, 5.15)	0.01
Number of gambling activities participated in at Wave 1					
1	73	6.0	1.00		
2	131	13.4	2.42	(0.86, 6.82)	
3	94	6.2	1.04	(0.38, 2.81)	
4-6	105	15.8	2.92	(1.21, 7.03)	
7-9	14	28.4	6.18	(1.67, 22.83)	
10+	3	7.0	1.17	(0.09, 14.61)	0.01
Pattern of participation					
Infrequent gambler	282	12.3	1.00		
Regular non-continuous gambler	112	6.6	0.50	(0.25, 1.03)	
Regular continuous gambler	26	24.2	2.27	(0.91, 5.68)	0.01
Instant Kiwi/other scratch tickets - annual					
No	227	8.3	1.00		
Yes	193	15.4	2.03	(1.09, 3.77)	0.03
Casino table games or EGMs (NZ) - annual					
No	388	9.9	1.00		
Yes	32	31.8	4.26	(1.32, 13.80)	0.02
Pub EGMs - annual					
No	351	8.7	1.00		
Yes	69	26.0	3.68	(1.90, 7.14)	0.0001
EGMs overall - annual					
No	390	10.6	1.00		
Yes	30	23.7	2.61	(1.12, 6.06)	0.03
Instant Kiwi/other scratch tickets - monthly					
No	346	9.6	1.00		
Yes	74	20.6	2.45	(1.23, 4.86)	0.01
Casino table games or EGMs (NZ) - monthly					
No	414	10.3	1.00		
Yes	6	93.0	116.04	(8.13, 1000.00)	0.0005
Pub EGMs - monthly					
No	406	10.3	1.00		
Yes	14	49.2	8.46	(3.15, 22.73)	<0.0001
Time spent playing EGMs in an average day (pub)					
No time	351	8.7	1.00		
Up to 15 minutes	28	13.8	1.68	(0.57, 4.98)	
16 to 30 minutes	20	23.5	3.22	(1.18, 8.77)	
31 to 60 minutes	13	44.7	8.47	(2.88, 24.92)	
>60 minutes	8	45.5	8.76	(2.50, 30.76)	<0.0001
Who spent time with on most enjoyed activity					
Alone	186	12.7	1.00		
With one person	68	9.6	0.73	(0.33, 1.65)	
With several people/a group	76	19.0	1.61	(0.65, 4.02)	
Most enjoyed activity not specified	91	4.5	0.33	(0.14, 0.79)	0.03
Methods - Setting a dollar limit before leaving home					
No	342	9.6	1.00		
Yes	77	20.4	2.41	(1.27, 4.58)	0.01

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Methods - Setting a time limit					
No	412	11.0	1.00		
Yes	7	43.8	6.31	(1.43, 27.87)	0.02
Quality of life (WHOQoL-8)					
Below median (Score 0 - 24)	182	15.3	1.64	(0.79, 3.40)	
Median score (Score 25)	42	2.6	0.24	(0.05, 1.16)	
Above median (Score 26 - 32)	196	10.0	1.00		0.02
Psychological distress (Kessler-10)					
Score 0 - 5	324	8.2	1.00		
Score 6 - 11	72	20.9	2.94	(1.23, 7.04)	
Score 12 - 19	17	25.8	3.87	(1.58, 9.46)	
Score 20 - 40	7	33.3	5.55	(1.67, 18.49)	0.0001

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

All measures are at the initial wave (i.e. Wave 1 for transition to Wave 2, Wave 2 for transition to Wave 3) unless otherwise indicated

APPENDIX 13:
Bivariate associations for transition from non-problem gambler to low-risk / moderate-risk / problem gambler for Pacific people, aggregated across the waves

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Personal income					
<\$20,000	52	21.9	1.00		
\$20,001 - \$40,000	52	21.5	0.98	(0.49, 1.95)	
\$40,001 - \$60,000	40	7.6	0.03	(0.13, 0.69)	
>\$60,000	24	13.9	0.06	(0.22, 1.55)	
Not reported	8	10.6	0.43	(0.05, 3.44)	0.05
Quality of life (WHOQoL-8)					
Below median (Score 0 - 24)	78	22.1	2.39	(1.29, 4.45)	
Median score (Score 25)	15	25.0	2.82	(0.99, 7.98)	
Above median (Score 26 - 32)	81	10.6	1.00		0.01

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

All measures are at the initial wave (i.e. Wave 1 for transition to Wave 2, Wave 2 for transition to Wave 3) unless otherwise indicated

APPENDIX 14:
Bivariate associations for staying as a low-risk / moderate-risk / problem gambler,
aggregated across the waves

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Age group (years) at Wave 1					
18 - 24	66	32.5	1.00		
25 - 34	119	41.8	1.49	(0.60, 3.68)	
35 - 44	80	41.4	1.47	(0.59, 3.62)	
45 - 54	84	55.7	2.61	(1.05, 6.48)	
55 - 64	55	55.0	2.53	(0.98, 6.55)	
65+	53	54.2	2.46	(0.94, 6.46)	0.13
Gender at Wave 1					
Male	233	43.7	0.83	(0.54, 1.28)	
Female	224	48.3	1.00		0.40
Ethnic group (prioritised) at Wave 1					
Māori	103	64.9	2.94	(1.78, 4.84)	
Pacific	49	49.9	1.58	(0.92, 2.70)	
Asian	33	40.6	1.08	(0.51, 2.31)	
European/Other	271	38.7	1.00		0.0003
Arrival in NZ					
NZ born	353	47.5	1.00		
before 2008	87	41.7	0.79	(0.49, 1.28)	
since 2008	16	36.5	0.64	(0.21, 1.89)	0.50
Country of birth					
NZ	353	47.5	1.00		
Other	103	40.9	0.77	(0.48, 1.21)	0.25
Religion					
No religion	168	40.0	1.00		
Anglican	65	43.9	1.17	(0.54, 2.57)	
Catholic	79	51.7	1.60	(0.84, 3.07)	
Presbyterian	38	62.7	2.51	(1.17, 5.40)	
Other Christian	72	53.1	1.70	(0.92, 3.12)	
Other religion	34	32.9	0.74	(0.32, 1.70)	0.08
Highest qualification					
No formal qualification	76	56.8	1.00		
Secondary school qualification	124	38.6	0.48	(0.25, 0.93)	
Vocational or Trade qualification	130	52.0	0.82	(0.44, 1.56)	
University degree or higher	126	40.4	0.52	(0.27, 0.99)	0.07
Labour force status					
Employed	285	45.9	1.00		
Unemployed	65	51.7	1.26	(0.69, 2.31)	
Student/Homemaker/Retired	105	42.4	0.87	(0.50, 1.52)	0.61
Household size					
1	33	65.3	1.00		
2	133	47.2	0.48	(0.24, 0.94)	
3	82	52.5	0.59	(0.27, 1.29)	
4	101	38.2	0.33	(0.16, 0.70)	
5+	107	40.7	0.37	(0.17, 0.78)	0.03
Personal income					
<\$20,000	148	43.3	1.00		
\$20,001 - \$40,000	112	57.3	1.76	(0.99, 3.11)	
\$40,001 - \$60,000	108	39.9	0.87	(0.47, 1.61)	
\$60,001 - \$80,000	37	35.7	0.73	(0.33, 1.63)	
\$80,001 - \$100,000	17	78.3	4.74	(1.33, 16.92)	
>\$100,000	10	25.7	0.45	(0.11, 1.86)	
Not reported	24	37.4	0.78	(0.24, 2.58)	0.02
Household income					
<\$20,000	54	53.8	1.00		
\$20,001 - \$40,000	87	45.0	0.70	(0.36, 1.37)	
\$40,001 - \$60,000	60	54.6	1.03	(0.47, 2.25)	
\$60,001 - \$80,000	85	43.1	0.65	(0.30, 1.41)	
\$80,001 - \$100,000	57	39.5	0.56	(0.25, 1.26)	
>\$100,000	80	43.7	0.67	(0.33, 1.37)	
Not reported	34	43.8	0.67	(0.25, 1.82)	0.72

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Area of residence					
Auckland	157	45.0	1.00		
Wellington	50	45.5	1.02	(0.49, 2.11)	
Christchurch	37	42.6	0.91	(0.31, 2.66)	
Rest of NZ	212	47.4	1.10	(0.68, 1.78)	0.97
New Zealand Individual Deprivation Index					
0	176	47.4	1.00		
1	122	41.7	0.80	(0.44, 1.43)	
2	76	44.1	0.88	(0.47, 1.63)	
3	30	46.9	0.98	(0.42, 2.30)	
4	29	37.5	0.67	(0.26, 1.74)	
5	17	70.8	2.69	(0.88, 8.28)	
6+	6	75.3	3.38	(0.79, 14.48)	0.25
Number of gambling activities participated in at Wave 1					
1	47	40.6	1.00		
2	65	34.3	0.77	(0.30, 1.96)	
3	104	38.0	0.90	(0.37, 2.14)	
4-6	169	47.4	1.32	(0.58, 3.02)	
7-9	59	62.4	2.43	(0.96, 6.18)	
10+	12	96.5	40.77	(4.50, 369.06)	0.0008
Pattern of participation					
Infrequent gambler	232	34.9	1.00		
Regular non-continuous gambler	103	47.9	1.72	(1.01, 2.92)	
Regular continuous gambler	122	65.5	3.54	(2.07, 6.05)	<0.0001
Gambling frequency					
At least weekly	231	57.9	4.65	(2.30, 9.40)	
At least monthly	133	41.2	2.37	(1.10, 5.08)	
At least once in past year	93	22.9	1.00		<0.0001
Typical monthly gambling expenditure					
\$1 - \$10	27	25.7	1.00		
\$11 - \$20	45	27.3	1.09	(0.28, 4.23)	
\$21 - \$30	36	28.7	1.17	(0.30, 4.50)	
\$31 - \$50	44	38.0	1.78	(0.44, 7.14)	
\$51 - \$100	88	37.5	1.74	(0.53, 5.71)	
\$101 - \$500	171	56.2	3.71	(1.20, 11.54)	
>\$500	43	74.6	8.53	(2.25, 32.33)	<0.0001
Cards games - annual					
No	393	43.5	1.00		
Yes	64	61.1	2.04	(1.06, 3.93)	0.03
Bets with friends/workmates - annual					
No	348	46.1	1.00		
Yes	108	45.4	0.97	(0.56, 1.68)	0.92
Text game or competition - annual					
No	431	46.8	1.00		
Yes	26	32.1	0.54	(0.20, 1.47)	0.23
Raffle/lottery (NZ/overseas) - annual					
No	177	49.1	1.00		
Yes	279	44.0	0.82	(0.51, 1.30)	0.39
Lotto - annual					
No	64	50.6	1.00		
Yes	393	45.2	0.81	(0.43, 1.51)	0.50
Keno overall - annual					
No	412	44.6	1.00		
Yes	45	58.9	1.78	(0.84, 3.81)	0.14
Instant Kiwi/other scratch tickets - annual					
No	201	44.2	1.00		
Yes	256	47.4	1.14	(0.73, 1.77)	0.565
Housie or bingo - annual					
No	428	44.7	1.00		
Yes	28	64.6	2.26	(1.07, 4.78)	0.03
Horse/dog race betting - annual					
No	395	43.0	1.00		
Yes	62	65.3	2.50	(1.32, 4.72)	0.005

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Sports betting - annual					
No	415	44.3	1.00		
Yes	42	62.5	2.10	(1.01, 4.37)	0.05
Casino table games or EGMs (overseas) - annual					
No	414	44.1	1.00		
Yes	42	63.9	2.25	(0.99, 5.11)	0.05
Casino table games or EGMs (NZ) - annual					
No	317	41.3	1.00		
Yes	139	56.6	1.85	(1.14, 3.01)	0.01
Casino table games (NZ) - annual					
No	406	44.9	1.00		
Yes	51	54.3	1.46	(0.66, 3.19)	0.35
Casino EGMs (NZ) - annual					
No	331	41.3	1.00		
Yes	125	58.2	1.98	(1.20, 3.28)	0.008
Pub EGMs - annual					
No	280	37.5	1.00		
Yes	176	59.5	2.45	(1.51, 3.96)	0.0003
Club EGMs - annual					
No	377	41.8	1.00		
Yes	79	65.6	2.66	(1.50, 4.71)	0.0008
EGMs overall - annual					
No	349	38.9	1.00		
Yes	107	69.0	3.50	(2.09, 5.87)	<0.0001
Short-term speculative investments - annual					
No	450	45.8	1.00		
Yes	6	54.4	1.41	(0.21, 9.47)	0.72
Overseas internet gambling - annual					
No	431	44.1	1.00		
Yes	25	78.2	4.56	(1.67, 12.46)	0.003
Card games - monthly					
No	427	43.9	1.00		
Yes	29	76.6	4.18	(1.76, 9.94)	0.001
Bets with friends/workmates - monthly					
No	430	45.6	1.00		
Yes	27	52.4	1.31	(0.53, 3.25)	0.55
Text game or competition - monthly					
No	448	45.9	1.00		
Yes	9	47.3	1.06	(0.22, 5.13)	0.95
Raffle/lottery (NZ/overseas) - monthly					
No	363	43.9	1.00		
Yes	93	54.1	1.51	(0.92, 2.46)	0.10
Lotto - monthly					
No	205	39.6	1.00		
Yes	251	51.2	1.60	(1.02, 2.50)	0.04
Keno - monthly					
No	440	44.7	1.00		
Yes	17	78.6	4.54	(1.69, 12.22)	0.003
Instant Kiwi/other scratch tickets - monthly					
No	335	44.3	1.00		
Yes	121	50.6	1.29	(0.81, 2.05)	0.28
Housie or bingo - monthly					
No	443	45.7	1.00		
Yes	14	52.8	1.33	(0.49, 3.56)	0.57
Horse/dog race betting - monthly					
No	418	43.0	1.00		
Yes	39	78.4	4.81	(2.16, 10.71)	0.0001
Sports betting - monthly					
No	437	45.4	1.00		
Yes	19	59.1	1.74	(0.63, 4.83)	0.29
Casino table games or EGMs (overseas) - monthly					
No	456	46.0	-		
Yes	1	0.0	-		

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Casino table games or EGMs (NZ) - monthly					
No	441	45.3	1.00		
Yes	15	66.2	2.37	(0.78, 7.21)	0.13
Casino table games (NZ) - monthly					
No	456	45.9			
Yes	1	100.0			
Casino EGMs (NZ) - monthly					
No	441	45.2	1.00		
Yes	15	66.3	2.38	(0.77, 7.39)	0.13
Pub EGMs - monthly					
No	364	38.4	1.00		
Yes	92	75.9	5.07	(2.91, 8.83)	<0.0001
Club EGMs - monthly					
No	419	43.8	1.00		
Yes	37	70.0	2.98	(1.38, 6.45)	0.005
EGMs overall - monthly					
No	386	40.1	1.00		
Yes	71	78.0	5.30	(2.79, 10.08)	<0.0001
Short-term speculative investments - monthly					
No	451	46.0	-		
Yes	5	0.0	-		
Overseas internet gambling - monthly					
No	440	45.0	1.00		
Yes	16	72.3	3.19	(0.99, 10.34)	0.05
Time spent playing EGMs in an average day (casino)					
No time	332	41.5	1.00		
Up to 15 minutes	17	48.2	1.32	(0.40, 4.31)	
16 to 30 minutes	19	33.4	0.71	(0.16, 3.13)	
31 to 60 minutes	23	50.4	1.44	(0.59, 3.48)	
>60 minutes	66	70.1	3.31	(1.76, 6.21)	0.006
Time spent playing EGMs in an average day (pub)					
No time	282	37.5	1.00		
Up to 15 minutes	36	39.3	1.08	(0.35, 3.33)	
16 to 30 minutes	43	46.8	1.46	(0.67, 3.19)	
31 to 60 minutes	40	72.1	4.31	(1.99, 9.36)	
>60 minutes	57	73.1	4.54	(2.35, 8.75)	<0.0001
Time spent playing EGMs in an average day (club)					
No time	378	41.9	1.00		
Up to 15 minutes	14	56.1	1.77	(0.50, 6.26)	
16 to 30 minutes	18	61.9	2.25	(0.79, 6.46)	
31 to 60 minutes	24	60.7	2.14	(0.79, 5.82)	
>60 minutes	23	78.6	5.08	(1.81, 14.24)	0.01
Who spent time with on most enjoyed activity					
Alone	178	54.1	1.00		
With one person	105	44.0	0.67	(0.37, 1.20)	
With several people/a group	122	38.8	0.54	(0.31, 0.94)	
Most enjoyed activity not specified	51	38.7	0.54	(0.25, 1.14)	0.10
Know people with gambling problems					
No	206	40.0	1.00		
Yes	250	50.9	1.56	(1.00, 2.42)	0.05
Methods - Setting a dollar limit before leaving home					
No	288	41.6	1.00		
Yes	166	54.2	1.66	(1.05, 2.61)	0.03
Methods - Getting someone you trust to manage the money					
No	442	46.0	1.00		
Yes	12	53.7	1.36	(0.49, 3.79)	0.55
Methods - Separating money for betting from other money and stopping					
No	394	44.0	1.00		
Yes	60	60.2	1.93	(1.04, 3.56)	0.04
Methods - Leaving ATM and credit cards at home					
No	418	44.8	1.00		
Yes	36	62.1	2.02	(0.93, 4.39)	0.08
Methods - Setting a time limit					
No	418	45.8	1.00		
Yes	36	50.5	1.21	(0.57, 2.54)	0.62

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Methods - Avoiding places that have betting or gambling					
No	415	44.9	1.00		
Yes	39	60.0	1.84	(0.95, 3.58)	0.07
Sought help (from formal and informal sources) - ever					
No	416	44.6	1.00		
Yes	41	60.2	1.88	(0.93, 3.78)	0.08
Sought help (from formal sources) - ever					
No	443	45.1	1.00		
Yes	13	75.2	3.69	(0.67, 20.27)	0.13
Sought help (from formal and informal sources) in last year					
No	443	45.1	1.00		
Yes	14	72.4	3.19	(0.97, 10.55)	0.06
Sought help (from formal sources) in last year					
No	452	45.5	1.00		
Yes	5	94.0	18.71	(2.02, 173.44)	0.01
Number of significant life events					
0	83	56.2	1.00		
1	102	49.8	0.77	(0.40, 1.47)	
2	99	41.1	0.54	(0.27, 1.08)	
3	68	52.1	0.85	(0.42, 1.73)	
4	54	34.7	0.41	(0.16, 1.05)	
5+	51	34.6	0.41	(0.18, 0.93)	0.15
Quality of life (WHOQoL-8)					
Below median (Score 0 - 24)	241	51.0	1.69	(1.03, 2.76)	
Median score (Score 25)	53	47.3	1.46	(0.67, 3.17)	
Above median (Score 26 - 32)	163	38.1	1.00		0.11
Psychological distress (Kessler-10)					
Score 0 - 5	249	47.8	1.00		
Score 6 - 11	126	43.0	0.82	(0.49, 1.37)	
Score 12 - 19	60	48.6	1.03	(0.54, 1.96)	
Score 20 - 40	21	34.7	0.58	(0.22, 1.52)	0.63
Hazardous alcohol consumption (AUDIT-C)					
No	229	41.1	1.00		
Yes	227	50.8	1.48	(0.95, 2.31)	0.09
Uses drugs					
Yes	124	48.7	1.00		
No	332	44.9	0.86	(0.50, 1.48)	0.58
Cannabis					
No	350	45.4	1.00		
Yes	106	47.7	1.09	(0.61, 1.95)	0.76
Ever smoked tobacco					
Yes	336	46.6	1.10	(0.69, 1.75)	
No	120	44.3	1.00		0.70
Ever smoked more than 100 cigarettes in lifetime					
Yes	248	50.2	1.45	(0.93, 2.27)	
No	209	41.0	1.00		0.10
Ever smoked daily for a period of time					
Yes	235	49.8	1.37	(0.88, 2.14)	
No	222	41.9	1.00		0.16
Current tobacco use					
Does not smoke now	104	48.0	1.33	(0.76, 2.34)	
Current smoker	144	51.7	1.54	(0.93, 2.58)	
Never smoked	209	41.0	1.00		0.23

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

All measures are at the initial wave (i.e. Wave 1 for transition to Wave 2, Wave 2 for transition to Wave 3) unless otherwise indicated

APPENDIX 15:
Bivariate associations for staying as a low-risk / moderate-risk / problem gambler for
Māori, aggregated across the waves

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Number of gambling activities participated in at Wave 1					
1	6	31.0	1.00		
2	11	46.1	1.90	(0.35, 10.47)	
3	17	51.7	2.38	(0.45, 12.64)	
4-6	42	68.0	4.73	(1.09, 20.65)	
7+	27	84.1	11.82	(2.08, 66.81)	0.02
Typical monthly gambling expenditure					
\$1 - \$10	3	11.6	1.00		
\$11 - \$20	4	53.4	8.72	(0.54, 139.92)	
\$21 - \$30	6	40.7	5.23	(0.37, 73.34)	
\$31 - \$50	7	29.7	3.22	(0.23, 45.73)	
\$51 - \$100	20	62.8	12.85	(1.17, 141.42)	
\$101 - \$500	47	71.3	18.88	(1.86, 191.19)	
>\$500	17	83.3	37.93	(3.08, 466.67)	0.01
Casino table games or EGMs (NZ) - annual					
No	73	58.3	1.00		
Yes	30	80.8	3.00	(1.15, 7.83)	0.02
Casino EGMs (NZ) - annual					
No	74	59.2	1.00		
Yes	29	79.7	2.70	(1.02, 7.15)	0.04
Pub EGMs - annual					
No	43	49.8	1.00		
Yes	60	76.0	3.19	(1.46, 6.98)	0.004
Club EGMs - annual					
No	83	59.7	1.00		
Yes	20	86.1	4.17	(1.30, 13.41)	0.02
EGMs overall - annual					
No	66	53.6	1.00		
Yes	37	85.5	5.13	(2.01, 13.07)	0.0006
Keno - monthly					
No	98	63.3	1.00		
Yes	5	96.2	14.76	(1.67, 130.31)	0.02
Pub EGMs - monthly					
No	67	53.8	1.00		
Yes	37	85.2	4.93	(2.03, 11.99)	0.0004
EGMs overall - monthly					
No	77	57.1	1.00		
Yes	26	87.8	5.40	(1.82, 16.02)	0.002
Time spent playing EGMs in an average day (pub)					
No time	44	50.7	1.00		
Up to 15 minutes	10	70.0	2.26	(0.48, 10.77)	
16 to 30 minutes	8	24.2	0.31	(0.09, 1.08)	
31 to 60 minutes	15	81.9	4.41	(1.09, 17.92)	
>60 minutes	26	90.6	9.35	(2.95, 29.67)	<0.0001
Methods - Setting a dollar limit before leaving home					
No	66	58.3	1.00		
Yes	37	77.0	2.39	(1.03, 5.56)	0.04
Hazardous alcohol consumption (AUDIT-C)					
No	43	46.8	1.00		
Yes	60	78.2	4.07	(1.91, 8.70)	0.0003
Uses drugs					
Yes	42	82.4	1.00		
No	61	52.8	0.24	(0.10, 0.56)	0.001
Cannabis					
No	69	54.8	1.00		
Yes	34	85.8	4.98	(1.94, 12.77)	0.0008

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

All measures are at the initial wave (i.e. Wave 1 for transition to Wave 2, Wave 2 for transition to Wave 3) unless otherwise indicated

APPENDIX 16:
Bivariate associations for staying as a low-risk / moderate-risk / problem gambler for Pacific people, aggregated across the waves

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Bets with friends/workmates - annual					
No	39	44.0	1.00		
Yes	17	70.4	3.02	(1.20, 7.58)	0.02
Sports betting - annual					
No	49	46.8	1.00		
Yes	7	91.1	11.65	(1.95, 69.69)	0.007
Casino EGMs (NZ) - annual					
No	36	43.8	1.00		
Yes	20	66.9	2.59	(1.03, 6.49)	0.04

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

All measures are at the initial wave (i.e. Wave 1 for transition to Wave 2, Wave 2 for transition to Wave 3) unless otherwise indicated

APPENDIX 17:
Bivariate associations for initiating gambling, aggregated across the waves

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Age group (years) at Wave 1					
18 - 24	133	29.9	1.00		
25 - 34	140	29.8	0.99	(0.46, 2.16)	
35 - 44	122	28.6	0.94	(0.44, 2.01)	
45 - 54	126	35.4	1.29	(0.61, 2.73)	
55 - 64	95	23.9	0.74	(0.33, 1.67)	
65+	197	25.8	0.82	(0.39, 1.71)	0.58
Gender at Wave 1					
Male	376	31.1	1.22	(0.83, 1.80)	
Female	437	26.9	1.00		0.30
Ethnic group (prioritised) at Wave 1					
Māori	50	44.6	1.80	(0.92, 3.51)	
Pacific	63	25.9	0.78	(0.47, 1.30)	
Asian	225	20.7	0.58	(0.37, 0.92)	
European/Other	466	31.0	1.00		0.01
Arrival in NZ					
NZ born	414	33.0	1.00		
before 2008	277	27.4	0.77	(0.52, 1.14)	
since 2008	120	17.9	0.44	(0.23, 0.85)	0.04
Country of birth					
NZ	414	33.0	1.00		
Other	398	24.5	0.66	(0.45, 0.96)	0.03
Religion					
No religion	197	36.4	1.00		
Anglican	77	37.1	1.03	(0.54, 1.97)	
Catholic	76	42.4	1.29	(0.68, 2.43)	
Presbyterian	65	30.9	0.78	(0.39, 1.59)	
Other Christian	239	20.5	0.45	(0.26, 0.80)	
Other religion	156	20.1	0.44	(0.24, 0.79)	0.004
Highest qualification					
No formal qualification	91	25.5	1.00		
Secondary school qualification	233	28.2	1.15	(0.61, 2.15)	
Vocational or Trade qualification	152	30.9	1.31	(0.69, 2.50)	
University degree or higher	336	29.3	1.22	(0.71, 2.09)	0.86
Labour force status					
Employed	440	30.9	1.00		
Unemployed	71	27.0	0.83	(0.44, 1.55)	
Student/Homemaker/Retired	297	26.4	0.80	(0.53, 1.21)	0.55
Household size					
1	76	32.2	1.00		
2	246	27.8	0.81	(0.48, 1.37)	
3	171	27.6	0.80	(0.44, 1.45)	
4	128	29.2	0.87	(0.47, 1.59)	
5+	190	29.9	0.90	(0.48, 1.69)	0.94
Personal income					
<\$20,000	369	22.9	1.00		
\$20,001 - \$40,000	200	34.2	1.76	(1.08, 2.86)	
\$40,001 - \$60,000	100	28.4	1.34	(0.74, 2.42)	
\$60,001 - \$80,000	40	40.7	2.31	(1.03, 5.22)	
\$80,001 - \$100,000	27	29.6	1.42	(0.53, 3.83)	
>\$100,000	27	33.2	1.68	(0.67, 4.17)	
Not reported	50	40.2	2.27	(1.07, 4.83)	0.12
Household income					
<\$20,000	125	25.2	1.00		
\$20,001 - \$40,000	173	21.6	0.82	(0.47, 1.43)	
\$40,001 - \$60,000	118	30.2	1.28	(0.71, 2.32)	
\$60,001 - \$80,000	83	23.2	0.90	(0.45, 1.78)	
\$80,001 - \$100,000	99	34.4	1.56	(0.72, 3.37)	
>\$100,000	126	36.4	1.70	(0.94, 3.07)	
Not reported	88	34.9	1.59	(0.79, 3.22)	0.19

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Area of residence					
Auckland	358	22.9	1.00		
Wellington	100	33.9	1.73	(0.96, 3.09)	
Christchurch	51	46.0	2.87	(1.05, 7.86)	
Rest of NZ	303	31.3	1.54	(1.02, 2.31)	0.04
New Zealand Individual Deprivation Index					
0	418	27.6	1.00		
1	193	33.3	1.31	(0.79, 2.18)	
2	97	28.1	1.03	(0.56, 1.88)	
3	39	18.1	0.58	(0.26, 1.31)	
4	23	28.8	1.06	(0.43, 2.60)	
5	24	34.7	1.40	(0.44, 4.45)	
6+	20	30.4	1.15	(0.38, 3.49)	0.72
Number of significant life events					
0	252	28.4	1.00		
1	231	28.6	1.01	(0.63, 1.60)	
2	169	30.4	1.10	(0.61, 1.96)	
3	80	23.1	0.76	(0.36, 1.57)	
4	48	29.0	1.03	(0.43, 2.44)	
5+	33	40.0	1.68	(0.66, 4.26)	0.83
Quality of life (WHOQoL-8)					
Below median (Score 0 - 24)	328	28.0	0.97	(0.65, 1.46)	
Median score (Score 25)	83	32.7	1.21	(0.67, 2.19)	
Above median (Score 26 - 32)	400	28.6	1.00		0.76
Psychological distress (Kessler-10)					
Score 0 - 5	605	29.6	1.00		
Score 6 - 11	146	18.2	0.53	(0.31, 0.91)	
Score 12 - 19	48	51.8	2.56	(1.25, 5.23)	
Score 20 - 40	12	27.2	0.89	(0.25, 3.18)	0.003
Hazardous alcohol consumption (AUDIT-C)					
No	691	27.2	1.00		
Yes	121	38.4	1.67	(1.04, 2.68)	0.03
Uses drugs					
Yes	58	30.5	1.00		
No	754	28.7	0.92	(0.43, 1.98)	0.82
Cannabis					
No	772	28.7	1.00		
Yes	40	31.3	1.13	(0.46, 2.78)	0.79
Ever smoked tobacco					
Yes	353	35.1	1.72	(1.17, 2.52)	
No	459	24.0	1.00		0.006
Ever smoked more than 100 cigarettes in lifetime					
Yes	236	40.3	2.11	(1.43, 3.13)	
No	576	24.2	1.00		0.0002
Ever smoked daily for a period of time					
Yes	215	41.2	2.17	(1.45, 3.23)	
No	597	24.4	1.00		0.0002
Current tobacco use					
Does not smoke now	126	39.2	2.03	(1.27, 3.24)	
Current smoker	110	41.4	2.22	(1.29, 3.80)	
Never smoked	576	24.2	1.00		0.001

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

All measures are at the initial wave (i.e. Wave 1 for transition to Wave 2, Wave 2 for transition to Wave 3) unless otherwise indicated

APPENDIX 18:
Bivariate associations for re-initiating gambling, aggregated across the waves

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Age group (years) at Wave 1					
18 - 24	78	47.1	1.00		
25 - 34	110	48.9	1.08	(0.46, 2.50)	
35 - 44	124	45.2	0.93	(0.43, 2.01)	
45 - 54	114	37.9	0.69	(0.32, 1.50)	
55 - 64	72	52.4	1.24	(0.54, 2.84)	
65+	124	38.7	0.71	(0.33, 1.52)	0.43
Gender at Wave 1					
Male	284	43.0	0.91	(0.61, 1.35)	
Female	338	45.4	1.00		0.63
Ethnic group (prioritised) at Wave 1					
Māori	67	52.3	1.38	(0.79, 2.39)	
Pacific	27	45.9	1.06	(0.56, 2.03)	
Asian	61	36.2	0.71	(0.38, 1.33)	
European/Other	459	44.3	1.00		0.41
Arrival in NZ					
NZ born	443	45.5	1.00		
before 2008	135	40.7	0.82	(0.52, 1.29)	
since 2008	44	43.6	0.93	(0.41, 2.07)	0.69
Country of birth					
NZ	443	45.5	1.00		
Other	179	41.4	0.85	(0.56, 1.28)	0.43
Religion					
No religion	236	49.4	1.00		
Anglican	84	49.5	1.01	(0.53, 1.90)	
Catholic	70	41.8	0.74	(0.39, 1.38)	
Presbyterian	43	55.3	1.27	(0.56, 2.85)	
Other Christian	140	32.6	0.50	(0.30, 0.83)	
Other religion	49	38.1	0.63	(0.30, 1.33)	0.08
Highest qualification					
No formal qualification	91	41.9	1.00		
Secondary school qualification	117	49.2	1.34	(0.68, 2.63)	
Vocational or Trade qualification	114	47.8	1.27	(0.66, 2.46)	
University degree or higher	300	41.8	1.00	(0.56, 1.77)	0.62
Labour force status					
Employed	413	43.3	1.00		
Unemployed	44	46.9	1.16	(0.60, 2.22)	
Student/Homemaker/Retired	161	45.5	1.09	(0.71, 1.69)	0.87
Household size					
1	67	46.4	1.00		
2	196	45.0	0.95	(0.55, 1.61)	
3	125	47.3	1.04	(0.56, 1.91)	
4	113	45.7	0.97	(0.52, 1.83)	
5+	121	37.6	0.70	(0.36, 1.33)	0.79
Personal income					
<\$20,000	204	47.3	1.00		
\$20,001 - \$40,000	156	42.2	0.81	(0.49, 1.37)	
\$40,001 - \$60,000	116	41.0	0.78	(0.43, 1.39)	
\$60,001 - \$80,000	59	51.3	1.18	(0.58, 2.37)	
\$80,001 - \$100,000	29	45.0	0.91	(0.36, 2.33)	
>\$100,000	38	42.7	0.83	(0.36, 1.94)	
Not reported	19	30.4	0.49	(0.16, 1.46)	0.80
Household income					
<\$20,000	89	48.6	1.00		
\$20,001 - \$40,000	95	43.8	0.83	(0.44, 1.57)	
\$40,001 - \$60,000	92	54.0	1.25	(0.65, 2.39)	
\$60,001 - \$80,000	70	36.2	0.60	(0.28, 1.27)	
\$80,001 - \$100,000	67	41.9	0.76	(0.37, 1.59)	
>\$100,000	166	43.6	0.82	(0.47, 1.45)	
Not reported	44	35.4	0.58	(0.24, 1.41)	0.54

Variable	Adjusted n	%	Odds Ratio	(95% CI)	p-value
Area of residence					
Auckland	204	44.2	1.00		
Wellington	66	52.8	1.42	(0.72, 2.80)	
Christchurch	48	22.3	0.36	(0.15, 0.86)	
Rest of NZ	303	46.1	1.08	(0.70, 1.67)	0.05
New Zealand Individual Deprivation Index					
0	357	43.1	1.00		
1	117	44.2	1.05	(0.63, 1.75)	
2	59	47.8	1.21	(0.62, 2.36)	
3	43	42.0	0.96	(0.39, 2.36)	
4	19	56.1	1.69	(0.54, 5.29)	
5	18	24.7	0.43	(0.14, 1.34)	
6+	9	94.0	20.71	(2.54, 168.56)	0.07
Number of significant life events					
0	165	46.4	1.00		
1	166	41.4	0.82	(0.49, 1.37)	
2	114	47.9	1.07	(0.61, 1.87)	
3	85	41.9	0.83	(0.42, 1.66)	
4	49	35.0	0.62	(0.24, 1.60)	
5+	44	53.1	1.31	(0.57, 3.01)	0.73
Quality of life (WHOQoL-8)					
Below median (Score 0 - 24)	256	47.5	1.27	(0.83, 1.93)	
Median score (Score 25)	73	43.9	1.10	(0.61, 1.98)	
Above median (Score 26 - 32)	292	41.6	1.00		0.55
Psychological distress (Kessler-10)					
Score 0 - 5	441	43.0	1.00		
Score 6 - 11	131	43.7	1.03	(0.64, 1.67)	
Score 12 - 19	42	56.5	1.72	(0.76, 3.92)	
Score 20 - 40	7	63.6	2.32	(0.52, 10.30)	0.43
Hazardous alcohol consumption (AUDIT-C)					
No	430	41.0	1.00		
Yes	191	51.7	1.54	(1.01, 2.34)	0.05
Uses drugs					
Yes	88	59.4	1.00		
No	533	41.8	0.49	(0.26, 0.91)	0.02
Cannabis					
No	548	42.9	1.00		
Yes	74	54.6	1.60	(0.81, 3.18)	0.18
Ever smoked tobacco					
Yes	435	48.4	1.75	(1.15, 2.66)	
No	187	34.9	1.00		0.009
Ever smoked more than 100 cigarettes in lifetime					
Yes	265	48.1	1.30	(0.88, 1.93)	
No	357	41.5	1.00		0.18
Ever smoked daily for a period of time					
Yes	251	50.1	1.48	(1.00, 2.20)	
No	371	40.4	1.00		0.05
Current tobacco use					
Does not smoke now	175	42.3	1.04	(0.67, 1.60)	
Current smoker	90	59.1	2.04	(1.14, 3.66)	
Never smoked	357	41.5	1.00		0.05

Data weighted for 2013 Census data (all waves) and attrition (Waves 2 and 3)

All measures are at the initial wave (i.e. Wave 1 for transition to Wave 2, Wave 2 for transition to Wave 3) unless otherwise indicated