



**RANDOMISED CONTROLLED TRIAL OF PROBLEM
GAMBLING BRIEF TELEPHONE INTERVENTIONS:
THREE YEARS LATER**

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EXECUTIVE SUMMARY

Brief summary of main findings at 36 months

Results from the three year (36 month) follow-up of participants recruited into a Randomised Controlled Trial (RCT) investigating the effectiveness of standard and brief telephone interventions for problem gambling are presented in this report.

Sample

- At baseline N=462, at 36 months N=172. Retention in the four treatment groups at 36 months ranged from 34% to 40% of baseline.
- There was no differential loss between the four groups.

Outcome measures

- There was no statistically significant difference in outcomes between the four treatment groups for number of days gambled per month, money lost gambling per day, treatment goal success, control over gambling, psychological distress and major depressive disorder.
- Treatment effects evident at the 3 month assessment were sustained over the entire 36 month period.
- There was no statistically significant difference in outcomes from 12 to 36 months for number of days gambled per month, money lost gambling per day, treatment goal success, control over gambling, problem gambling severity (past 3 month time frame), psychological distress, motivation and major depressive disorder.

Findings for the most intensive treatment (MI+W+B)

- The percentage of problem gamblers (past 12 month time frame) at 36 months was lower in the MI+W+B group (24%) than the other groups (41% - 48%). The median PGSI score for the MI+W+B group was 1 (low-risk) compared to the other groups with median scores of 3 to 7 (moderate-risk).
- Participants who received the MI+W+B treatment continued to improve from 12 to 36 months for quitting or improving gambling, compared to those who received the TAU and MI interventions.
- There were some indications that participants with low hazardous alcohol consumption and non-Māori in the MI+W+B group at 36 months appeared to have better outcomes for quitting or improving gambling, compared with some of the less intensive interventions. There was no significant difference for Māori for quitting or improving gambling at 36 months between the intervention groups¹. However, these results need to be treated with caution due to small sample size in some of the subgroups.

Receiving additional assistance for gambling problems

- At 36 months, the percentages of participants in the four groups who reported receiving additional assistance from professional (formal) sources in the past 6 months ranged from 4% to 15%. The percentages for receiving informal assistance (e.g. from family/friends) in the past 6 months ranged from 0% to 6.5%.

Conclusion

- Clinically significant outcomes were sustained over time and were similar between the four groups apart from problem gambling severity and quitting or reducing gambling where participants receiving the most intensive treatment (MI+W+B) had improved outcomes compared with participants in other groups.

¹ At the 12 month assessment, it was noted that Māori in the MI+W+B group showed greater improvement in money lost gambling (i.e. lost less money on average) than Māori in the MI group.

Background

Problem gambling and wider gambling-related harms constitute a significant public health challenge. They are part of the raft of non-communicable diseases (NCDs) that generate a broad spectrum of morbidity and harm to individuals, families and communities. Problem gambling is highly comorbid with smoking, alcohol misuse and a range of other mental and physical health disorders. Māori, Pacific people, people living in high deprivation neighbourhoods and some other population sectors are disproportionately impacted. Various policies and services have been introduced to reduce the harmful impacts of gambling. This includes a national gambling helpline and face-to-face counselling services. It is not known how effective these services are, in general, or for particular groups. This lack of information and a weak evidence base internationally impedes service improvement. Only a few forms of psychological intervention have been shown to be 'possibly efficacious' and none have been demonstrated to be effective when conducted in clinical or community settings.

One of the 'possibly efficacious' treatments is a brief intervention involving a motivational interview and self-help workbook. From studies in Canada, it has been shown to produce outcomes that are superior to wait-list controls and appear to be comparable to those of more intensive therapies. It was not known how readily this type of intervention could be integrated into the everyday operations of an existing problem gambling service or what the outcomes would be when delivered in this context, and evaluated by researchers independent of the team that developed them. The present clinical trial was designed to answer these questions. As such, it breaks new ground by moving evaluation from efficacy testing with volunteers to an assessment of effectiveness with problem gamblers who seek help from a national gambling helpline.

Two of the interventions used in this trial had been evaluated previously in efficacy studies. In these studies, they were compared with each other and wait-list control groups. They had not been compared formally with other interventions that are commonly used in gambling services. Consequently, a further objective of the trial is to see how these interventions compare with helpline standard care. A corollary of this is that it will be possible to get an indication of the extent to which standard care reduces problems beyond what would have occurred if clients had wanted help and had been placed on a wait-list. The helpline does not have a waiting list and it would not be ethical to establish one to evaluate the service.

Brief interventions have been shown to be effective with alcohol and other addictions. There is reason to believe that this might also be the case with problem gambling. There is uncertainty, however, regarding the durability of these effects. One of the interventions included in the trial involved just a single motivational interview. The workbook and other aspects were not included. The trial included four groups: standard care; motivational interview; motivational interview plus a workbook; motivational interview plus a workbook and follow-up motivational interviews. A major purpose of the study was to compare outcomes from these different types and intensities of intervention.

Most of the previous problem gambling trials and outcome studies are of short duration, typically 12 months. Follow-ups rarely extend beyond 24 months. In large part, this has been a consequence of the difficulty in retaining long-term contact with problem gamblers. While the present trial ended at 12 months, participants have subsequently been re-assessed at 36 months. This extension allows the durability of treatment effects to be evaluated, across the study as a whole, and in the different treatment conditions.

A further objective of the study is to see if some subgroups of clients, including those with high prevalence rates of problem gambling, do better with different types and intensities of

treatment. Little is known about this, in large part because most trials have had small samples that have not enabled subgroup differences to be examined. This information is important with respect to matching clients to therapies that work best for them, and developing stepped-care models that are cost-effective in reaching larger numbers of people, including those who do not access care at present. Sufficient numbers of clients were included in the present trial to assess this issue, to some extent. The 36 month follow-up also enabled assessment of outcome differences emerging over time.

Methods

This report presents the findings from the three year (36 month) follow-up of participants recruited into a Randomised Controlled Trial (RCT) investigating the effectiveness of standard and brief telephone interventions for problem gambling. Full methodological details are presented in the report for the RCT covering the first 12 months after intervention delivery (Abbott, Bellringer, Vandal, Hodgins, Palmer du Preez, Landon, Sullivan, & Feigin, 2012). Therefore, only a brief summary of the methods is detailed in this report.

The study was designed as a single-site RCT with participants recruited from gamblers calling the gambling helpline for assistance. The inclusion criteria were: minimum age of 18 years; perception of having a gambling problem; and willingness to read a short workbook (to ensure reading ability), have calls recorded, provide follow-up data on gambling, and provide the name of collateral/s. Present or past involvement in treatment or mutual help groups for gambling or other mental health problems was documented and did not preclude participation. Callers were excluded from the trial if they were considered by the counsellor to be actively psychotic, or they required immediate crisis or police intervention because they posed a serious risk to themselves or others.

Four hundred and sixty-two first-time helpline callers who met eligibility criteria were randomly assigned to four groups on a 1:1:1:1 ratio using a computer-generated block randomisation procedure. The treatments were: (1) Helpline standard care (TAU)², (2) Single motivational interview (MI), (3) Single motivational interview plus cognitive-behavioural self-help workbook (MI+W), and (4) Single motivational interview plus workbook plus four follow-up (booster) motivational telephone interviews (MI+W+B). Callers could choose their own treatment goal (quit some or all forms of gambling, or control their gambling). The primary outcome measures were self-reports of days gambled, money lost gambling and treatment goal success. Secondary outcome measures included problem gambling severity, control over gambling, gambling impacts, psychiatric comorbidity, general psychological distress and quality of life. Initial assessments were conducted by helpline counsellors prior to participants receiving a randomly allocated intervention. Further information³ was collected by research staff, blind to treatment allocation, within seven days after the telephone intervention; the primary and secondary outcome measures were repeated at three, six, 12 and 36 months post-intervention. Collateral information⁴, from one or more persons nominated by callers, was obtained at three, 12 and 36 months. Intention To Treat analyses were used.

² Brief screening, problem identification and referral to face-to-face problem gambling counselling services or other services and websites and/or suggestions for self-care. Motivational interviewing was not included.

³ More detailed gambling/problem gambling history, the mood module of the Primary Care Evaluation of Mental Disorders, and the New Zealand Index of Socio-economic Deprivation for Individuals.

⁴ Collaterals were asked about the participant's involvement with gambling over the last month, and the confidence they had in the accuracy of their reports.

The hypotheses⁵ for the 36 month follow-up assessments relate to assessment of treatment outcomes at 36 months and their comparison to at 12 months:

- a. Hypothesis 1
 - a. The MI+W+B group will have the same efficacy outcomes as the TAU group at the 36 month follow-up assessment
 - b. The MI+W+B group will have the same efficacy outcomes as the MI group at the 36 month follow-up assessment
 - c. The MI+W+B group will have the same efficacy outcomes as the MI+W group at the 36 month follow-up assessment
- b. Hypothesis 2
 - a. The difference in efficacy outcomes between the MI+W+B and TAU groups at 36 months will be the same as they were at 12 months
 - b. The difference in efficacy outcomes between the MI+W+B and MI groups at 36 months will be the same as they were at 12 months
 - c. The difference in efficacy outcomes between the MI+W+B and MI+W groups at 36 months will be the same as they were at 12 months
- c. Hypothesis 3
 - a. There is no difference in efficacy outcome between levels of risk factor at 36 months.

The trial was registered with the Australian New Zealand Clinical Trials Registry (registration number ACTRN12609000560291). The extension of the study to include a 36 month follow-up assessment of participants was approved by the Multi-region Ethics Committee (reference number MEC/09/04/043, 22 August 2012).

Results

Clinical trial - 12 months

As outlined in Abbott et al. (2012), the four interventions were successfully integrated into the operations of the helpline service. The majority of counsellors received training and became proficient in the trial interventions that were subsequently delivered appropriately and consistently. The large majority of the 462 callers recruited into the trial received the applicable intervention (N = 451). Overall trial retention was 81%, 74% and 64% at three, six and 12 months respectively. Retention only slightly varied across interventions and there was no differential loss to follow-up between the intervention groups or overall.

Participants in all four groups evidenced statistically and clinically significant, sustained improvement on the three primary outcome measures (median days gambled per month, money lost per day, gambling quit or improved). This applied when performance was time-averaged across the duration of the trial and when assessed at 12 months. Substantial improvement was also found for problem gambling severity and other secondary outcomes including self-ratings of control over gambling, gambling impacts on work, social life, family and home, health, psychological distress, major and minor depression, and quality of life. Where outcomes were measured at baseline, three, six and 12 months most changes occurred by three months and were sustained throughout the trial. In contrast to other outcomes, little or no change was found for tobacco use and alcohol misuse.

As predicted, there were no significant primary outcome differences between the more minimal MI and TAU interventions. However, contrary to expectation, clients who received the more

⁵ For a detailed explanation of the hypotheses, see Appendix 10.

intensive MI+W and MI+W+B treatments did not have better outcomes than those who received MI and TAU. All four treatments produced similar primary outcomes despite their variation in content and duration. This was also the case for problem gambling severity and all but one of the secondary outcome measures, namely self-reported control over gambling. Clients in the MI+W+B and MI+W groups, relative to those in MI, reported significantly greater improvement in their control over gambling (time-averaged). However, there were no significant differences between the groups when control over gambling was measured at 12 months rather than time-averaged across the study period.

Additional to predicting superior outcomes in the two more intensive groups at 12 months, it was hypothesised that the MI+W+B group would experience both immediate and delayed effects, with greater improvement from three to 12 months in this group than in the others. In regard to treatment goal success, the MI+W+B group did show greater improvement from three to 12 months than the MI+W group, suggesting that the addition of follow-up motivational booster interviews increased the impact of the initial interview and workbook. However, on this measure, the MI+W+B group did not show greater improvement over this period than the MI and TAU groups. Furthermore, during the last nine months of the trial, no differences between the four groups were evident for days gambled, money lost or problem gambling severity.

While, overall, similar outcomes were obtained across the four treatment groups at 12 months, differences were found between a number of subgroups. However, these differences usually applied to only one or two primary outcome measures. In most cases, clients who received the most intensive MI+W+B intervention had better outcomes than those who received the least intensive MI intervention.

Clients in the following categories, determined at intake, had better outcomes when they received the MI+W+B intervention than they did when they received MI alone.

- Māori (money lost, 12 months)
- Higher problem gambling severity (money lost, 12 months; treatment goal attained, 12 months)
- Higher psychological distress (money lost, 12 months; treatment goal attained, 12 months)
- Not misusing alcohol (treatment goal attained, 12 months)
- Controlled gambling treatment goal (money lost 12 months; number of days gambled, 12 months; treatment goal attained, time-averaged)
- Low belief in treatment success (treatment goal attained, 12 months).

MI+W+B clients with controlled gambling treatment goals also had better outcomes (number of days gambled, 12 months) than those in the MI+W group. Those in the latter group did better than those who received MI alone (treatment goal attained, 12 months). Higher problem severity clients who received MI+W+B also experienced greater improvement (money lost, 12 months; treatment goal attained, 12 months) than those who received TAU. Males in the MI+W group, but not those in the MI+W+B group, had better outcomes (money lost, time-averaged) than males who received MI or TAU. No other gender differences were found.

Although there were no overall outcome differences between clients who received MI and TAU, those whose goal was to stop rather than reduce their gambling did better with TAU than MI (money lost, 12 months). Clients with low belief in treatment success also did better in the TAU group than in the MI group (treatment goal achieved, 12 months).

36 month follow-up

One hundred and seventy-two participants were re-assessed 36 months after their initial entry into the 12 month trial (37%). This contrasts with 64% retention at 12 months. Retention varied slightly between the four treatment groups (range 34% to 40%). The great majority of people who were not re-assessed at 36 months had moved or had their telephone disconnected. Much smaller numbers withdrew from the study. While attrition was high at 36 months, on a range of demographic, problem gambling severity and other measures assessed at baseline, there were no differences between those who remained in the study and those who were lost to it. There was also no differential loss between the four treatment groups. In other words, there is no evidence from the available data that the outcomes were a consequence of differential attrition.

A main study finding was that there was no statistically significant difference in outcomes between the four treatment groups at 36 months for the three primary outcome measures, control over gambling, problem gambling (PGSI-3; a past three months measure), psychological distress and major depressive disorder. However, in regard to problem gambling severity as assessed by the PGSI-12 (a past 12 months measure), at 36 months the percentage of problem gamblers was substantially lower in the MI+W+B condition (24%) than in the others (range of 41% to 48%). At the start of the trial, virtually all participants (96%) were assessed as problem gamblers, most with scores well above the criterion of eight. The median PGSI-12 score was 17. At 12 months, the percentages of problem gamblers in the four treatment groups ranged from 55% to 67% and did not differ significantly. At 36 months the median PGSI-12 score for MI+W+B participants was one. A score of one is at the bottom of the low-risk category. Median scores for the other groups ranged from three to seven. Scores in this range are categorised as moderate risk.

The other main study finding was that the substantial treatment effects evident from the third month of the trial were sustained over the entire 36 month period. More specifically, there were no statistically significant outcome differences between the intervention groups from 12 to 36 months for the three primary outcome measures, control over gambling, problem gambling severity (PGSI-3), psychological distress, motivation and major depressive disorder. However, in regard to having stopped gambling or improved, the MI+W+B group did better at 36 months than 12 months, than did MI or TAU participants. In other words, on this measure, participants who received the most intensive intervention continued to improve from 12 to 36 months relative to those who received the least intensive interventions. This is consistent with the finding that past 12 months problem gambling prevalence and severity also decreased substantially more during this period in this treatment group than in others.

At the three month assessment, around a quarter of participants reported having received formal assistance (other than the helpline contact) for their gambling problems. The percentage reporting having received formal assistance of this type reduced slightly at six and 12 months in all treatment groups except MI. In the case of MI it remained much the same throughout the trial and was higher than in the other three groups at 12 months (26% compared with others that ranged between 15% and 18%). However, at 36 months a very small number of MI clients reported receiving formal assistance (5%), similar to the number of clients in the MI+W+B group (4%). At 36 months, percentages remained much the same for the TAU and MI+W groups (15%, 12.5%) as they were at 12 months. At three months, around a third of participants reported receiving informal assistance for their gambling problems. This percentage stayed much the same and did not vary between groups at the six and 12 month assessments. Receipt of informal assistance reduced substantially in all groups at 36 months (range of 0% to 6.5%).

At baseline, participants in all treatment groups had high levels of psychological distress (Kessler-10 median scores ranging from 28.5 to 32), hazardous alcohol use (AUDIT-C, median score of 5 in all groups) and moderate to high rates of depressive disorder (major depression, range of 49% to 63%; minor depression, 13% to 16%; dysthymia, 39% to 44%). In all treatment groups similar, substantial reductions in levels of psychological distress occurred between baseline and three months. Levels continued to reduce slightly at six and 12 months and remained much the same at 36 months. At that time, the TAU median score (15) was slightly higher than the other groups (range 11 to 12). Median hazardous alcohol use scores (AUDIT-C) reduced somewhat over time for the TAU, MI and MI+W groups (median score of 3 in all groups at 6 and 12 months). At 36 months, there was no change for TAU and MI+W participants and the MI median decreased slightly to two. Like the other groups, the MI+W+B median reduced (median of 4 at three and six months) but differed in that it subsequently increased to the baseline median of five at both 12 and 36 months.

Rates of major depressive disorder reduced substantially in all treatment groups (18% to 23% at 12 months). At 36 months, MI+W and MI+W+B groups remained much the same (20%, 17%). However, the MI group decreased (from 23% to 12.5%) and the TAU group increased (from 18% to 28%). Substantial reductions also occurred for minor depression (range of 1.4% to 4.5% at 12 months). At 36 months, there were no cases in three groups and 2.5% in one group. Dysthymia rates also reduced, albeit much less so than was the case for major and minor depression. Rates ranged from 29% to 40% at 12 months. At 36 months, there was no change in the TAU group (33%). Rates decreased somewhat in the other three groups (range of 22% to 30% at 36 months).

At baseline, around a fifth of clients in all treatment groups reported receiving treatment for a mental health disorder other than problem gambling during the past 12 months (range 19% to 24%). Similar percentages reported likewise at 12 and 36 months (ranges of 16% to 20% and 15% to 20% respectively). A similar pattern was evident for having received a prescription for a mental health disorder during the past 12 months (range of 23% to 28% at baseline, 18% to 29% at 12 months, 20% to 26% at 36 months).

A small number of subgroups had different outcomes depending on the treatment group that they were in. However, participant attrition reduced sample size and the number of potential differences that could be assessed. It also reduced confidence in the results of analyses that were conducted. At 36 months, in regard to having quit gambling or improved, participants with low hazardous alcohol use appeared to do better in the MI+W+B condition than MI or TAU participants. This client group also did better in this condition at 12 months relative to MI participants at that time. Non-Māori relative to Māori also did significantly better on this outcome measure in the MI+W+B group than in the MI and TAU groups. Given the small sample size and very large and low odds ratios in the statistical model used, these results need to be treated with caution.

At the 36 month assessment, participants who at that time had a goal of quitting some or all types of gambling had substantially higher median PGSI-12 scores than those who wanted to control their gambling. The percentage of problem gamblers in each treatment group who wanted to quit gambling ranged from 40% to 68% whereas the percentage who wanted to control their gambling ranged from 11% to 33%. There were also strong associations between participant 36 month outcome goals and other 36 month outcome measures. People with a current goal of controlling their gambling rather than quitting at 36 months had lower levels of gambling participation and problems, reported greater control over gambling, experienced less psychological distress and were less likely to experience major depression.

At 36 months, participants were asked if they had experienced a number of major life events during the past two years. In most treatment groups, larger proportions of problem gamblers than non-problem gamblers reported some events including divorce/separation, legal difficulties, injury/illness, increase in arguments, moved city and change in working/living conditions. Differences were not apparent for most events considered. Given the small sample size, caution is required in interpreting these results. Participants who experienced some life events (namely legal difficulties and an increase in arguments) relative to those who did not had significantly higher levels of psychological distress and problem gambling severity (PGSI-3), and less control over gambling, at 36 months. Having a divorce/separation was also associated with problem gambling severity and having a major illness or injury with psychological distress. People who had experienced the foregoing events also had higher rates of major depression. While some of these events may have contributed to relapse or continued gambling problems and psychological distress, they were assessed at the same time as the follow-up outcomes. Consequently, they could have resulted from relapse or continued problems.

Major conclusions

At the end of the 12 month trial, clients in all treatment groups had improved substantially. Contrary to expectation, there was no difference between the four groups on the primary and most secondary outcome measures. The major purpose of the 36 month follow-up was to see whether these statistically and clinically significant improvements would be sustained longer term and whether or not differences between treatment groups subsequently emerged. In the trial a number of client groups did better in some treatments than in others, albeit on only a few outcome measures. Most often they improved more when they received the MI+W+B intervention than when they received the least intensive interventions (MI and TAU). There was also interest in whether similar differences would be found at 36 months.

Overall, on the primary and secondary measures considered at 36 months, participants in all treatment groups did as well, or better, than they did at 12 months. This included psychological distress and depression as well as a number of gambling outcome measures. There was a trend, across all treatment groups, for problem gambling severity to continue to reduce at each successive assessment point throughout the trial and at follow-up. On most measures, as was also the case at 12 months, outcomes generally did not differ between treatment groups. The most notable exception was for past 12 months problem gambling prevalence. The percentage of problem gamblers in the MI+W+B condition decreased markedly whereas reductions for clients who received the other interventions were more modest. MI+W+B clients, relative to their MI and TAU counterparts, also reported greater treatment success (quit gambling or improved) at 36 months than they did at 12 months. This means that the substantial 12 month treatment gains were sustained, in all four treatment groups, following completion of the trial. While clients who received the most intensive intervention had similar outcomes to other clients on a number of measures, they differed in that they more often achieved their treatment goal and were no longer problem gamblers at 36 months. In other words, while all treatments were similarly effective initially, some clinically significant differences emerged later.

The 36 month sample was not sufficiently large to adequately examine potential subgroup differences within and across the treatment groups. However, a number of groups including Māori and clients with higher problem gambling severity, higher psychological distress and a low belief in treatment success did better in MI+W+B at 12 months than they did in MI and, in some instances, TAU. Clients who sought to control rather than stop gambling also did better in the more intensive treatment groups. Consequently, while it is likely that many clients will

do as well with very brief interventions as they do with interventions of longer duration, the findings suggest that some groups benefit from additional therapy.

The 12 month findings are consistent with those of a number of other studies in the gambling and wider addictions treatment field that indicate that 'more' is not necessarily better than 'less'. Additional to having a large sample relative to previous gambling trials, enabling subgroup differences to be examined, the present study included a three year follow-up. The findings indicate that while 'more' might not be better than 'less' in the short to medium term, over time it can be. While requiring replication and further study, the findings provide information that can assist in tailoring interventions to particular client groups. In the interim, consideration could be given to offering MI+W+B type interventions to most or all helpline callers. Some callers, including those with more serious problems and comorbidities, as well as callers with controlled gambling treatment goals, could be encouraged to participate.

Although the MI+W+B intervention is referred to as intensive, this is only relative to the other interventions in the trial. All are brief interventions. It is of note that the outcomes achieved appear to be comparable to those found in trials of longer duration face-to-face therapies. This is unlikely to be because helpline callers recruited into the study had less serious gambling problems than participants in other trials. Most scored well above the problem gambling cut-point on the PGSI and had high levels of psychological distress as well as depression, alcohol misuse and other co-morbidities. However, some uncertainty will remain regarding the effectiveness of the trial interventions relative to longer duration therapies until they are compared directly in clinical trials.

It is also important to note that throughout the trial, moderate numbers of clients in all treatment conditions reported receiving additional treatment for problem gambling and for other mental health disorders. Clients who received additional professional help did not have better outcomes than those who did not. However, this does not mean that they did not benefit from it. They could have been people who required additional help and who, without it, would have had worse outcomes. Problem gambling services are widely available in New Zealand. It cannot be assumed that similar trial and follow-up results would be achieved in jurisdictions where this is not the case or that brief telephone interventions can be a total substitute for face-to-face and other longer-term therapies.

The challenge going forward is to develop cost-effective interventions optimally matched to client requirements. On the basis of the present study findings, the MI+W+B treatment has potential to be the initial step, offered to helpline (and perhaps face-to-face) clients, in a comprehensive stepped care intervention framework. Those who have not made substantial progress with regard to their gambling treatment goals at three months, and/or who have significant related morbidities, could be recommended to obtain more intensive gambling therapy and/or specialist treatment for other morbidities such as major depression or alcohol misuse. Longer term, based on future studies such as the face-to-face randomised controlled trial scheduled to commence in New Zealand in 2016, it may be possible to further refine assessment and decision-making regarding referral.



1. BACKGROUND

This report builds on the previously reported randomised controlled trial (RCT) assessing the effectiveness of three well-defined brief motivational interviewing-based telephone interventions for problem gambling compared to 'standard care' also delivered by telephone (Abbott et al., 2012).

Four hundred and sixty-two participants were recruited from gamblers calling the gambling helpline for assistance and were randomly assigned to one of four groups.

- Group 1: Standard helpline care (TAU)
- Group 2: Single motivational telephone interview (MI)
- Group 3: Single motivational telephone interview plus cognitive-behavioural self-help workbook (MI+W)
- Group 4: Single motivational telephone interview plus cognitive-behavioural self-help workbook plus four motivational 'booster sessions' (MI+W+B).

Participants were assessed for a range of measures at baseline, three months, six months and 12 months⁶. All helpline counsellors involved in the trial were successfully trained to reliably and consistently deliver motivational interviews, the standard helpline intervention and follow-up booster sessions. Following training, the new counselling approach and other trial procedures became integrated into the operations of the helpline service. The great majority of the 462 callers recruited into the trial (N = 451) received the applicable, randomised intervention, although only a minority of MI+W+B participants received all four booster sessions (N = 39, 34%). Overall trial retention was 81%, 74% and 64% at three-, six- and 12-months respectively, with participant retention varying slightly across the four intervention groups. Interview duration did not differ across the intervention groups and there was no significant differential loss to follow-up (attrition) between the study groups or overall.

In regard to treatment outcome, participants in all four intervention groups evidenced statistically and clinically significant, sustained improvement on the three primary measures (self-reports of days gambled, money lost gambling and treatment goal success). This applied when performance was time-averaged across the duration of the trial and when assessed at 12 months. Substantial improvement was also found for problem gambling severity and other measures including self-ratings of control over gambling; gambling impacts on work, social life, family and home and health; psychological distress; major and minor depression and quality of life. Little or no change was evident with regard to alcohol misuse and tobacco use.

As hypothesised, there were no significant outcome differences between the MI and TAU interventions. Contrary to expectation, participants in the more intensive MI+W and MI+W+B interventions did not have better outcomes on the primary outcome measures than those who received MI and TAU. Although there were no significant primary outcome differences between participants in each of the treatment groups overall, differences were found for a number of subgroups. Usually these differences were evident for only one or a few outcome measures. In most cases, MI+W+B participants had significantly better outcomes than their counterparts receiving MI alone. MI participants with lower levels of belief in their success in achieving their treatment goal did worse on one outcome measure than those in TAU. In this case, those in the more intensive MI+W+B condition had better outcomes than their MI counterparts. Participants who, at the baseline assessment, had more serious gambling problems or whose goal was to control/reduce their gambling rather than quit gambling had better outcomes in the MI+W+B group than in the TAU and MI groups. Similarly, participants

⁶ The results presented in this section are reproduced from the Executive Summary of the original RCT report (Abbott et al., 2012).

in the MI+W+B group with higher levels of psychological disorder and lower alcohol misuse levels had better outcomes in relation to money lost gambling and/or having quit or improved control over gambling, compared with their counterparts in the MI group. The only finding related to ethnicity was that Māori in the MI+W+B group showed greater improvement in money lost gambling (i.e. lost less money on average) at the 12 month assessment than Māori in the MI group.

Whilst the aforementioned results showed improvement in gambling and other variables at 12 months post-treatment, longer-term follow-up can provide a more comprehensive assessment of the differential impact and durability of interventions. A longer term follow-up assessment also enables relationships between outcome measures to be assessed and understood more fully. Relapses are anticipated and with a longer-term follow up assessment it will be possible to determine their duration, severity and consequences for recovery and well-being.

The Banff Consensus on Reporting Outcomes on Problem Gambling Treatment Research (Walker et al., 2006) recommends that follow-up assessments be conducted at four time-points:

- Post-treatment
- Short-term (three to six months following treatment)
- Medium-term (one year following treatment)
- Long-term (two years or more following completion of treatment).

For the current RCT, follow-up assessments were made at three, six and 12 months post-treatment, previously reported by Abbott et al. (2012). This report details the results of a three year (36 month) follow-up assessment of the participants.



2. LITERATURE REVIEW

This section does not duplicate the review completed as part of the original RCT report (Abbott et al., 2012). Instead, following a summary of each of the main points made in the original review, information has been presented which updates key areas with relevant and recent research that has been published since 2012. To provide an overview of intervention effectiveness for ethnic minority groups experiencing gambling harms, the search terms “culture based,” “culturally based,” “culturally appropriate,” “culturally sensitive” and “culturally relevant” were used in combination with “intervention”, “treatment” and “problem gambling” in Google Scholar to identify appropriate publications and grey literature.

2.2 General overview

As part of the original review, literature was summarised describing the increasing public health significance of problem gambling in New Zealand as well as prevalence, comorbidity, and wider impacts associated with gambling problems in New Zealand. Since 2012, the first reports from the National Gambling Study (the first nationwide gambling survey since 1999) have indicated that 0.7% of New Zealanders aged 18 years and older can be classified as current problem gamblers (based on the Problem Gambling Severity Index PGSI). This equates to an estimated 23,504 adults experiencing significant gambling problems. A further 1.8% are considered to be moderate-risk gamblers; it is, therefore, estimated that an additional 60,440 adults will be at moderate to high risk of developing problems in future. In total, around one in 40 adults (2.5%) is either a problem gambler or moderate-risk gambler, equating to approximately 83,944 adults (Abbott, Bellringer, Garrett, & Mundy-McPherson, 2014b).

Researchers consistently highlight that problem gambling rarely occurs alone, with problem gamblers experiencing elevated rates of numerous mental health and physical disorders as well as social problems (Abbott, Williams, & Volberg, 2004; Petry & Weinstock, 2007). The literature continues to suffer from a lack of prospective studies which limits understanding of the nature of the relationships between gambling and the comorbid behaviours, conditions and problems (Abbott & Clarke, 2007). However, it is increasingly clear that problematic alcohol consumption has a predictive relationship with persistent gambling problems (Abbott, Williams, & Volberg, 2004; Hodgins & Holub, 2007) and that the high rates of psychiatric disorder in pathological gamblers seem strongly influenced by the co-occurring alcohol problems (Abdollahnejad, Delfabbro, & Denson, 2014).

Daily tobacco use is the most common co-occurring health issue among problem gamblers with estimates varying from 41% to 65%. Recent research explored the impact of tobacco use on the outcome of a cognitive behavioural gambling treatment among 385 treatment-seeking pathological gamblers enrolled in one of 11 gambling treatment providers in Minnesota (Odlaug, Stinchfield, Golberstein, & Grant, 2013). Consistent with the literature (e.g. Petry & Oncken, 2002; Shaffer, Bilt, & Hall, 1999) daily tobacco users presented at services with significantly more severe gambling and mental health symptoms at treatment intake and study recruitment. Daily tobacco use, however, was not significantly associated with the number of days gambled at follow up assessment or with treatment completion. Although tobacco users presented with greater gambling problem severity, they had similar rates of treatment completion and treatment outcomes as participants who did not use tobacco. Daily tobacco use was reported in 244 (63%) participants and there was no significant change in smoking status at six months post-treatment.

Soberay, Faragher, Barbash, Brookover and Grimsley (2014) have recently reported on the relationship between co-occurring psychological disorders and variables associated with clinical presentation and treatment outcomes in a sample of 53 pathological gamblers recruited through a university based counselling clinic. Participants were screened for depression, mood disorders, generalised anxiety disorder and post-traumatic stress disorder. Overall, participants who attended at least six sessions (cognitive-behavioural therapy, time-limited dynamic psychotherapy and solution-focused brief therapy were all utilised within the clinic) reported similar significant improvement in psychosocial functioning by the end of their sixth session regardless of the number of co-occurring disorders detected. Thus it would appear that for gambling, co-occurring psychological issues may not affect treatment outcome. This finding conflicts with research in the alcohol treatment area which suggests that co-occurring addictions may adversely affect treatment outcome (e.g. Winters & Kushner, 2003; Bobo et al, 1998) and requires further investigation and corroboration.

The impacts of problem gambling extend to impaired quality of life for gamblers, suicide and financial, legal, family and social problems (Abbott, Volberg, Bellringer, & Reith, 2004; Grinols, 2007). Recent research has examined, in more detail, the negative impacts on families and couple relationships of problem gamblers. A large-scale Australian study of 120 help-seeking family members of problem gamblers has shown that just over half reported some form of family violence in the past 12 months (20% only victimisation, 10% only perpetration and 21% both victimisation and perpetration) (Suomi et al., 2013). Most of these participants reported a relationship between gambling and family violence, and most indicated that gambling issues preceded violence. A qualitative Australian study has explored the impacts of problem gambling on 18 partners and ex-partners of problem gamblers, with a wide range of negative effects on their financial security, their emotional, mental and physical health and on their relationships being raised and discussed (Holdsworth, Nuske, Tiyce, & Hing, 2013). Similar results have been found using in depth interviews with family members of gamblers in Singapore (Mathews & Volberg, 2013). That gambling harm has wide ranging impacts underscores the public health significance of problem gambling and the need for accessible and effective treatment options. Additionally, as problem gambling harm disproportionately affects Māori and Pacific people and those living in deprived circumstances (Abbott et al., 2014b; Ministry of Health, 2006, 2008a), measures to prevent and reduce problem gambling remain highly relevant to the goal of reducing health inequalities in New Zealand. Accordingly, maintaining and developing accessible, responsive and effective interventions is specified in the Ministry of Health's strategic plan to minimise gambling harm (Ministry of Health, 2013).

New Zealand was one of the first jurisdictions to introduce services for problem gambling (beginning in 1992). The Ministry of Health funds a range of face-to-face intervention services as well as a national gambling helpline. Investment in intervention comprises roughly half of the total expenditure on services within the gambling sector. In 2012/13, the Ministry of Health allocated over \$8 million to intervention services (Ministry of Health, 2013). The gambling helpline continues to provide a free 24-hour, seven-day-a-week service that represents a first contact point for people in crisis as a result of their own or someone else's gambling (Ministry of Health, 2013). The helpline provides information, screening, brief intervention, referral and follow-up services. From late 2008, the helpline has also provided full intervention services, ensuring access to treatment for people in areas without face-to-face services and for people who prefer a telephone-based service (Ministry of Health, 2010). National statistics for 2011 and 2012 continue to indicate a levelling off in the number of people accessing intervention services for gambling. The Ministry notes that gambling helpline statistics indicate that calls to the service have been declining for some years, and continued to decline during the 2010/11 to 2012/13 period (Ministry of Health, 2013).

Although substantial financial resources are allocated to problem gambling treatment in New Zealand, there remains little evidence of how effective these services are in the long-term, or whether or not comparable outcomes could be produced more effectively using different approaches. Internationally, a variety of interventions have been developed for people with gambling problems (Abbott, Volberg, et al., 2004; Hodgins & Holub, 2007). The results of a meta-analysis of studies concluding that psychological interventions for problem gamblers are associated with favourable outcomes compared with no treatment (Pallesen, Mitsem, Kvale, Johnsen, & Molde, 2005) remain unchallenged. However, the large diversity in treatment strategies, mode of delivery, materials used, location, dose and practitioner involvement in treatment in the gambling field continues to limit conceptualisation of treatment approaches (Problem Gambling Research and Treatment Centre, 2011). The methods used by researchers assessing gambling treatment continues to lack sophistication in comparison to those used in substance addiction treatment fields (e.g. failure to include comparative or control groups, randomly assign to treatment, or evaluate manualised interventions) which has resulted in the relatively weak evidence base. The findings of the Problem Gambling Research and Treatment Centre review (2011) remain pertinent, showing little movement from the findings of earlier reviews (Abbott et al., 2004; Hodgins & Holub, 2007; Petry, 2005; Toneatto & Ladouceur, 2003; Toneatto & Millar, 2004; Westphal & Abbott, 2006) where it is evident that problem gambling treatment efficacy, effectiveness and outcome studies are limited.

Some psychological interventions occupy the “possibly efficacious” category (Chambless & Ollendick, 2001) of at least one randomised controlled trial from one investigator group. These include cognitive treatments (Ladouceur, et al., 2001), cognitive behavioural treatments (Echeburúa, Báez, & Fernández-Montalvo, 1996; Gooding & Tarrier, 2009; Petry, et al., 2006), cognitive and exposure therapies (Battersby, Smith, & Harvey, 2014) and brief motivational interviewing (MI) and self-help interventions (Hodgins, Currie, Currie, & Fick, 2009; Hodgins, Currie, & el-Guebaly, 2001; Hodgins, Currie, el-Guebaly, & Peden, 2004; Petry, Weinstock, Ledgerwood, & Morasco, 2008; Petry, Weinstock, Morasco, & Ledgerwood, 2009; Celio & Lisman, 2014). While these and similar interventions are apparently being used in every day clinical settings, to our knowledge, none have been evaluated in effectiveness or benchmarking studies (controlled studies of efficacious treatment) and only two have been evaluated in naturally occurring community treatment settings (Carlbring et al., 2010; Battersby et al., 2014).

There are also only a few outcome studies in the gambling treatment field (uncontrolled reports of treatment characteristics, number of clients and client characteristics and outcomes). Recent research on gambling treatment outcomes has focused on CBT approaches (e.g. the previously discussed study linking tobacco use and outcomes by Odlaug, et al., 2013). Another outcome study has linked NEO Personality Inventory-Revised domains (high Neuroticism low Conscientiousness) with gambling relapse (abstinence was used as a measure of treatment success) at 12 months (Ramos-Grille, Gomà-i-Freixanet, Aragay, Valero, & Vallès, 2013). Guo and colleagues (2014) point out that research on predictors of treatment outcome among pathological gamblers is inconclusive and dominated by studies from Western countries. Using a prospective longitudinal design, their study examined demographic, clinical, behavioural and treatment programme predictors of gambling frequency at three, six and 12-months, among problem gamblers treated using a manualised CBT and workbook programme at an addiction clinic in Singapore. Significant reductions in gambling frequency, gambling symptom assessment scale scores, and personal wellbeing index were reported between baseline and subsequent outcome assessments, with the greatest change occurring in the initial three months. No demographic, clinical, behavioural or treatment programme variable consistently predicted outcome at all three assessments, though treatment satisfaction was the most frequent significant predictor. However, it was noted that being unemployed, having larger than average debts, poor treatment satisfaction and attending fewer sessions at the later stages of treatment

were associated with significantly poorer outcomes at the 12 month follow up point. The authors attested that these findings show promise for the effectiveness of a CBT-based treatment approach for the treatment of Chinese problem gamblers. They highlighted that early treatment satisfaction seemed highly inter-related with short-term outcomes, whereas baseline gambling behaviour and treatment intensity seemed to play a more significant role in the longer term. These recent outcome studies were all carried out in natural help-seeking environments/clinics adding to the face validity of their findings.

Westphal and Abbott's (2006) conclusions in relation to the gambling intervention effectiveness literature are still relevant, namely that: "gamblers respond to several possibly efficacious treatments... with the majority benefitting, at least in the short term, when conducted by the original investigators. There is no evidence that the beneficial effects occur when the treatments are performed by other investigators or community based clinicians" (p.131). This is clearly a serious shortcoming which the present study in its previous phase has begun to address specifically in relation to a brief motivational interviewing (MI) intervention. A systematic review of randomised clinical trials of cognitive and exposure therapies for gambling disorders, has revealed a paucity of research that conforms to current best practice for producing trustworthy and generalisable results including a lack of disclosure of randomisation procedures and blinded status of data analysts, the absence of sample size calculations and the conflating of primary and secondary outcome measures (Smith, Dunn, Harvey, Battersby, & Pols, 2013). These conclusions reiterate those of the previous reviews (e.g. Westphal & Abbott, 2006; Cowlishaw et al., 2012; Fink et al., 2012) which highlight the significant barriers to evidence-based treatments in the gambling field including low statistical power, heterogeneous samples, lack of protocol driven treatments, missing or skewed data, single site clinical trials, lack of independent replication of studies and high rates of non-specific treatment response.

The reviews mentioned above also suggest that, for most problem gamblers, short-term and less intense ('minimal' or 'brief') interventions might be as effective as longer, more intensive therapies. Such approaches typically include brief motivational interviews and/or self-help workbooks, and have been validated in the alcohol and substance misuse fields (e.g. Kaner et al., 2007). Excluding the previous phase of the present study, there have been no recent additions to the seven RCTs that have been conducted looking at the effectiveness of brief motivational interviewing techniques for gambling. A randomised trial is currently underway to examine the effectiveness of a brief self-directed cognitive-behavioural motivational therapy delivered over the internet (Hodgins, Fick, Murray, & Cunningham, 2013). Results are not yet available. One RCT has been reported since 2012 which found a single session personalised normative feedback intervention effectively reduced college student gambling risk taking behaviour after one week in comparison to a control group (Celio & Lisan, 2013).

To summarise the results of the seven RCTs that have examined the effects of motivational interviewing specifically on gambling, three earlier randomised controlled trials have found brief MI conducted face-to-face to be as effective as cognitive treatments in reducing gambling severity (Carlbring, et al., 2010; Larimer, et al., 2012; Petry, et al., 2009). Two studies have involved telephone delivery of MI and the trial of a self-help workbook (Hodgins, et al., 2009; Hodgins, et al., 2001; Hodgins, et al., 2004). One RCT has examined the effectiveness of a particular brief self-help toolkit intervention in comparison to wait-list control (LaBrie, et al., 2012). One study compared single-session face-to-face MI with a control interview (Diskin & Hodgins, 2009). Review of this RCT research suggests that motivational interviewing is superior to wait-list control in reducing problem gambling behaviour. Geisner and colleagues (2014) have recently reanalysed data from Larimer et al. (2012) and demonstrated crossover effects of an MI individual personalised feedback intervention (this involved discussing personalised feedback derived from a baseline questionnaire measuring gambling severity and

other health issues) on comorbid mental health problems. These additional benefits were not evident in a cognitive behavioural treatment group or assessment only control.

A promising application of brief interventions to problem gambling involves short motivational telephone interview, followed by a self-help workbook which has been found to be effective at 24 months post intervention (Hodgins, et al., 2001; 2004). The interviews use motivational enhancement therapy principles directed towards building commitment to change (e.g. Miller & Rollnick, 2012) which has been effective as treatment for gambling (Diskin & Hodgins, 2009; Hodgins, et al., 2004) and in enhancing treatment compliance (Wulfert, Blanchard, Freidenberg, & Martell, 2006). The workbook is based on a cognitive-behavioural model of problem gambling, relapse prevention and the findings of research on problem gambling recovery processes. The foregoing indicates that brief interventions involving no face-to-face contact can have clinically significant, enduring impact. However, the extent to which MI, workbook and additional 'booster' telephone sessions add value to treatment was contested across trial findings (Hodgins, et al., 2001; 2004; 2009; cf Petry et al., 2008).

Petry and colleagues' (2008) and Hodgins and colleagues' (2009) findings suggest that 'more' treatment is not necessarily 'better'. These findings are echoed in the alcohol brief treatment field as well (Apodaca, Miller, Schermer, & Amrhein, 2007). With brief treatment, it is possible that motivational interviewing is the most important ingredient. If this is so, efficiencies would be created by removing unnecessary intervention components (i.e. workbook, workbook plus booster follow-up calls), at least for some clients. However, more trials (incorporating large and representative sample sizes in natural treatment settings) are needed to determine whether, and for whom, such efficiencies may be beneficial or appropriate.

Questions remain about which groups respond best to which form, mix and/or intensity of interventions. Further, Hodgins and colleagues (2001) recommended that future studies examine the impact of treatment on other areas such as psychological distress and family and social functioning. There is, therefore, a need for definitive RCTs that evaluate the effectiveness of well-developed and documented brief interventions for problem gambling (Hodgins et al., 2001; 2004) and modifications to it with representative samples of problem gamblers who seek information and help for gambling.

Phase one of the current study provided the first evidence that brief telephone interventions for problem gamblers in New Zealand can be effective in reducing problem gambling behaviour and that this beneficial effect is retained at 12 months post-intervention. However, longer-term follow-up can provide a more comprehensive assessment of the differential impact and durability of interventions. A longer term follow-up assessment also enables relationships between outcome measures to be assessed and understood more fully, and for relapses to be assessed in relation to their duration, severity and consequences for recovery and well-being.

2.2 Ethnic-specific overview

Effectiveness of interventions for ethnic minority groups

Although recognition of the unique needs of ethnic minority groups in problem gambling treatment is not new, very few studies have examined the effectiveness of existing treatment approaches for these groups. In an early position paper, Blaszczyński, Walker, Sagris and Dickerson (1999) asserted the need for problem gambling counsellors with bilingual abilities and training in culturally appropriate interventions. Although problem gambling prevalence studies in New Zealand and in a number of other countries including the United Kingdom,

Singapore and the United States of America (USA) have taken account of problem extent among different ethnic groups (Abbott et al., 2014b; National Council on Problem Gambling, 2015; Wardle et al., 2011; Welte, Barnes, Wieczorek, Tidwell, & Parker, 2002), problem gambling intervention efficacy studies have tended not to report against the ethnic characteristics of their samples. Some clinical trials and evaluations cited in the preceding section (Celio & Lisman, 2014; Echeburúa et al., 1996; Hodgins et al., 2009; Ladouceur et al., 2001; Toneatto & Dragonetti, 2008) have not detailed participants' ethnicity. Although other studies included ethnicity as part of participants' demographic characteristics to ensure balanced groups (Hodgins et al., 2001, 2004, 2013; LaBrie et al., 2012; Larimer et al., 2012; Petry et al., 2006, 2008, 2009), ethnicity was not treated as a variable in assessments of intervention effectiveness. Language barriers may be a factor that prevent significant inclusion of ethnic minority participants in clinical trials. For instance, in Diskin and Hodgins' (2009) study, lack of English speaking capacity was an exclusion criterion, while in Hodgins et al.'s (2013) study, ability to access online information in English was an inclusion criterion.

Problem gambling among ethnic minority groups

Nevertheless, some studies such as by Fong et al. (2010) and Alegría et al. (2009) have documented ethnic differences in their samples; for example; higher problem gambling prevalence among ethnic groups when compared to Caucasians. The authors associated these high rates to cultural factors and acculturation processes that influence gambling behaviours. Other studies that have explored gambling behaviours among specific ethnic samples have noted high gambling participation rates, higher levels of problem gambling presentation, differences in gambling types and problems associated with gambling, differences in help-seeking behaviour, possible cultural effects on gambling motivations and gambling-related attitudes, and a preference for interventions in native languages (Chui & O'Connor 2006; Lee, Chae, Lee & Kim, 2007; Petry, Armentano, Kuoch, Norinth, & Smith, 2003; Tse, Rossen & Hoque, 2012). Several reviews have also highlighted higher participation rates among ethnic minority groups whose gambling participation, behaviours, triggers, harm-related perceptions, help-seeking behaviours, and treatment experiences were influenced by, among others, specific culturally held values and beliefs and acculturation processes (among immigrants) (Breen & Gainsbury, 2013; Loo, Raylu & Oei, 2008; Papineau, 2005; Raylu, Loo, & Oei, 2013; Raylu & Oei, 2004; Tse, Yu, Rossen & Wang, 2010).

A common theme in the aforementioned studies and reviews was a requirement for culturally-relevant interventions and culturally sensitive services for the effective treatment of ethnic minority groups. Western-based treatment models may be ineffective for ethnic communities due to limited consideration of cultural attitudes, beliefs and values in these models (Tse et al., 2010). Loo et al. (2008) recommended more studies that test the validity of existing instruments for ethnic groups, while Petry et al. (2003) recommended additional psychometric testing of the South Oaks Gambling Screen in different languages.

Culturally-relevant problem gambling intervention services

Despite the limitations identified above, in some countries, there is a move towards delivering culturally tailored problem gambling intervention services. A proposed model for problem gambling treatment services in Victoria, Australia included the consideration of treatment delivery in relevant languages, financial counselling to suit different cultural values and beliefs, and development of culturally appropriate interventions and treatment programmes to meet the needs of Aboriginal and Torres Strait Islander communities and other culturally and linguistically diverse communities (KPMG, 2013). In a qualitative study, which included

interviews with problem gambling counsellors in Australia, Breen, Hing and Gordon (2013) proposed that culturally appropriate counselling and treatment services hold potential for minimising gambling harms among indigenous Australians.

New Zealand's response to the needs of a culturally diverse society is evidenced in the Ministry of Health's funding of dedicated intervention services for Māori, Pacific and Asian communities which deliver services based on the cultural beliefs, values and practices of the respective ethnic groups (Ministry of Health, 2008b). Some studies in New Zealand have documented the content of culturally appropriate interventions for Māori and have noted the value of such intervention services as individuals within these communities tend to be more receptive towards such services (Morrison & Boulton, 2013; Morrison & Wilson, 2013). In a study on problem gambling intervention service approaches in New Zealand, Tse et al.'s (2008) interviews with practitioners and clients provided some context, objectives and therapeutic orientations of interventions delivered for European, Māori, Pacific and Asian populations. The qualitative component of their study found that intervention effectiveness, as perceived by practitioners and clients, was dependent upon how well clients' cultural and language needs were met. However, in their pilot clinical trial (to gauge effectiveness of face-to-face and telephone counselling services) which included 53 European clients, 20 Māori, eight Pacific, seven Asian and eight "Other", a majority of participants (95%) indicated English as the preferred medium for receiving counselling support. Three individuals indicated preference for the Korean language while two indicated a preference for Mandarin. The study was unable to carry out comprehensive analysis of ethnic differences due to insufficient numbers of Māori and Pacific clients completing the interventions.

The aforementioned studies provide some preliminary evidence of the need for, and value of, culturally-appropriate intervention services. The development and implementation of culturally-appropriate problem gambling intervention services should follow the course taken within other areas of therapy that have seen a somewhat more systematic documentation of adapted Western-based psychotherapies in the treatment of ethnic minorities and appropriate evaluations to ensure effectiveness (e.g. Hwang, 2006; Kohn *et al.*, 2002; Matos, Torres, Santiago, Jurado, & Rodriguez, 2006; Miranda *et al.*, 2005).

Summary

In brief, studies and reviews have highlighted the effects of cultural factors on gambling participation, and the value of tailoring interventions to meet the needs of ethnic minority groups. However, there was a lack of treatment efficacy studies comparing treatment outcomes for different ethnic groups. This means that possible confounding effects on treatment outcomes resulting from clients' ethnicity and possible differences in treatment suitability for the different ethnic groups remains unknown. In New Zealand, psychosocial intervention services are adapted to fit the cultural needs of multiple ethnic groups and are sometimes delivered in languages that meet client needs; however, details of these 'adapted' intervention services are little documented, and outcomes resulting from ethnic-specific interventions have not been robustly explored. While it may be intuitively assumed that clients of specific ethnicity would experience better outcomes if they underwent culturally appropriate interventions, robust effectiveness studies are needed to substantiate this assumption. It would be valuable for future treatment effectiveness studies to ensure sufficient sample sizes to enable measurement of treatment effects on different ethnic groups.

3. RESEARCH METHODOLOGY

3.1. Ethics approval

Ethical approval to conduct a 36 month post-treatment assessment with participants was granted by the Northern B Health and Disability Ethics Committee on 22 August 2012 (Appendix 1). This is a Health Research Council accredited human ethics committee. All participant materials (i.e. survey questionnaires, information sheets and consent forms) and other relevant documents were submitted to the Committee, which considers the ethical implications of proposals for research projects with humans where participants are asked questions in relation to their health.

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

- All participants were coded to protect their identities
- No personal identifying information has been reported.

In addition:

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

3.2. Trial design

This was a single-site Randomised Controlled Trial (RCT) with gambler callers to the gambling helpline randomly assigned to one of four parallel groups in a 1:1:1:1 ratio:

- Group 1: Helpline standard care (control group; 'Treatment as Usual' (TAU))
- Group 2: Single brief motivational interview (MI)
- Group 3: Single brief motivational interview plus cognitive-behavioural self-help workbook (MI+W)
- Group 4: Single brief motivational interview plus cognitive-behavioural self-help workbook plus four follow-up motivational booster sessions (MI+W+B).

Participants were randomly assigned (computer generated) to the four groups until each group contained a minimum of 110 participants (described in more detail in section 3.7).

3.3. Participants

3.3.1 Eligibility criteria

Participants were recruited from callers to the gambling helpline who sought information or assistance for their own gambling problem.

The inclusion criteria were:

- Minimum age of 18 years
- Perception of having a gambling problem
- Willingness to:
 - Read a short workbook (to ensure reading ability)
 - Have calls recorded
 - Provide follow-up data on gambling
 - Provide the name of collateral/s.

Present or past involvement in treatment or mutual help groups for gambling or other mental health problems was documented and did not preclude participation.

Callers were excluded from the trial if:

- They were considered by the counsellor to be actively psychotic
- They required immediate crisis or police intervention because they posed a serious risk to themselves or others.

3.3.2 Setting and location

The study took place at the gambling helpline, Auckland, New Zealand in that the interventions were delivered by trained gambling helpline counsellors. As the interventions were delivered by telephone, participants were based throughout New Zealand. Recruitment and delivery of interventions occurred from August 2009 to February 2011.

The 36 month follow-up assessment calls were made by telephone by trained university research assistants from the North Shore Campus of Auckland University of Technology (AUT), Auckland, New Zealand. Research assistants were blind to participants' treatment group.

Follow-up contact protocol

At least 10 attempts were made to contact each participant within a month of the scheduled follow-up date, initially at the participant's preferred day/time and then on other days/times. If contact could not be made, a letter was sent to the last known postal address asking the participant to contact the research team. If a response was not received within seven days of sending the letter, the scheduled contact was documented as 'incomplete'. The participant continued to be included in the study and contact was sought at the next scheduled assessment.

If a participant's telephone numbers were no longer current or had been disconnected and if the participant had provided 'alternative contact' details (e.g. partner, parent, friend), the 'alternative contact' was telephoned to seek current contact details for the participant. If alternative contact details had not been provided or if the alternative contact did not know their whereabouts, a letter was sent to the participant's last known postal address asking them to contact the research team. If a response was not received within seven days of sending the letter, attempts were made to trace the participant using telephone directories, internet searches, and a request for updated contact information from the gambling helpline. If the participant still could not be contacted, the assessment was documented as 'incomplete'. The participant continued to be included in the study and contact was sought at the next scheduled assessment.

3.4. Interventions

Detailed information regarding the interventions delivered to participants and the monitoring of treatment integrity and fidelity has previously been described in the initial report for this RCT (Abbott et al., 2012). In brief, eligible participants underwent an initial baseline assessment and then received their randomly allocated intervention which was delivered by telephone by a trained gambling helpline counsellor.

3.4.1. Group 1: Helpline standard care (TAU)

Group 1 participants received a protocolled version of the helpline's standard care. This included brief screening, listening to clients' concerns (problem identification) and, in the instance of first time callers or regular callers who were experiencing persistent difficulties, referral to face-to-face problem gambling counselling services or other services and websites and/or suggestions for self-care (e.g. controlling access to money, coping with gambling urges, alternative activities to gambling, and goals around saving money). No motivational interviewing aspects were included to differentiate this intervention from the three trial interventions (Groups 2, 3 and 4)⁷. Additionally, participants were offered an information pack (relevant information pamphlets, for example detailing venue self-exclusion processes, or budgeting advice).

3.4.2. Group 2: Single brief motivational interview (MI)

Group 2 participants received a brief motivational interview which was structured to encourage the client to build a commitment to change by emphasising the reasons why change is desirable. This approach was shaped by five therapeutic guidelines, namely: (1) expression of empathy (acceptance of individual and recognition that ambivalence about change is normal), (2) development of a discrepancy between the individuals' present behaviour and their goals and self-image, (3) avoidance of argumentation and confrontation, (4) rolling with resistance (looking for opportunities to reinforce accurate perceptions versus correcting misperceptions) and, (5) support of self-efficacy. Interviews ended with a summary of participants' stated reasons for changing and specific therapeutic goals.

3.4.3. Group 3: MI plus self-help workbook (MI+W)

Group 3 participants received a brief motivational interview, as for Group 2, combined with the use of a cognitive-behavioural self-help workbook. Within 24 hours of the initial interview, participants were mailed the workbook⁸, along with a written summary of their stated reasons for changing and their specific goals.

3.4.4. Group 4: MI+W plus four follow-up motivational booster sessions (MI+W+B)

Group 4 participants received the same intervention as Group 3 and also received four follow-up motivational booster sessions of 10 to 15 minutes duration at one week after the initial interview and at one, three and six months. These booster sessions focused on motivation of, and reinforcement for, behaviour change through the use of the workbook. At each session, progress was reviewed, motivation and commitment renewed, and new short-term goals developed. If a participant could not be contacted for a particular booster session, that session was missed and the next attempt at contact was at the next scheduled booster session.

⁷ To further differentiate this intervention from the three trial interventions, counsellors specifically did not do any of the following with participants: send the gambling helpline workbook (which was similar to the trial workbook); provide gambling screen feedback; ask about behaviour changes; ask about commitment, motivation, confidence or likelihood of success; or offer additional telephone calls.

⁸ Becoming a Winner: Defeating Problem Gambling (adapted from Hodgins et al., 2001, 2004).

3.5. Outcome measures

Primary outcome measures were self-reports of:

- Days gambled
- Money lost gambling
- Treatment goal success.

Secondary outcome measures included control over gambling, gambling impacts, problem gambling severity, psychiatric comorbidity and substance use, tobacco and psychotropic medication use, general psychological distress and quality of life.

Collateral assessment (at three months and one year) from people nominated by participants included participant's gambling over the past month, observed changes and confidence in accuracy of their (collateral) reports.

Detailed information regarding the baseline, three-, six- and 12-month assessments has previously been described in the initial report for this RCT (Abbott et al., 2012). The 36 month assessment is described below. As the majority of the measures are repeated from previous assessments, they are only described briefly here.

3.5.1. Assessment at 36 months

Participants were contacted by an AUT researcher to complete a telephone follow-up assessment at 36 months post-intervention.

Gambling/problem gambling history

A detailed timeline of gambling frequency and money spent gambling during the previous two years⁹ was administered (based on Sobell & Sobell, 1992). Participants were provided with memory cues such as recent holidays and news events to facilitate retrieval of this information.

Gambling impacts

The impacts of gambling on financial status, employment, family and other relationships, criminal offending and general health (adapted from Abbott & Volberg, 1992; Abbott, 2001b) were reported.

Significant life events

Participants were asked to report significant life events experienced in the prior two years and to comment on whether or how those life events had influenced any gambling behaviour.

⁹ For the six months prior to the assessment, participants were asked to think about their gambling in each of those six months. For the prior 18 months, participants were asked to think about their gambling in that time period as a whole.

Treatment goal, additional treatment or help, and workbook

Participants were asked whether, in the past six months, they had met their treatment goal ('not at all', 'partially', 'mostly', 'completely') and what their present goal and personal sense of *control* over their gambling were (0 'no control' to 10 'total control').

They were also asked what other treatment or help, if any, they received for their problem gambling during the past two years. These forms of treatment/help were listed and, for each for the first six months, they were asked how often the treatment or help was obtained (number of occasions) and how helpful it was in reaching their goal ('not at all', 'partially', 'mostly', 'completely').

Participants were asked if they had received the 'Becoming a Winner' workbook, if they had read it in the past six months ('not at all', 'some sections', 'completely') and if so, whether they had completed any of the exercises or used any of the recommended strategies.

Problem gambling

The nine-item Problem Gambling Severity Index (PGSI) (Ferris & Wynne, 2001) was used to measure severity of gambling problems. It was administered in both a past 12-month and a past three-month time frame (reported as PGSI-12 and PGSI-3, respectively).

Comorbidity and substance use

The mood module of the Primary Care Evaluation of Mental Disorders (PRIME-MD, Spitzer et al., 1994) was administered to provide diagnoses of major depressive disorder, dysthymia, minor depressive disorder, and alcohol abuse/dependence.

The Kessler-10 (K-10) questionnaire was included to provide a continuous measure of general psychological distress that is responsive to change over time. It also produces a summary measure indicating probability of currently experiencing an anxiety or depressive disorder (Kessler & Mroczek, 1994).

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.

A brief version (10-item scale) of the Drug Abuse Screening Test (DAST; Skinner, 1982) was administered to assess drug abuse.

Participants were also asked about current tobacco use.

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).

Socio-demographics

Marital status, highest educational level, employment status, annual household income, and area of residence data were collected¹⁰.

The eight-item New Zealand Index of Socio-economic Deprivation for Individuals (Salmond, 2005) was administered.

3.5.2. Collateral assessments

After the 36 month assessment, at least one collateral person per participant (where details for collateral participants had been provided by the trial participants) was contacted by telephone and asked about the participant's involvement with gambling over the previous 12 months. They were also asked how confident they were about the accuracy of their reports ('not at all', 'somewhat', 'fairly', 'extremely').

3.6. Sample size, randomisation and blinding

Detailed information regarding sample size, randomisation and blinding has previously been described in the initial report for this RCT (Abbott et al., 2012).

3.7. Hypotheses at 36 months and statistical methods

3.7.1. Hypotheses for the 36 month analyses

The 36 month follow-up study hypotheses¹¹ assess treatment outcomes at 36 months and their comparison to 12 months, between groups (Hypotheses 1 and 2) and across all groups (Hypothesis 3). The hypotheses investigated are all inequality hypotheses:

- d. Hypothesis 1
 - a. The MI+W+B group will have the same efficacy outcomes as the TAU group at the 36 month follow-up assessment
 - b. The MI+W+B group will have the same efficacy outcomes as the MI group at the 36 month follow-up assessment
 - c. The MI+W+B group will have the same efficacy outcomes as the MI+W group at the 36 month follow-up assessment
- e. Hypothesis 2
 - a. The difference in efficacy outcomes between the MI+W+B and TAU groups at 36 months will be the same as they were at 12 months
 - b. The difference in efficacy outcomes between the MI+W+B and MI groups at 36 months will be the same as they were at 12 months
 - c. The difference in efficacy outcomes between the MI+W+B and MI+W groups at 36 months will be the same as they were at 12 months
- f. Hypothesis 3
 - a. There is no difference in efficacy outcome between levels of risk factor at 36 months.

¹⁰ Age, gender and ethnicity data were collected at the baseline assessment.

¹¹ For a detailed explanation of the hypotheses, see Appendix 10.

The risk factors covered by Hypothesis 3 are listed in the second table in Appendix 3. All alternatives are specified as two-sided, with a significance threshold set at 5%.

3.7.2. Analysis scope

Analyses are categorised as inferential or descriptive. Inferential analyses consist of linear or generalised linear mixed modelling, as described in Section 3.7.5 (statistical methods), in some cases using multivariate outcomes, addressing the hypotheses specified above. Descriptive analyses consist of a reporting of the main statistics regarding an outcome, usually broken down by intervention group and presented at all data points.

On the basis of the design and results of the original RCT, outcomes have been identified as being subject to either a descriptive or an inferential analysis in the present 36 month follow-up study.

3.7.3. Outcomes

The outcomes are listed in Appendix 2, along with an indication of whether they were covered by an inferential or a descriptive analysis. The primary outcomes from the original RCT (Days gambled in last month, Money spent gambling in last month, Gambling Quit or Improved) are all covered by inferential analyses (as detailed in the original report, Abbott et al., 2012).

3.7.4. Attrition and attrition-specific analyses

The retention proportion at 36 months was 37%, compared to 64% at 12 months. A preliminary analysis was conducted to establish the baseline risk and demographic profile of the responders vs. non-responders at 36 months.

A further preliminary analysis was conducted to assess the possibility of differential attrition between intervention groups. Initial examination of the raw data, specifically the mean trajectories displayed as thicker broken lines in Figure A and Figure B¹², indicate that there was no *a priori* reason to believe in systematic trajectory differences between the different completion groups, defined as the groups whose last available assessment was at three, six, 12 and 36 months, respectively.

¹² In these figures, 0=Baseline, 1=3 months, 2=6 months, 3=12 months, 4=36 months, colour-coded by last completed assessment, with completion-group specific mean trajectories (thicker lines).

Figure A: Trajectories of days gambled in the previous month against assessment time point

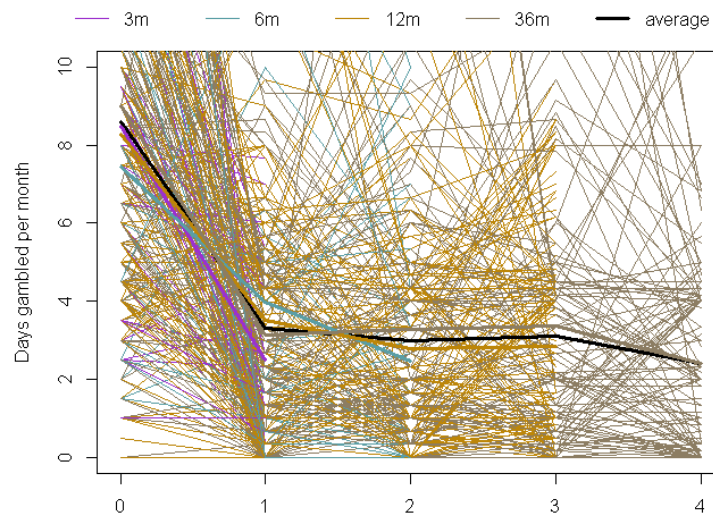
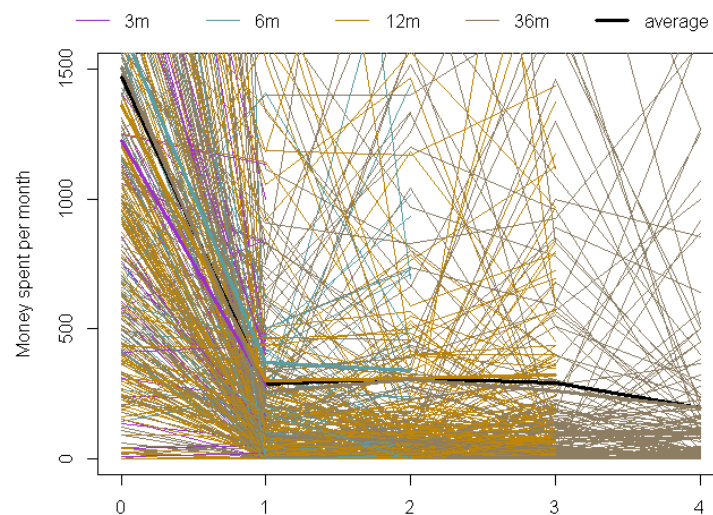


Figure B: Trajectories of money lost gambling in the previous month against assessment time point



3.7.5. Statistical methods

The aforementioned exploratory analyses on attrition indicated that some gain in efficiency could be obtained from applying a common regression model to the intervention or risk factor levels explored in Hypotheses 1, 2 and 3 groups of sub-hypotheses, regardless of completion group.

Initial analyses of raw data (Figure C and Figure D) involving the intervention groups indicated that sufficiently smooth regression curves (using piecewise linear splines) consisted in a reasonable model to obtain the estimates targeted by the hypotheses (attempts at using a penalty term to enforce smoothness caused computational difficulties). The contrasts and estimates of interest were thus based on all available repeated measures but are reported only as they apply to comparisons between 12 months and 36 months, or outcomes at 36 months, as the case may be.

Splines for all analyses were created based on the continuous variable 'days since baseline measure' and were placed at appropriate points ('knots') in time (at 6 and 12 months since baseline) as found by applying a search heuristic of knots to the trajectories of the primary outcomes.

'Days gambled' and 'Money lost gambling' were modelled using linear splines appropriately placed in a mixed model (repeated measures) that combined the outcomes simultaneously as one group, forming a multivariate dependent variable. A nested, zero-mean, participant- and outcome- specific normally distributed random effect was assigned to account for within-participant correlation. Additionally, the residual variance was assumed distinct between each outcome; a within-subject, within-outcomes covariance structure which allowed for decreased correlation over time for an individual, was found to be more appropriate than a simpler compound symmetry structure.

The residuals in an untransformed model of Days gambled and Money lost were found to be non-normal and so a transformation was applied to the data. Estimates of contrasts for these variables and their confidence limits have been back-transformed so that their values are in natural units. Consideration of the first order bias correction term under the transformation applied to the Days gambled/Money lost data indicated that all back-transformed contrast estimates for these variables are slightly biased towards zero. Our inference here is, therefore, conservative, meaning that the true significance level for Days gambled/Money lost is smaller than 5%.

Other analyses only involved univariate (single outcome) models. For dichotomous or categorical outcomes, appropriately placed splines in generalised linear mixed models suitable for dichotomous data (logistic) or polytomous data (multinomial with cumulative logit link for ordered categories) were used. Wherever appropriate, models were adjusted for baseline values.

'Motivation', originally a continuous outcome was modelled as a dichotomous outcome due to violation of the normal model assumption. S5_2_Motivation was split into a dichotomous variable cut at the median of 10.

In both the dichotomous and continuous cases, a nested, zero-mean, participant-specific normally distributed random effect was assigned, where appropriate, to account for within-participant correlation; furthermore a residual covariance structure that allowed for decreased correlation between points over time for an individual was investigated and assigned if appropriate.

Figure C: Trajectories of days gambled in the previous month against assessment time point

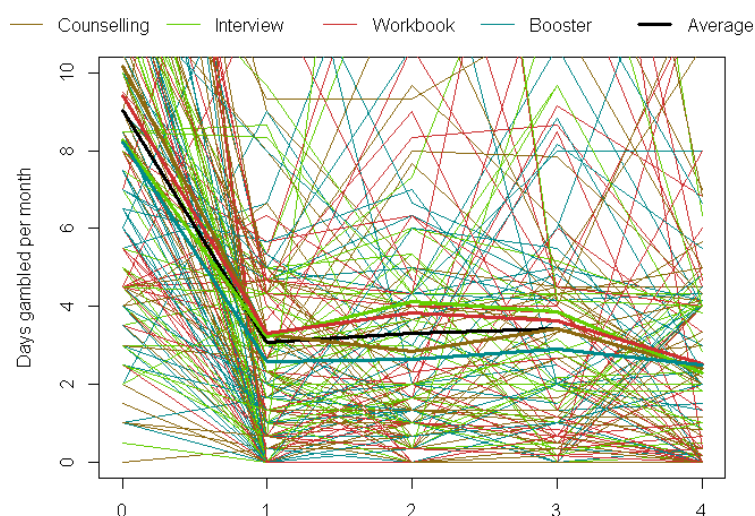
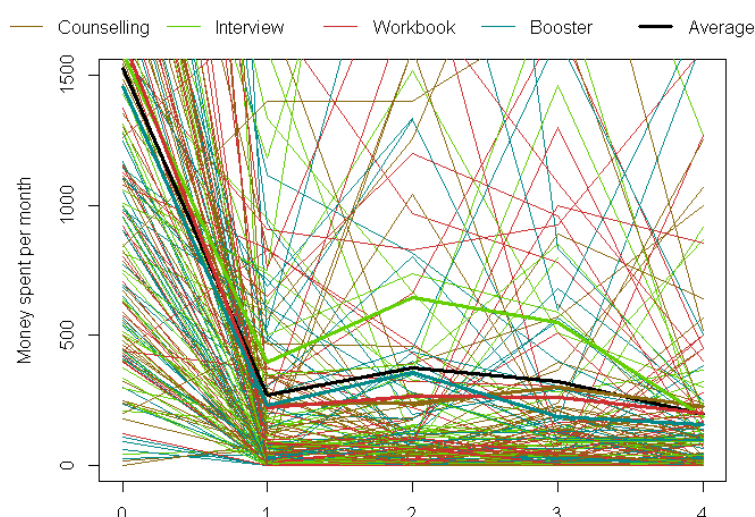


Figure D: Trajectories of money lost gambling in the previous month against assessment time point



Covariates collected at 36 months listed under the key risk factors for Hypothesis 3 testing were applied to outcomes at 36 months only. Normal regression (for continuous outcomes) and logistic regression (for dichotomous outcomes including dichotomised 'motivation') limited to outcomes at 36 months were used to model contrasts between key risk factor levels in outcomes at 36 months for Hypothesis 3.

3.7.6. Subgroup analyses

Analyses involving the primary outcomes were also carried out according to the subgroups detailed in Appendix 2. Subgroup analyses were carried out using interactions not stratification.

3.7.7. Inferential framework

Significance threshold

All tests of significance of hypotheses concerning treatment effect parameters were carried out using a level of significance of 5% and two-sided alternatives. The significance threshold of potential confounders was set at 10%, to promote unbiased and conservative inference. All estimates were produced as point estimates and as 95% confidence intervals. Unless otherwise noted, model selection, when required, was performed using backward selection from the largest model dictated by the situation.

Family-wise error rate adjustment

Each composite hypothesis (Hypothesis 1, 2 and 3, separated further into primary vs. secondary outcomes) was assessed by controlling False Discovery Rate at the stated significance threshold, in accordance with the procedure outlines in Benjamini and Hochberg (1995). Sub-hypotheses thus retained were deemed statistically significant. The composite hypothesis was deemed statistically significant if all sub-hypotheses were retained.

Analytical framework for continuous endpoint analysis

Normality assumption

The analysis described below is predicated on normality of residuals. Checks of normality of residuals were done for all non-subgroup continuous models involving comparisons between intervention groups, and appreciable deviations were dealt with via the contingencies for non-normality that are described in section 3.7.8.

Regression model

Repeated measures analyses fitted available endpoints as repeated measures over the three assessment time points (excluding baseline) to an appropriate normal mixed effects generalised least squares regression model. Baseline outcome value was included as an independent predictor in all models, when available and appropriate. Specific covariates and interactions were included in specific analyses, such as subgroup analyses. Models were adjusted for baseline covariates listed in Appendix 2, subject to achieving significance.

Inclusion of treatment arm; univariate and multivariate settings

When time point-specific (TPS) estimation was required, estimates and contrasts were found by setting the value of each spline (based on the 'time since baseline') to what it would be for the needed assessment time (0, 3, 6, 12 and 36 months) and the spline curve was entered in the model in interaction with the treatment arm, and a factor identifying the outcome in the case of multivariate analyses. The analysis-appropriate estimates (e.g. contrasts between groups at 36 months) were retained and reported.

Variance structure

A nested, zero-mean, participant-specific normally distributed random effect was assigned to observations from a single participant to account for within-participant correlation in a simple compound-symmetry structure. Simple tests were carried out to determine whether a more complex structure beyond the compound symmetry induced by the random effects was necessary to account for within-subject correlation (i.e. tests for within-subject covariance which allowed for decreased correlation over time for an individual were undertaken).

Counsellors were found to be a negligible source of variance in the trial analysis and were not considered in the follow-up analysis.

Results

For continuous outcomes, the estimated treatment contrasts for Hypotheses 1 and 3 represented differences in location, themselves interpretable as differences in changes from a reference treatment group under the adjustment for baseline value. For the Hypothesis 2 sub-hypothesis they are differences in changes in location between 36 and 12 months. Estimated treatment contrasts were produced as point estimates and as 95% confidence intervals.

Alternative analytical frameworks for continuous endpoints under non-normality I: Alternative family and transformation¹³

If non-normality of residuals was evinced or a non-normal family and/or non-identity link were required, analyses equivalent to the *Analytical framework for continuous endpoint analysis* using an alternative generalised linear model as a first choice, a data transformation as a second choice, or both as a third choice, were investigated based on the estimated variance function from the residuals.

Any estimate produced under a non-identity link was converted to natural units with first-degree bias correction, and their confidence intervals produced by applying the inverse link to the confidence interval bounds of the linear predictor, rather than use of the delta method.

Alternative analytical frameworks for continuous endpoints under non-normality II: Dichotomisation

Should the provisions of *Alternative analytical frameworks for continuous endpoints under non-normality I* fail to apply satisfactorily, the outcomes were dichotomised based on thresholds commonly held in the literature or, failing the existence of such a threshold, on the basis of the approximate median of the outcome in the TAU group, without consideration of the time point. The analyses then proceeded according to the previously detailed analytical framework using a binomial family and logit link (i.e. using mixed effects logistic regression).

In most cases the estimated treatment contrasts represent odds ratios with respect to a reference treatment category, adjusted for baseline odds. Estimated odds ratios were produced as point estimates and as 95% confidence intervals.

¹³ This section also applies to binomial outcomes with logit link and multinomial outcomes with cumulative logit link.

Analytical framework for dichotomous (polytomous) endpoint analyses

The analyses proceeded according to *Alternative analytical frameworks for continuous endpoints under non-normality I* using a binomial (respectively, multinomial) family and logit (respectively, cumulative logit) link (i.e. using mixed effects logistic regression).

For dichotomous outcomes, the estimated treatment contrasts for Hypotheses 1 and 3 sub-hypotheses represent odds ratios with respect to a reference group, adjusted for baseline odds. For Hypothesis 2, the estimates are odds ratios for 36 months divided by the odds ratio for 12 months. Estimated odds ratios (or ratios of odds ratios in the case of Hypothesis 2) were produced as point estimates and as 95% confidence intervals.

Software

Analyses were undertaken primarily with PROC MIXED and PROC GLIMMIX in SAS version 9.4.

3.7.8. Missing data

Imputations for the 12 month analyses were carried over for the 36 month analyses. Additionally, minor risk factor (including baseline adjustors) missingness (less than about 5% missing) were accommodated by casewise deletion. Moderate missingness (between about 5% and 20%) normally led to the use of a multiple imputation model being used. Assessment of baseline adjustor missingness was limited to just those where there was at least one repeated measure for the outcome in question.

Missing outcome values were accommodated without further adjustment in mixed effects models, under an assumption of missingness completely at random or missingness at random.

3.7.9. Confirmatory analyses

Normality assessment

Normality of continuous outcomes for all aggregate models investigating comparisons between intervention groups was assessed using q-q plots, Kolmogorov-Smirnov and Shapiro-Wilks tests. This was done on the residuals of the mixed effects models involving treatment and spline curve interaction, as well as baseline outcome value, when available; if appreciable deviations from normality were found, visual assessment of the estimated variance function was used to determine whether a transformation of the data or a different generalised linear model was required. Linear models naturally accommodate slighter departures from normality. All analyses (univariate at each time point and repeated measures) associated with an outcome were effected using the same transformation and/or generalised linear model

Attrition analyses

Attrition analyses were carried out by considering intervention group and the covariates listed in Appendix 3 (demographic and baseline severity covariates) in interaction with intervention

group as potential explanatory variables for attrition. Demographics in interaction with treatment group were also considered.

Participants were categorised into completion groups, defined as the groups whose last available assessment was at three, six, 12 and 36 months respectively. This ordered categorical variable (with four categories) was then used as the outcome variable in an ordered multinomial model (with a cumulative logit link) of attrition with intervention group as a predictor. We modelled the probability that, for any given point in time, that an individual had dropped out of the study at or before that time point. Separate models were then undertaken that added as a predictor, an interaction of intervention group with another variable (either an Appendix 3 variable or a demographic variable). These models were used to test if the Appendix 3 variable or demographic variable had a modifying effect on the effect of treatment group on attrition. All models had the proportional odds assumption checked and validated.

Influence and outlier analyses

All aggregated (i.e. non-subgroup) continuous analyses involving comparison of intervention groups had residual checks and influence diagnostics examined to ensure model validity and robustness. Influence and outlier analyses led to data queries and confirmation of the data value.

Testing of random effects

Random effects associated with participants were tested using likelihood ratio tests against equivalent null models not involving the target random effect (but involving the remaining random effect) in the analyses of each (possibly multivariate) outcome. The random effects were tested based on a likelihood ratio test, with models fitted using maximum likelihood only (not REML). The resulting p-value was based on an appropriate null mixture chi-squared distributions.

Random effects that did not appear significant were removed from the model. If a random effect was removed from a model it was removed from all analyses for that outcome.



4. RESULTS

This chapter details the results of data analyses from the 36 month follow-up assessments of participants from the original randomised controlled trial.

Section 4.1 shows the number of participants including the flow of participants through the clinical trial.

In section 4.2 are the participant numbers in the Intention To Treat data set, details regarding attrition and descriptive statistics covering changes over time.

Sections 4.3 and 4.4 relate to Hypotheses 1 and 2 which respectively detail the contrasts between intervention groups in outcomes at 36 months, and the contrasts between intervention groups in differences in outcomes between 36 and 12 months. The risk factors assessed for these analyses were Māori ethnicity, baseline problem gambling severity (PGSI), baseline psychological distress (Kessler-10) and baseline hazardous alcohol use (AUDIT-C).

Section 4.5 relates to Hypothesis 3 which details the contrasts between key risk factor levels in outcomes at 36 months. The risk factors assessed for these analyses were treatment assistance (past six months), current goal (quit gambling/control gambling) and occurrence of significant life events (in past two years).

Section 4.6 details collateral assessments.

4.1 Participants

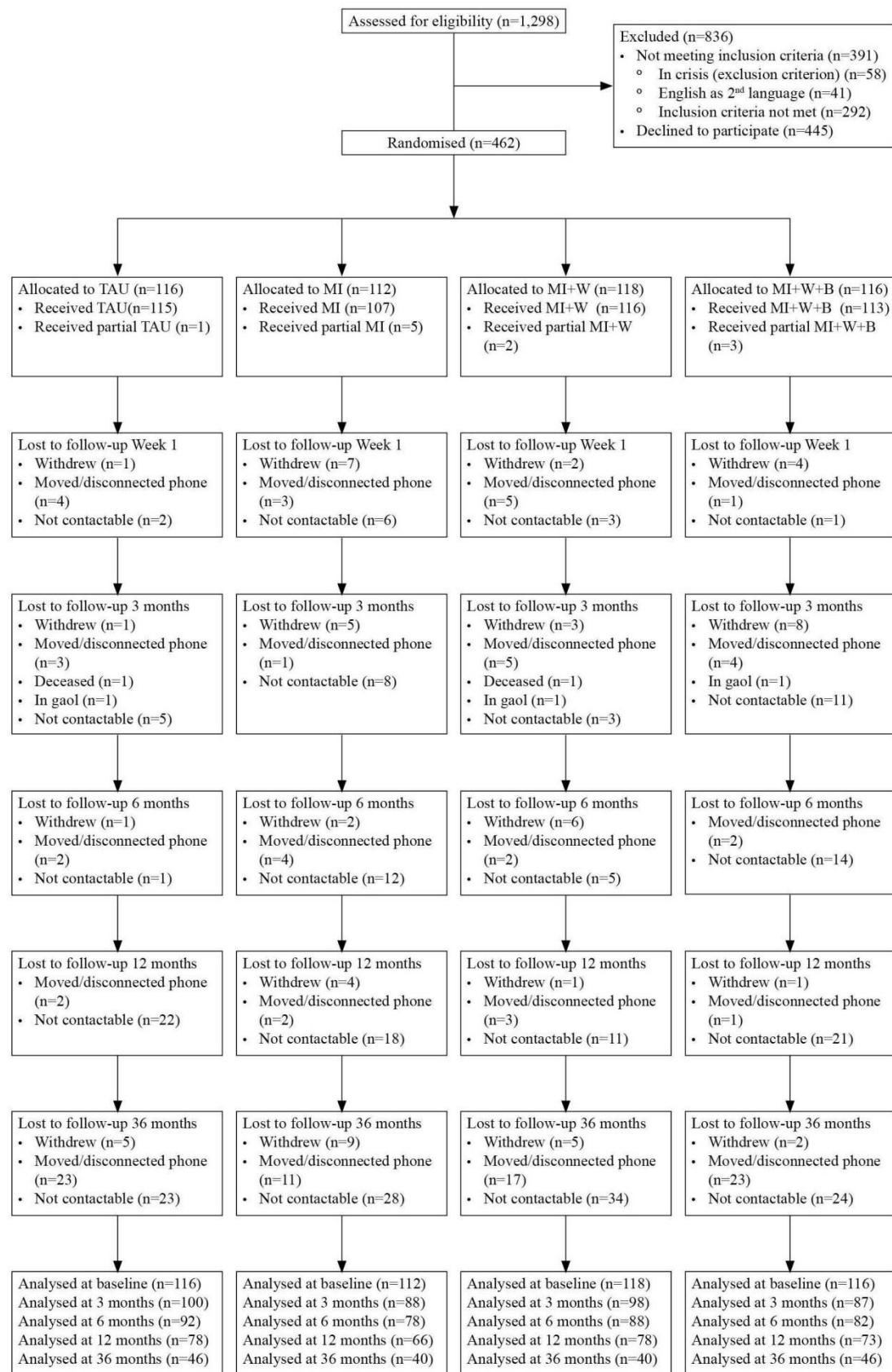
4.1.1. Participant flow and study sample

Participant flow and study sample information is reproduced from the original trial (Abbott et al., 2012) with the 36 month follow-up assessment numbers added to Figure 1. A total of 1,298 gambler callers to the gambling helpline was assessed for eligibility in the trial; 836 were excluded as they did not meet inclusion criteria, met exclusion criteria or they declined to participate. A total of 462 participants was randomised: 116 to the TAU group, 112 to the MI group, 118 to the MI+W group and 116 to the MI+W+B group¹⁴. The number of participants receiving the full intervention after randomisation was 115, 107, 116 and 113 for the TAU, MI, MI+W and MI+W+B groups respectively¹⁵.

¹⁴ These were the participants included in the Intention To Treat analyses as previously reported (Abbott et al., 2012).

¹⁵ These participants comprised the Per Protocol analysis set as previously reported (Abbott et al., 2012).

Figure 1: Participant flow



Note: Not contactable participants were not contactable at those assessment points but may have been contacted at subsequent assessments.

4.2 Descriptive statistics

This section details the number of participants in the Intention To Treat (ITT) data set for each of the four groups and attrition over the 36 month period. It also details descriptive results across time.

4.2.1. Number of participants

Intention To Treat data set

In total, 462 participants were recruited into the trial with between 112 and 118 participants allocated per group. A total of 373 participants (81%) remained in the trial at the three month assessment, 340 participants (74%) at the six month assessment, 295 participants (64%) at the 12 month assessment, and 172 participants (37%) at the 36 month assessment. Participant retention varied between the groups at each assessment. Numbers are detailed in Table 1.

Table 1: Intention To Treat data set at each time point

Group	Time point				
	Baseline	3 months (% retention)	6 months (% retention)	12 months (% retention)	36 months (% retention)
TAU	116	100 (86%)	92 (79%)	78 (67%)	46 (40%)
MI	112	88 (79%)	78 (70%)	66 (59%)	40 (36%)
MI+W	118	98 (83%)	88 (75%)	78 (66%)	40 (34%)
MI+W+B	116	87 (75%)	82 (71%)	73 (63%)	46 (40%)
N	462	373 (81%)	340 (74%)	295 (64%)	172 (37%)

4.2.2. Attrition

The profile of responders vs. non-responders over time (all time points to the 36 month assessment) compared with the profile at the baseline assessment by demographic variables, baseline risk variables and treatment group showed no differential loss to follow-up between the groups. Additionally, attrition analyses considering the covariates detailed in Appendix 3 (demographic and baseline severity covariates) were all insignificant at the 5% level. Thus, there is no evidence for the presence of a bias in the outcome summary statistics due to differential attrition.

4.2.3. Socio-demographic characteristics

Socio-demographic data were collected at baseline and have been described in the initial report for this RCT (Abbott et al., 2012). For completeness, the data have been reproduced in Appendix 4, Table 4: 1 together with percentages and numbers at each assessment point.

4.2.4. Treatment goal

Participants' treatment goal was either to quit all/some modes of gambling or control their gambling. At the baseline assessment there was little variation between the groups with at least three-quarters (74% to 84.5%) reporting a desire to quit all or some modes of gambling. By

the three-month assessment and sustained through to the 36 month assessment, the profile had changed with a greater percentage of participants in all groups reporting a desire to control their gambling (45% to 63%) (Table 2).

Table 2: Treatment goal

		Time point				
		Baseline	3 months	6 months	12 months	36 months
TAU	Quit (%)	79.1	54.8	46.0	43.6	50.0
	Control (%)	20.9	45.2	54.0	56.4	50.0
MI	Quit (%)	82.9	51.8	48.6	42.4	42.5
	Control (%)	17.1	48.2	51.4	57.6	57.5
MI+W	Quit (%)	74.4	39.4	38.1	41.0	38.5
	Control (%)	25.6	60.6	61.9	59.0	61.5
MI+W+B	Quit (%)	84.5	46.4	33.8	46.6	37.2
	Control (%)	15.5	53.6	66.2	53.4	62.8
<i>N</i>		459	354	313	295	166
<i>N MISSING</i>		3	19	13	0	6

4.2.5. Significant life events

At the 36 month assessment only, participants were asked if they had experienced a significant life event in the previous two years. A list of 15 events was presented with a 16th option of 'other'. The majority of respondents in each group had experienced significant life events (range 82.5% to 96%) with the median number of events experienced being 3 or 4 and the maximum number ranging from 9 to 11 (Table 3). The percentage of respondents who experienced each event are detailed in Appendix 4, Table 4: 2.

Table 3: Significant life events

Significant life event		Group			
		TAU	MI	MI+W	MI+W+B
Any event	Yes (%)	95.7	92.5	82.5	87.0
Number of events	Mean	4.3	3.8	3.6	3.8
	Standard Deviation	2.8	2.4	2.4	2.4
	Minimum	0	0	0	0
	Q1	2	2	2	2
	Median	3	4	4	3.5
	Q3	6	5	5	6
	Maximum	11	10	9	9
	<i>N</i>	46	40	40	46
	<i>N Missing</i>	0	0	0	0

Influence of significant life events on level of gambling - qualitative responses

Immediately following the significant life events questions, participants were asked how they believed significant life events had influenced their level of gambling (or gambling abstinence) in the last two years. This question was open-ended.

Just less than half of the respondents (48%) indicated that significant life events had not affected their level of gambling at all. One-fifth of the respondents (20%) reported that significant life events (e.g. moving town¹⁶, new relationship, pregnancy, a death in the family) had forced them to focus on activities other than gambling by removing them from their usual gambling environment or making them too busy to gamble, thus reducing their gambling. Another fifth (21%) reported that a negative significant life event (e.g. relationship break-up, natural disaster) had caused them to increase their gambling to escape negative feelings and to feel better.

A few participants (n=6) indicated that a significant life event/s (e.g. pregnancy and giving up drinking) had increased their gambling as they had more free time. Three participants reported that when their financial situation worsened it forced them to reduce their gambling (e.g. lost a job, had an accident and became unable to work full time). Two participants reported that when their financial situation improved (e.g. they got a new job, inherited some money) they had more money, so they increased their gambling. Conversely, one participant commented that when their financial situation improved (via a new job with higher pay) they could think of a larger range of things on which to spend their money (gambling became seen as a waste of money) thereby reducing their gambling. Another participant reported that leaving a bad relationship reduced their need to escape by gambling and thus reduced their gambling.

Twenty-six participants who had remained abstinent over the last two years provided a response to this question. Almost half indicated that significant events had not affected their abstinence from gambling (n=12). Similar to respondents who had gambled, the next most common response (n=11) was that major life changes (e.g. starting a new relationship, pregnancy, a serious illness in the family) had led to focusing energy and attention on other life areas, thus helping to maintain their gambling abstinence. One participant reported that ending a dysfunctional relationship reduced their need to gamble to escape that relationship and, therefore, contributed to their ability to resist returning to gambling. The reported impact of a change in financial circumstances was varied, with one participant reporting that a loss of job security kept them away from gambling, whilst another participant reported that having more money encouraged them to be more discerning, helping them remain abstinent.

Participants were also asked if anything else had contributed to their gambling or abstinence from gambling over the last two years. Two-thirds (65%) responded that there were no other factors contributing to their gambling. The most common additional factors identified as helping to reduce or control gambling were: self-motivation and/or self-discipline (n=9), having very little money left to spend on gambling (e.g. hit 'rock bottom' financially) (n=9), having good support from family and friends (n=3), receiving support from professional problem gambling services (n=3), finding a distraction from gambling (e.g. computer games) (n=2), accessing support from a church (n=2) and taking part in the study itself (i.e. receiving calls from study researchers and completing the study workbook) (n=2). Factors associated with increased gambling or loss of control included mental health issues, drug use or "addictive personality" (n=8) and the loss or lack of family support (n=6). Improvements in financial situation through money won or inherited were reported to help reduce gambling by one participant, and facilitate increased gambling for another participant.

¹⁶ At the 36 month assessment, participants who had moved house in the previous two years (n=67) were asked if they had moved closer to, or further away from, gambling venues. Just less than half of the respondents (48%) reported they had moved further away from venues, two-fifths (39%) reported moving closer to venues, and 13% gave other responses.

4.2.6. Primary efficacy outcomes

The primary outcome measures were self-reports of:

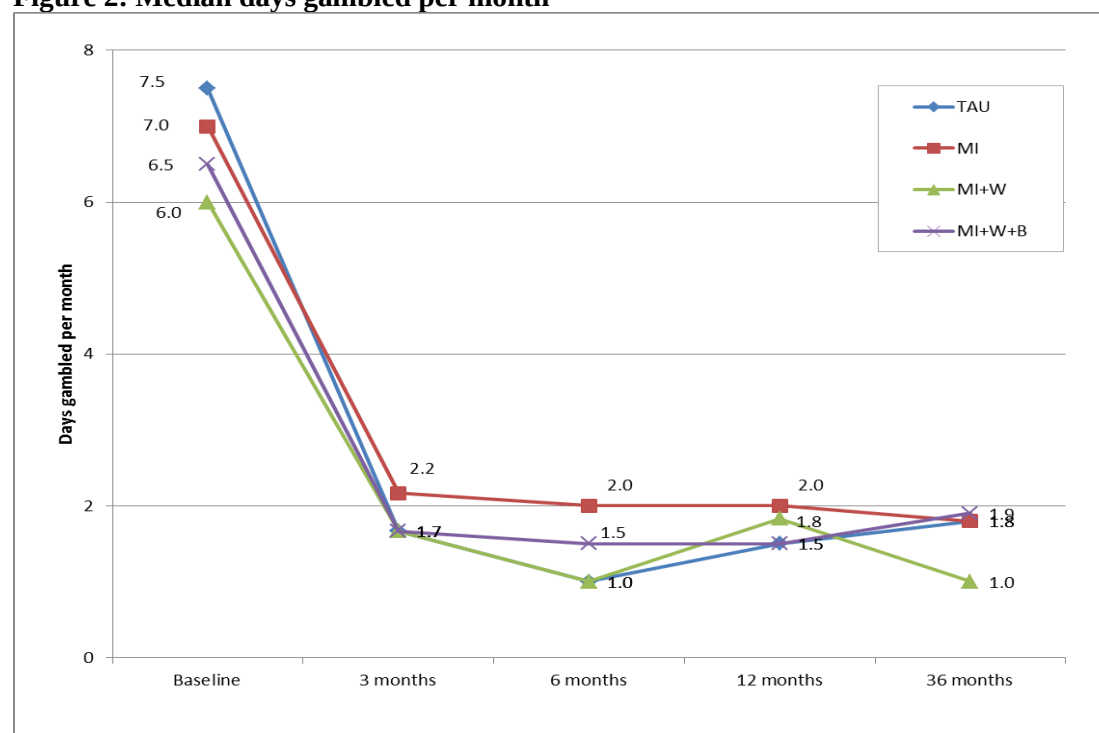
- Days gambled per month
- Money lost gambling per day
- Treatment goal success (yes or no).

Data for the participants by intervention group are detailed in Appendix 4, Table 4: 3.

Median days gambled per month

The self-reported number of days per month when gambling occurred (days gambled) at each time point was similar across the groups with the median between 6.0 to 7.5 days at baseline, decreasing to 1.7 to 2.2 days at the three month assessment and remaining fairly static at this level at the six, 12 and 36 month assessments (Figure 2). Although the median number of days gambled was slightly lower at 36 months for the MI+W group in comparison with the other groups (1.0 vs. 1.8 or 1.9), examination of the minimum and maximum days gambled and Standard Deviation shows that all groups were similar (Appendix 4, Table 4.3). Thus, sustainability of the treatment effect for all groups was evident over the long-term (36 months).

Figure 2: Median days gambled per month

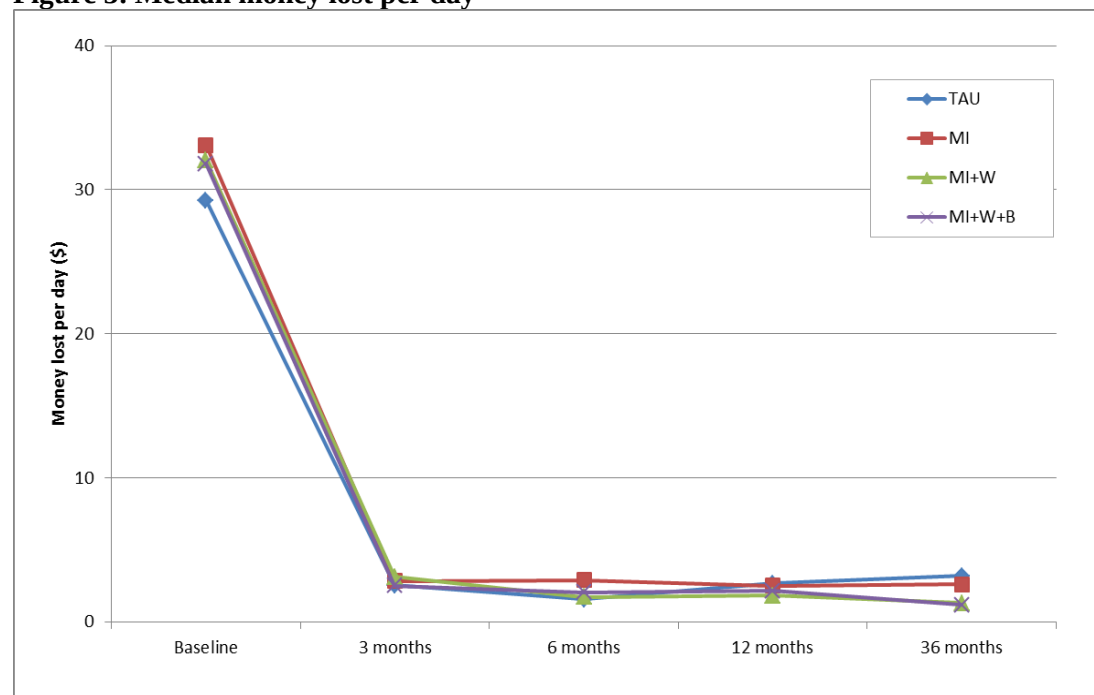


Median money lost per day

The self-reported amount of money lost gambling per day at each time point was similar across the groups with the median between \$29 and \$33 at baseline, decreasing to \$2.50 to \$3 per day at the three month assessment. This level was sustained at the six, 12 and 36 month assessments (Figure 3). The maximum amount of money lost per day by participants in each treatment

group was variable with no trends apparent at the follow-up assessments. Thus, sustainability of the treatment effect for all groups was evident over the long-term (36 months).

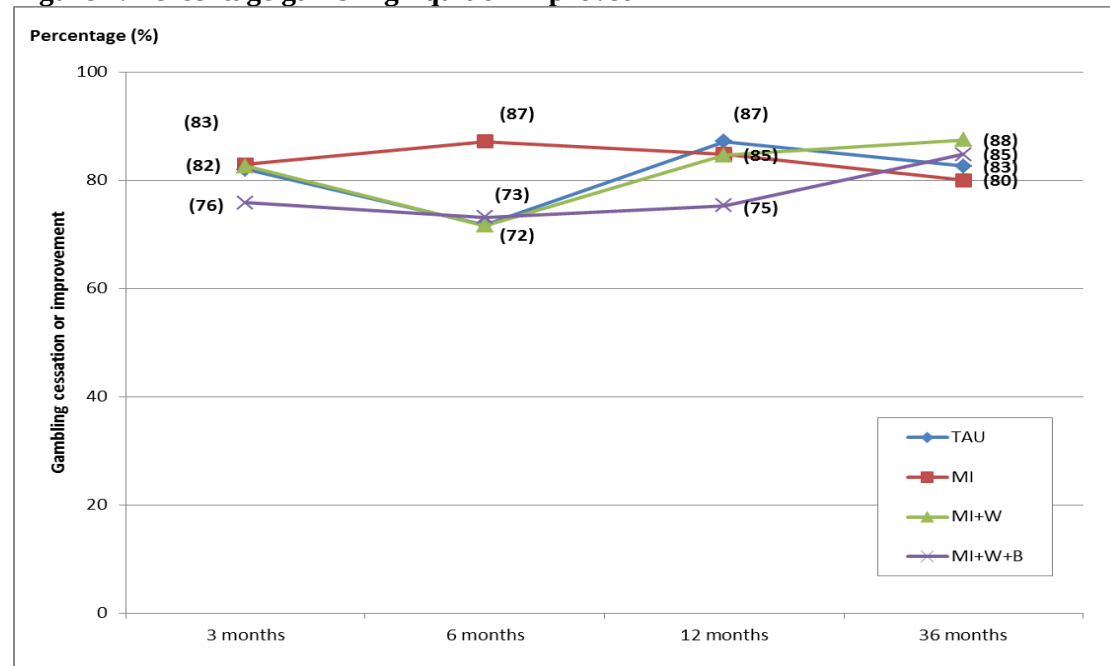
Figure 3: Median money lost per day



Self-reported gambling-quit or improved

Four-fifths (82% to 83%) of participants in the TAU, MI and MI+W groups self-reported that they had ceased gambling or improved control over their gambling (gambling- quit or improved) at the three month assessment. At the six month assessment the percentage of participants decreased slightly for the TAU and MI+W groups (72%), increasing again to similar levels to the three month assessment at the 12-month assessment (87%, 85% respectively). The percentage was slightly lower for the MI+W+B group at the three, 6 and 12 month assessments (76%, 73% and 75% respectively). However, at the 36 month assessment, all groups were similar with 83% to 88% of participants reporting that they had ceased gambling or improved control over their gambling (Figure 4). Thus, sustainability of the treatment effect for all groups was evident over the long-term (36 months).

Figure 4: Percentage gambling - quit or improved



4.2.7. Secondary efficacy outcomes

Problem Gambling Severity Index

Problem Gambling Severity Index (PGSI) data are presented in Appendix 4, Table 4: 4.

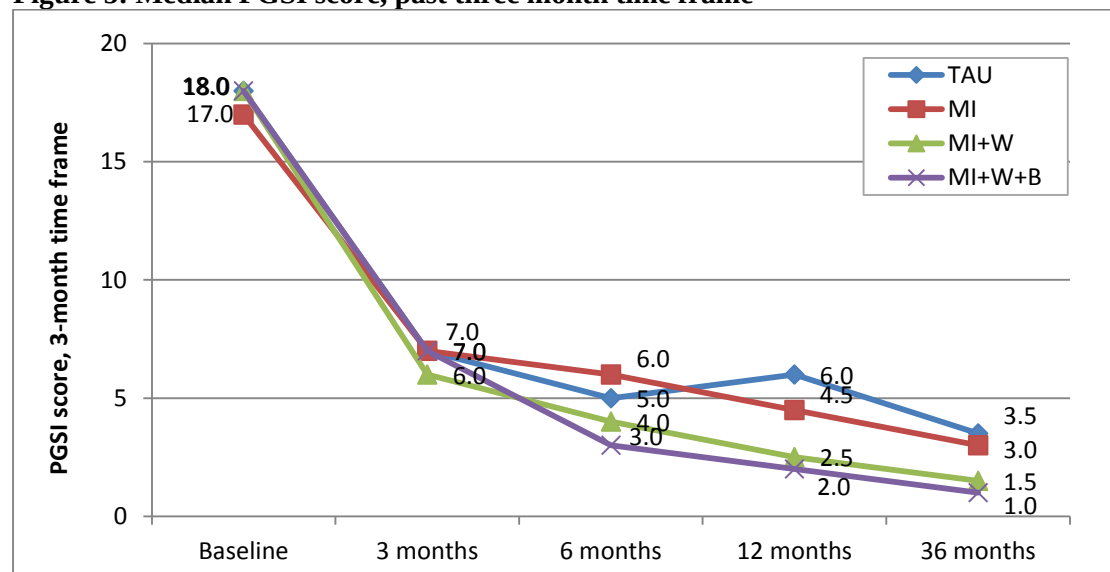
At the baseline assessment, almost all participants across the four groups (95% to 97%) were categorised as current problem gamblers via the PGSI administered in a past 12 month time frame, with a median PGSI score of 17 (of a possible 27). At the 12 month assessment, improvement was noted for all groups with half to two-thirds of the participants being categorised as problem gamblers (55% to 67%) with a median score of 9 to 10. Improvement continued over time such that at the 36 month assessment, less than half (41% to 48%) of the participants in the TAU, MI and MI+W groups were categorised as problem gamblers; the median PGSI score was 7, 3 and 5 respectively, indicating moderate risk. Only 24% of participants in the more intensive MI+W+B group were categorised as problem gamblers at the 36 month assessment with a median PGSI score of 1.0, indicating low risk (Table 4).

Table 4: Median PGSI score, past 12 month time frame

Group	Time point				
	Baseline	3 months	6 months	12 months	36 months
TAU	17.0	-	-	9.0	7.0
MI	17.0	-	-	9.0	3.0
MI+W	17.0	-	-	10.0	5.0
MI+W+B	17.0	-	-	10.0	1.0

When PGSI was administered in a past three month time frame, there was evidence of a trend for reduction in problem severity across time for all groups. However, a greater reduction was noted for the MI+W and MI+W+B groups with a median PGSI score of 1.5 and 1.0 respectively (low-risk gambler) at the 36 month assessment, in comparison with the TAU and MI groups which showed median scores of 3.5 and 3.0 (moderate-risk gambler) respectively (Figure 5).

Figure 5: Median PGSI score, past three month time frame

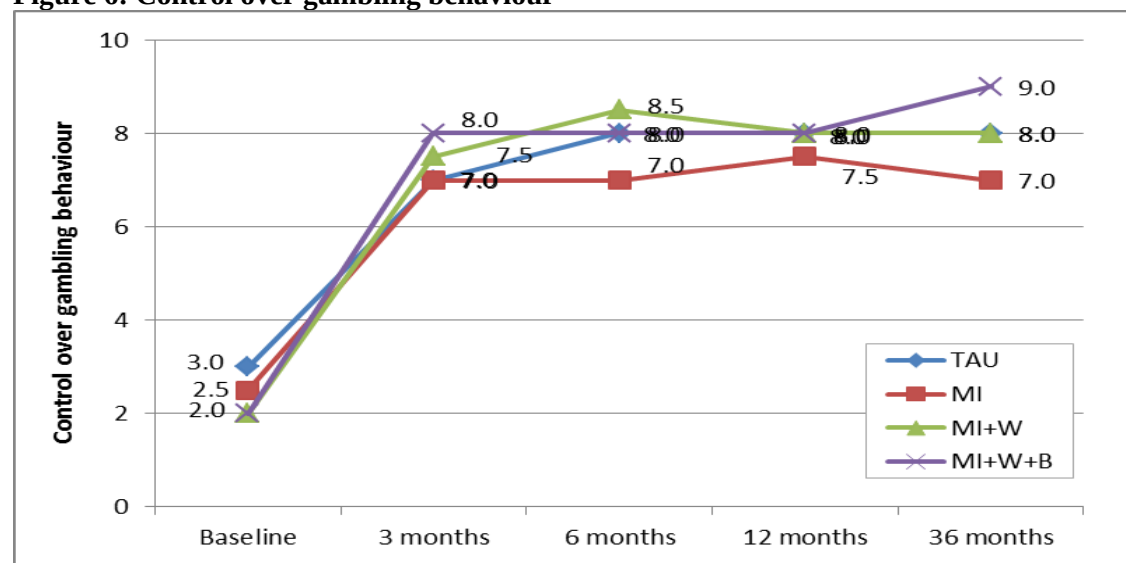


Control over gambling behaviour

Control over gambling behaviour data are presented in Appendix 4, Table 4: 5.

Participants were asked to rate their control over their gambling on a scale of 0 to 10 (0 = 'no control', 10 = 'total control'). At the baseline assessment, the median was 2.0 to 3.0 across the four groups. At the three, 6 and 12 month assessments for each group, the median score was between 7.0 and 8.5, though the range was from 0 to 10. Participants who received the more intensive intervention, MI+W+B, appeared to have slightly more control over their gambling at the 36 month assessment in comparison to participants in other groups, with a median of 9.0 vs.7.0 to 8.0 (Figure 6); however, the full range was still spanned (0 to 10).

Figure 6: Control over gambling behaviour



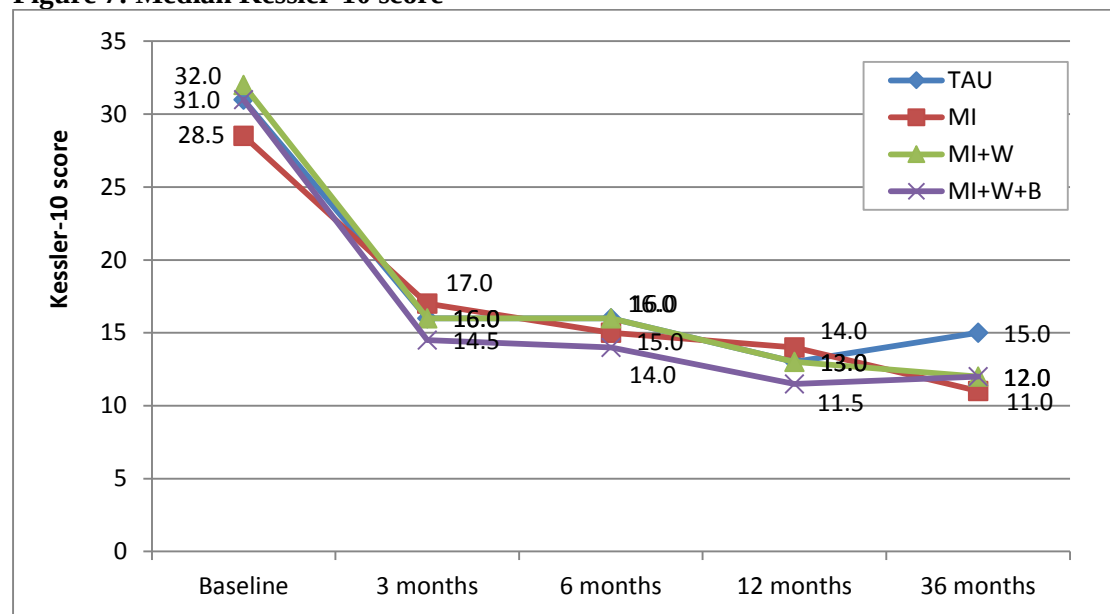
Co-existing issues

Various psychological distress and substance abuse/dependence screens were administered to participants at the baseline and follow-up assessments. The data are presented in Appendix 4, Table 4: 6.

Psychological distress

Using the Kessler-10 screen, the median score for participants in each group at baseline ranged from 28.5 to 32 (of a total possible score of 50). Higher scores indicate a greater level of psychological distress. At the three month assessment, the median score had decreased to 14.5 to 17, and this appeared generally stable at the six month assessment. A further slight improvement in score was noted at the 12 month assessment (median scores 11.5 to 14) with the effect generally sustained at the 36 month assessment (median scores 11 to 15) (Figure 7).

Figure 7: Median Kessler-10 score



The percentage of participants in each group showing major depressive disorder decreased at the 12 month assessment in relation to the baseline assessment. At the 36 month assessment, the improvement continued for participants in the MI and MI+W+B groups. However, a greater percentage of participants in the TAU and MI+W had major depressive disorder at 36 months than at 12 months, although the percentage remained lower than at baseline (Appendix 4, Table 4: 6).

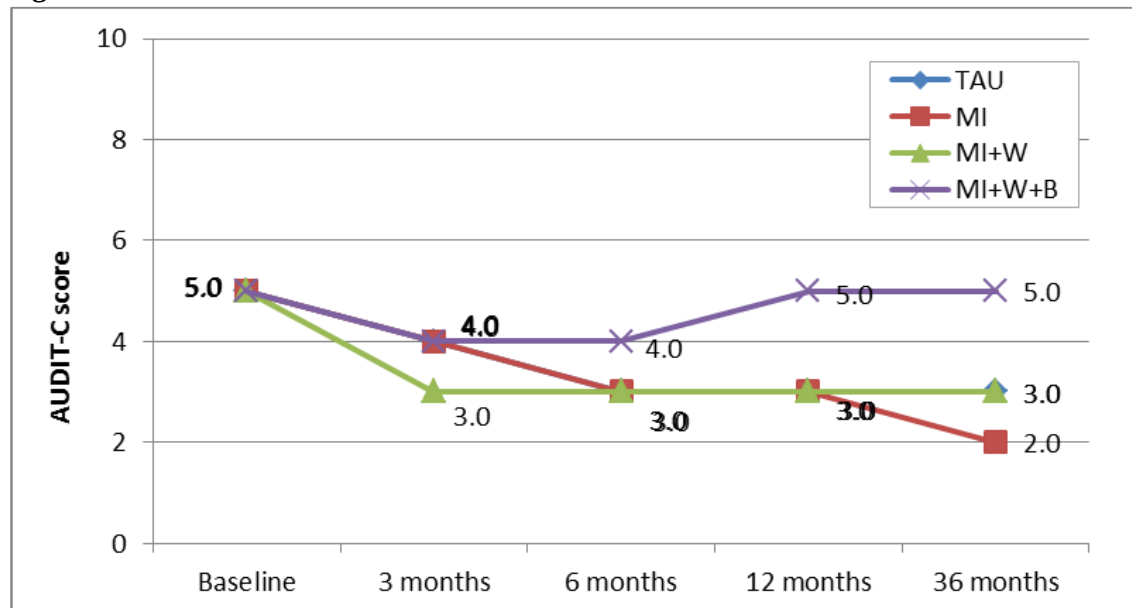
The percentage of participants in each group showing minor depressive disorder or dysthymia decreased at the 12-month assessment in relation to the baseline assessment. At the 36 month assessment further improvement (lower percentage) was noted for participants in all groups apart from TAU which showed a stabilisation in the percentage of participants with dysthymia rather than a decrease (Appendix 4, Table 4: 6).

There were no notable differences in percentages of participants with bipolar disorder or who were receiving treatment or prescriptions for mental health (past 12-month time frame) across the groups or across time (Appendix 4, Table 4: 6).

Substance abuse/dependence

The median score for hazardous alcohol use via AUDIT-C was 5.0 (of a total possible score of 12) for all groups at the baseline assessment. Over time the trend was a reduction in median score (improvement) for participants in the TAU, MI and MI+W groups (note that the TAU line follows the MI line until 36 months when the median is 3). However, participants in the more intensive MI+W+B group did not show this trend, with an initial slight reduction in median score noted at the three month assessment, which was maintained at the six month assessment and then increased to the baseline level at the 12 and 36 month assessments (Figure 8).

Figure 8: Median AUDIT-C score



Very few participants scored on the DAST screen for drug abuse/dependence, thus due to the small sample no conclusions can be drawn.

Motivation

Participants across all groups and assessment periods remained motivated to overcome their gambling problems with a median score of 9 or 10 (where 0 = 'not at all' and 10 = 'extremely'). However, it is noted that median motivation in the TAU and MI groups was 10 at baseline through to the 12 month assessment but decreased slightly to 9.5 and 9 respectively, at the 36 month assessment (Appendix 4, Table 4: 7).

Treatment service assistance

At each follow-up assessment, participants were asked if they had received any assistance (formal or informal) (additional to their initial gambling helpline intervention) in the previous three months (three and six month assessments) or previous six months (12 and 36 month assessments) for their gambling problems. Overall data are presented in Appendix 4, Table 4: 8.

At the three-month assessment, approximately one-fifth to one-quarter (20% to 27%) of participants had received some form of formal assistance (from a professional person) for their gambling problems over the past three months. For all groups apart from the MI group, the percentage decreased slightly at the six and 12 month assessments (15% to 18%). For participants in the MI group, the percentage receiving formal assistance at the six and 12 month assessments remained fairly constant at 23% and 26% respectively. By the 36 month assessment, only a small percentage of participants in the MI and MI+W+B groups reported receiving formal assistance (5% and 4% respectively) whilst the percentage of those in the TAU and MI+W groups was similar to that of previous assessments at 15% and 12.5% respectively.

Overall, a slightly higher percentage of participants reported receiving some form of informal assistance (e.g. from family, friends or other non-professional person) than those receiving formal assistance at the three-month assessment (37% to 42%). The percentage remained at a similar level for participants in all groups at the six- and 12-month assessments (30% to 44%) and decreased substantially at the 36 month assessment (0% to 6.5%).

4.3 Risk factors - Hypothesis 1

The 36 month follow-up study hypotheses assess treatment outcomes at 36 months and their comparison at 12 months, between groups (Hypotheses 1 and 2) and across all groups (Hypothesis 3). The first hypothesis investigated was:

- Hypothesis 1: The MI+W+B group has the same efficacy outcomes as each of the other intervention groups at the 36-month follow-up assessment.

4.3.1. Continuous outcomes

There was no statistically significant difference in outcomes between intervention groups at 36 months for days gambled, money lost gambling, control over gambling, problem gambling severity (PGSI, past three month time frame) or psychological distress (Kessler-10) (Table 5).

Table 5: Hypothesis 1 for days gambled, money lost, control over gambling, PGSI-3 and psychological distress at 36 months

Outcome	Contrast*	Estimate of contrast	(95% CI) ^	FWER adjusted p-value	Alternative accepted
Days gambled	TAU vs. MI+W+B	-0.04	(-0.27 - 0.27)	0.97	No
	MI vs. MI+W+B	0.03	(-0.23 - 0.38)	0.97	No
	MI+W vs. MI+W+B	-0.02	(-0.27 - 0.31)	0.97	No
Money lost	TAU vs. MI+W+B	0.19	(-0.21 - 0.79)	0.97	No
	MI vs. MI+W+B	0.11	(-0.28 - 0.72)	0.97	No
	MI+W vs. MI+W+B	0.11	(-0.28 - 0.70)	0.97	No
Control over gambling	TAU vs. MI+W+B	-0.85	(-1.89 - 0.20)	0.35	No
	MI vs. MI+W+B	-0.83	(-1.92 - 0.27)	0.35	No
	MI+W vs. MI+W+B	-0.35	(-1.43 - 0.73)	0.71	No
PGSI-3	TAU vs. MI+W+B	2.20	(-0.32 - 4.72)	0.35	No
	MI vs. MI+W+B	2.09	(-0.58 - 4.75)	0.35	No
	MI+W vs. MI+W+B	0.25	(-2.39 - 2.89)	0.91	No
Kessler-10	TAU vs. MI+W+B	-0.12	(-2.94 - 2.69)	0.93	No
	MI vs. MI+W+B	-1.49	(-4.48 - 1.49)	0.57	No
	MI+W vs. MI+W+B	-1.21	(-4.13 - 1.71)	0.63	No

FWER adjustment family: Primary Outcomes Hypothesis 1 for days gambled and money lost; Secondary Outcomes Hypothesis 1 for control over gambling, PGSI-3 and Kessler-10

* Contrast is first listed intervention group minus second listed

^ Confidence intervals correspond to the nominal significance level (unadjusted for multiple testing) and may be considered anti-conservative

4.3.2. Dichotomous outcomes

There was no statistically significant relative difference in the Odds of each outcome variable at 36 months between intervention groups (i.e. the Odds Ratio was not significantly different than 1) for gambling-quit or improved, motivation to overcome gambling problems and major depressive disorder (Table 6).

Table 6: Hypothesis 1 for gambling-quit or improved, motivation and major depressive disorder at 36 months

Outcome	Contrast (Odds Ratio)*	Estimate of contrast (Odds Ratio)	(95% CI) ^	FWER adjusted p-value	Alternative accepted
Gambling-quit or improved	TAU vs. MI+W+B	1.99	(0.77 - 5.14)	0.97	No
	MI vs. MI+W+B	1.58	(0.58 - 4.28)	0.97	No
	MI+W vs. MI+W+B	0.52	(0.19 - 1.46)	0.97	No
Motivation[#]	TAU vs. MI+W+B	2.26	(0.80 - 6.37)	0.35	No
	MI vs. MI+W+B	3.79	(1.28 - 11.2)	0.24	No
	MI+W vs. MI+W+B	1.68	(0.57 - 4.92)	0.57	No
Major depressive disorder	TAU vs. MI+W+B	0.54	(0.20 - 1.45)	0.47	No
	MI vs. MI+W+B	1.37	(0.41 - 4.58)	0.76	No
	MI+W vs. MI+W+B	0.82	(0.28 - 2.42)	0.83	No

FWER adjustment family: Primary Outcomes Hypothesis 1 for gambling-quit or improved; Secondary Outcomes Hypothesis 1 for motivation and major depressive disorder

[#] Motivation outcome is for score 10 on the Likert scale (high motivation) vs. score <10

* The first listed intervention group is the reference group (i.e. the denominator) for the Odds Ratio

^ Confidence intervals correspond to the nominal significance level (unadjusted for multiple testing) and may be considered anti-conservative

4.3.3. Subgroup analyses for continuous outcomes

There was no statistically significant difference in outcomes between intervention groups at 36 months for days gambled and money lost by hazardous alcohol consumption, Māori ethnicity, psychological distress and problem gambling severity (Appendix 5).

4.3.4. Subgroup analyses for dichotomous outcomes

A statistically significant relative difference was noted in the Odds for gambling-quit or improved between TAU and MI+W+B, and also between MI and MI+W+B for low hazardous alcohol consumption at 36 months, with the Odds being higher for the MI+W+B group than for the TAU and MI groups (i.e. Odds Ratio >1). This finding was not apparent between the MI+W and MI+W+B groups or for high hazardous alcohol consumption. A statistically significant relative difference was also noted in the Odds for gambling-quit or improved between MI+W and MI+W+B for non-Māori ethnicity at 36 months, with the Odds being lower for the MI+W+B group at 36 months, i.e. the Odds Ratio is <1 (Table 7). *However, the results in this section come from models where some Odds Ratios (including for the findings above) were extremely small or extremely large (likely due to small sample sizes in some categories) so these findings should be treated with caution and should not be considered conclusive.*

The contrasts in the relative difference in Odds of gambling-quit or improved for psychological distress (Kessler-10) and problem gambling severity (PGSI, past 12 month time frame) sub-groups were non-estimable due to small sample size.

Table 7: Hypothesis 1 subgroup analyses (AUDIT-C and Māori ethnicity) for gambling-quit or improved at 36 months

Outcome	Subgroup [†]	Contrast (Odds Ratio)**	Estimate of contrast*	(95% CI) [^] *	FWER adjusted p-value*	Alternative accepted*
Gambling-quit or improved	Low base AUDIT-C	TAU vs. MI+W+B	49.21	(6.29 - 385.25)	0.01	Yes
	High base AUDIT-C	TAU vs. MI+W+B	0.73	(0.22 - 2.45)	0.97	No
	Low base AUDIT-C	MI vs. MI+W+B	31.70	(3.45 - 291.46)	0.05	Yes
	High base AUDIT-C	MI vs. MI+W+B	0.65	(0.19 - 2.21)	0.97	No
	Low base AUDIT-C	MI+W vs. MI+W+B	5.81	(0.65 - 52.22)	0.97	No
	High base AUDIT-C	MI+W vs. MI+W+B	0.28	(0.08 - 1.03)	0.77	No
Gambling-quit or improved	Non-Māori	TAU vs. MI+W+B	1.76	(0.52 - 5.94)	0.97	No
	Māori	TAU vs. MI+W+B	2.70	(0.52 - 14.07)	0.97	No
	Non-Māori	MI vs. MI+W+B	2.24	(0.67 - 7.54)	0.97	No
	Māori	MI vs. MI+W+B	0.01	(0.00 - 0.40)	0.29	No
	Non-Māori	MI+W vs. MI+W+B	0.05	(0.01 - 0.29)	0.02	Yes
	Māori	MI+W vs. MI+W+B	1.99	(0.38 - 10.4)	0.97	No

FWER adjustment family: Primary Outcomes Hypothesis 1

[†] High base AUDIT-C dichotomised ≥ 4 (male), ≥ 3 (female); Low base AUDIT-C dichotomised < 4 (male), < 3 (female)

* These results come from a model where some Odds Ratios are extremely small or extremely large

** The first listed intervention group is the reference group (i.e. the denominator) for these Odds Ratios

[^] Confidence intervals correspond to the nominal significance level (unadjusted for multiple testing) and may be considered anti-conservative

4.4 Risk factors - Hypothesis 2

The 36 month follow-up study hypotheses assess treatment outcomes at 36 months and their comparison at 12 months, between groups (Hypotheses 1 and 2) and across all groups (Hypothesis 3). The second hypothesis investigated was:

- Hypothesis 2: The difference in efficacy outcomes between the MI+W+B group and each of the other groups at 36 months will be the same as they were at 12 months.

4.4.1. Continuous outcomes

There was no statistically significant difference in the outcomes between intervention groups between 36 months and 12 months for days gambled, money lost, control over gambling, problem gambling severity (PGSI, past three month time frame) or psychological distress (Kessler-10) (Table 8).

Table 8: Hypothesis 2 for days gambled, money lost, control over gambling, PGSI-3 and psychological distress between 36 months and 12 months

Outcome	Contrast (increase from 12 mths to 36 mths)*	Estimate of contrast	(95% CI)^	FWER adjusted p-value	Alternative accepted
Days gambled	TAU vs. MI+W+B	-0.08	(-0.31 - 0.23)	0.86	No
	MI vs. MI+W+B	-0.11	(-0.35 - 0.20)	0.82	No
	MI+W vs. MI+W+B	-0.07	(-0.31 - 0.26)	0.86	No
Money lost	TAU vs. MI+W+B	0.12	(-0.25 - 0.68)	0.86	No
	MI vs. MI+W+B	0.00	(-0.35 - 0.53)	0.99	No
	MI+W vs. MI+W+B	0.23	(-0.19 - 0.86)	0.82	No
Control over gambling	TAU vs. MI+W+B	-0.56	(-1.73 - 0.61)	0.61	No
	MI vs. MI+W+B	-0.18	(-1.41 - 1.05)	0.78	No
	MI+W vs. MI+W+B	-0.76	(-1.97 - 0.44)	0.54	No
PGSI-3	TAU vs. MI+W+B	1.88	(-0.84 - 4.61)	0.54	No
	MI vs. MI+W+B	0.74	(-2.13 - 3.61)	0.70	No
	MI+W vs. MI+W+B	1.15	(-1.68 - 3.98)	0.64	No
Kessler-10	TAU vs. MI+W+B	-0.70	(-3.70 - 2.31)	0.70	No
	MI vs. MI+W+B	-3.27	(-6.46 - -0.08)	0.30	No
	MI+W vs. MI+W+B	-1.44	(-4.54 - 1.66)	0.61	No

FWER adjustment family: Primary Outcomes Hypothesis 2 for days gambled and money lost; Secondary Outcomes Hypothesis 2 for control over gambling, PGSI-3 and Kessler-10

* Contrast is first listed intervention group minus second listed

^ Confidence intervals correspond to the nominal significance level (unadjusted for multiple testing) and may be considered anti-conservative

4.4.2. Dichotomous outcomes

A statistically significant relative difference was noted in the Odds Ratios for gambling-quit or improved between TAU and MI+W+B, and between MI and MI+W+B at 36 months compared to at 12 months, with the Odds Ratios (which show the relative increase in Odds for the MI+W+B group compared to the reference group) being higher at 36 months. This finding was not apparent between the MI+W and MI+W+B groups (Table 9).

There was no relative difference in the Odds Ratios for the outcome variables between 36 months and 12 months between intervention groups for motivation to overcome gambling problems and major depressive disorder (Table 9).

Table 9: Hypothesis 2 for gambling-quit or improved, motivation and major depressive disorder between 36 months and 12 months

Outcome	Contrast (relative increase in Odds Ratio* from 12 months to 36 months)	Estimate of contrast (ratio of Odds Ratios)	(95% CI)^	FWER adjusted p-value	Alternative accepted
Gambling-quit or improved	TAU vs. MI+W+B	7.10	(3.31 - 15.2)	<0.0001	Yes
	MI vs. MI+W+B	4.26	(1.95 - 9.31)	<0.01	Yes
	MI+W vs. MI+W+B	1.47	(0.64 - 3.37)	0.82	No
Motivation[#]	TAU vs. MI+W+B	3.18	(0.95 - 10.67)	0.30	No
	MI vs. MI+W+B	3.73	(1.05 - 13.29)	0.30	No
	MI+W vs. MI+W+B	2.03	(0.58 - 7.02)	0.57	No
Major depressive disorder	TAU vs. MI+W+B	0.45	(0.13 - 1.61)	0.54	No
	MI vs. MI+W+B	1.50	(0.35 - 6.46)	0.70	No
	MI+W vs. MI+W+B	0.62	(0.16 - 2.42)	0.67	No

FWER adjustment family: Primary Outcomes Hypothesis 2 for gambling-quit or improved; Secondary Outcomes Hypothesis 2 for motivation and major depressive disorder

[#] Motivation outcome is for score 10 on the Likert scale (high motivation) vs. score <10

* Reference group (i.e. the denominator) for each Odds Ratio is the first listed intervention group

^ Confidence intervals correspond to the nominal significance level (unadjusted for multiple testing) and may be considered anti-conservative

4.4.3. Subgroup analyses for continuous outcomes

There was no statistically significant difference in outcomes for days gambled and money lost between intervention groups at 36 months compared to at 12 months by hazardous alcohol consumption, Māori ethnicity, psychological distress and problem gambling severity (Appendix 6).

4.4.4. Subgroup analyses for dichotomous outcomes

A statistically significant relative difference was noted in the Odds Ratios for gambling-quit or improved between TAU and MI+W+B and between MI and MI+W+B for low hazardous alcohol consumption and non-Māori ethnicity at 36 months compared to at 12 months, with the Odds Ratios (which show the relative increase in Odds for the MI+W+B group compared to the reference group) being higher at 36 months. This finding was not apparent between the MI+W and MI+W+B groups or for high hazardous alcohol consumption or Māori ethnicity (Table 10). *However, the results in this section come from models where some Odds Ratios (including those for the findings above) were extremely small or extremely large (likely due to small sample size) so these findings should be treated with caution and should not be considered conclusive.*

The contrast in Odds Ratios for psychological distress (Kessler-10) and problem gambling severity level (PGSI, 12 month time frame) was non-estimable due to small sample size.

Table 10: Hypothesis 2 subgroup analyses (AUDIT-C and Māori ethnicity) for gambling-quit or improved between 36 months and 12 months

Outcome	Subgroup [†]	Contrast (Relative increase in Odds Ratio** from 12 months to 36 months)	Estimate of contrast (ratio of Odds Ratios)*	(95% CI) [^] *	FWER adjusted p-value*	Alternative accepted*
Gambling-quit or improved	Low base AUDIT-C	TAU vs. MI+W+B	87.61	(15.01 - 511.37)	<0.0001	Yes
	High base AUDIT-C	TAU vs. MI+W+B	3.65	(1.36 - 9.83)	0.10	No
	Low base AUDIT-C	MI vs. MI+W+B	104.99	(15.33 - 719.24)	<0.0001	Yes
	High base AUDIT-C	MI vs. MI+W+B	1.68	(0.67 - 4.23)	0.82	No
	Low base AUDIT-C	MI+W vs. MI+W+B	9.09	(1.32 - 62.42)	0.16	No
	High base AUDIT-C	MI+W vs. MI+W+B	1.09	(0.4 - 3.0)	0.98	No
Gambling-quit or improved	Non-Māori	TAU vs. MI+W+B	16.24	(6.19 - 42.55)	<0.0001	Yes
	Māori	TAU vs. MI+W+B	1.30	(0.35 - 4.89)	0.92	No
	Non-Māori	MI vs. MI+W+B	8.75	(3.57 - 21.48)	<0.0001	Yes
	Māori	MI vs. MI+W+B	0.01	(0.0 - 0.5)	0.15	No
	Non-Māori	MI+W vs. MI+W+B	0.16	(0.04 - 0.68)	0.11	No
	Māori	MI+W vs. MI+W+B	6.34	(1.46 - 27.57)	0.11	No

FWER adjustment family: Primary Outcomes Hypothesis 2

[†] High base AUDIT-C dichotomised ≥ 4 (male), ≥ 3 (female); Low base AUDIT-C dichotomised < 4 (male), < 3 (female)

* These results come from a model where some Odds Ratios are extremely small or extremely large

** The reference group (i.e. the denominator) for each Odds Ratio is the first listed intervention group

[^] Confidence intervals correspond to the nominal significance level (unadjusted for multiple testing) and may be considered anti-conservative

4.5 Risk factors - Hypothesis 3

The 36 month follow-up study hypotheses assess treatment outcomes at 36 months and their comparison at 12 months, between groups (Hypotheses 1 and 2) and across all groups (Hypothesis 3). The final (third) hypothesis investigated was:

- There is no difference in efficacy outcomes between levels of risk factors at 36 months.

4.5.1. Descriptive statistics

Treatment service assistance

At the 36 month assessment, the median PGSI score for participants in the TAU and MI+W groups who received any additional assistance in the previous six months was higher than for participants in the MI and MI+W+B groups (12.0 and 11.5 vs. 6.5 and 4.0 respectively). For participants seeking formal assistance from face-to-face services the profile was slightly different with participants in the TAU and MI+W+B groups having a higher median PGSI score than participants in the MI and MI+W groups (13.0 and 9.0 vs. 3.0 and 6.5 respectively) (Table 11). It is of note that participants seeking any help or formal help had median PGSI scores

which indicated problem gambler or moderate-risk status. However, numbers were very small and any interpretation should be treated with caution.

Additional data, including that pertaining to participants who did not seek additional treatment service assistance, are shown in Appendix 7, Table 7: 1.

Table 11: Median PGSI score by treatment assistance

Treatment assistance		Group			
		TAU	MI	MI+W	MI+W+B
Any assistance	n=30 [#]	12.0	6.5	11.5	4.0
Informal assistance	n=6	3.5	0.0	-	4.0
Formal assistance	n=15	13.0	3.0	6.5	9.0

[#] Includes participants reporting “other” assistance received

Examination of the proportion of problem gamblers in each treatment group confirmed the above finding, with higher percentages of problem gamblers seeking any assistance or formal assistance in the previous six months, compared with the percentage of problem gamblers seeking informal assistance (Table 12). However, as indicated previously, due to the very small sample sizes any interpretation must be treated with caution.

Table 12: Percentage of problem gamblers seeking treatment assistance

Treatment assistance		Group			
		TAU	MI	MI+W	MI+W+B
Any assistance	n=30 [#]	55.6	50.0	62.5	42.9
Informal assistance	n=6	0.0	0.0	-	33.3
Formal assistance	n=15	57.1	0.0	50.0	50.0

[#] Includes participants reporting “other” assistance received

Goal setting

At the 36 month assessment, the median PGSI score for participants in all treatment groups whose goal was to quit some or all forms of gambling was higher than for participants whose goal was to control their gambling (range 6 to 12 vs. range 0 to 3). Thus, participants who had a goal of wanting to quit gambling three years after their initial treatment were more likely to still be moderate-risk or problem gamblers than participants who wanted to control their gambling (more likely to be non-problem, low-risk or moderate-risk gamblers) (Table 13).

Additional data are presented in Appendix 7, Table 7: 2.

Table 13: Median PGSI score by current goal

Goal		Group			
		TAU	MI	MI+W	MI+W+B
Quit gambling	n=69	12.0	9.0	9.0	6.0
Control gambling	n=95	3.0	0.5	2.5	0.0

Examination of the proportion of problem gamblers in each treatment group confirmed the above finding, with a greater percentage of problem gamblers having a current goal of quitting gambling (range 40% to 60%) compared with problem gamblers whose goal was to control their gambling (range 11% to 33%) (Table 14).

Table 14: Percentage of problem gamblers by current goal

Goal		Group			
		TAU	MI	MI+W	MI+W+B
Quit gambling	n=69	68.2	52.9	66.7	40.0
Control gambling	n=95	27.3	31.8	33.3	11.1

Significant life events

At the 36 month assessment, participants were asked to report if they had experienced a major (significant) life event in the previous two years. The median PGSI score for participants by treatment group and by life event is detailed in Table 15. For some individual life events, the number of participants who had experienced that event was very small; thus results should be treated with caution.

For the majority of life events, no trends were apparent between participants who had experienced the event in comparison with those who had not. However, there was an overall indication (experienced any major event) and for the following specific life events, that participants who had experienced those events generally had slightly higher median PGSI scores than participants who had not experienced those events: divorce or separation, legal difficulties, major injury or illness, increased number of arguments with someone close, moved city, major change in living or working conditions, and other significant event.

Additional data pertaining to significant life events are shown in Appendix 7, Table 7: 3.

Table 15: Median PGSI score by significant life events

Life event	Life event in past two years - No					Life event in past two years - Yes				
	n	TAU	MI	MI+W	MI+W+B	n	TAU	MI	MI+W	MI+W+B
Death	102	7.0	6.5	4.5	2.0	67	8.0	3.0	8.0	1.0
Divorce/ separation	133	6.0	3.0	6.0	1.0	36	12.0	12.5	4.5	4.0
Legal difficulties	146	7.0	3.0	4.5	1.0	23	8.5	18.0	9.0	12.0
Injury/illness	117	5.0	2.5	6.0	0.5	52	10.0	9.0	4.5	6.0
Became partnered	137	7.0	5.0	4.0	1.5	32	8.5	2.5	13.0	0.0
Work trouble	131	7.0	3.0	4.5	1.0	38	9.0	2.5	6.0	6.0
Retirement	166	7.0	3.0	5.5	1.5	3	17.0	4.0	0.0	4.0
Pregnancy/ new baby	135	7.0	3.0	6.0	2.0	34	9.0	5.5	3.5	0.0
Financial change	93	7.0	6.5	4.5	0.0	76	8.0	0.0	6.0	6.0
Mortgage/loan	137	7.0	5.0	6.0	1.0	32	13.0	1.5	4.0	10.0
Increase in arguments	125	6.0	1.0	4.0	0.5	44	15.0	13.0	8.0	11.0
Moved house	107	6.0	4.5	4.0	0.5	62	9.0	3.0	9.0	5.0
Moved city	144	6.0	3.0	4.0	1.0	25	11.0	9.0	14.0	8.0
Change in living/working conditions	85	6.0	3.0	3.0	1.0	84	9.0	7.0	9.0	3.0
Earthquake	140	7.0	4.0	5.5	1.0	29	11.0	0.0	2.0	4.0

Life event	Life event in past two years - No					Life event in past two years - Yes				
	<i>n</i>	TAU	MI	MI+W	MI+W+B	<i>n</i>	TAU	MI	MI+W	MI+W+B
Other event	151	7.0	3.0	4.0	1.0	18	6.0	8.0	10.0	9.0
Any event	18	10.5	1.0	0.0	0.5	151	7.0	4.0	5.5	2.0

Examination of the proportion of problem gamblers in each treatment group confirmed the above finding, with a greater percentage of problem gamblers experiencing the significant life events listed in the previous paragraph, in comparison with the percentage of problem gamblers who had not experienced those events in the prior two years (Table 16). However, as detailed previously, for some individual life events, the number of participants who had experienced that event was very small and results should be treated with caution.

Table 16: Percentage of problem gamblers by significant life events

Life event	Life event in past two years - No					Life event in past two years - Yes				
	<i>n</i>	TAU	MI	MI+W	MI+W+B	<i>n</i>	TAU	MI	MI+W	MI+W+B
Death	102	44.0	45.8	42.9	20.0	67	52.4	33.3	54.5	30.0
Divorce/separation	133	38.9	36.4	48.3	25.7	36	80.0	66.7	40.0	20.0
Legal difficulties	146	44.7	32.4	44.1	17.5	23	62.5	100.0	60.0	80.0
Injury/illness	117	36.7	31.8	48.4	23.5	52	68.8	52.9	37.5	27.3
Became partnered	137	44.1	41.9	41.2	26.3	32	58.3	37.5	80.0	14.3
Work trouble	131	45.2	45.2	46.9	21.6	38	53.3	25.0	42.9	37.5
Retirement	166	46.7	41.0	47.4	25.0	3	100.0	0.0	0.0	100.0
Pregnancy/new baby	135	45.9	38.7	48.5	20.6	34	55.6	50.0	33.3	36.4
Financial change	93	43.5	45.5	45.8	8.3	76	52.2	35.3	46.7	42.9
Mortgage/loan	137	42.9	41.4	48.5	20.0	32	63.6	40.0	33.3	60.0
Increase in arguments	125	36.4	27.6	44.8	11.8	44	76.9	80.0	50.0	63.6
Moved house	107	40.7	42.9	38.5	15.4	62	57.9	36.4	61.5	36.8
Moved city	144	41.0	38.9	43.8	18.9	25	85.7	66.7	57.1	50.0
Change in living/working conditions	85	36.4	34.8	33.3	22.7	84	58.3	50.0	57.1	26.1
Earthquake	140	43.6	41.2	46.7	29.7	29	71.4	40.0	44.4	0.0
Other event	151	48.8	39.4	41.2	22.0	18	33.3	50.0	80.0	50.0
Any event	18	100.0	33.3	42.9	0.0	151	45.5	41.7	46.9	28.2

4.5.2. Continuous outcomes

At the 36 month assessment some statistically significant differences were noted with various risk factors for outcome measures of days gambled, money lost, psychological distress (Kessler-10), control over gambling and problem gambling severity (PGSI, past three month time frame).

Current goal of maintaining gambling abstinence vs. quitting all types of gambling or gambling in a non-problematic way, and having control over gambling vs. quitting gambling was

statistically significant for the majority of the outcome measures. It was also significant for maintaining gambling abstinence vs. quitting some types of gambling for all outcome measures. Other goals also achieved a level of statistical significance for the days gambled and PGSI outcome measures.

Experiencing some major events in the previous 12 months were also risk factors which reached a level of statistical significance with the secondary outcome measures. Psychological distress, problem gambling severity and control over gambling were associated with having experienced legal difficulties, and having had an increase in arguments with a close person vs. not experiencing those events. Having had a divorce/separation was also associated with problem gambling severity. Additionally, psychological distress was associated with having a major illness or injury vs. not having that event.

Statistically significant data are presented in Table 17; all data are presented in Appendix 8, Tables 8: 1 to 8: 5.

Table 17: Hypothesis 3 outcomes by various risk factors at 36 months

Outcome	Risk factor	Contrast*	Estimate of contrast	(95% CI)^	FWER adjusted p-value	Alternative accepted
Days gambled	Current goal dich.	Control over gambling vs. quit	-0.27	(-0.43 - -0.07)	0.05	Yes
	Current goal	Other goal vs. maintain gambling abstinence	0.97	(0.20 - 2.22)	0.03	Yes
	Current goal	Maintain gambling abstinence vs. quit all types of gambling	-0.44	(-0.59 - -0.25)	<0.001	Yes
	Current goal	Maintain gambling abstinence vs. quit some types of gambling	-0.55	(-0.69 - -0.34)	<0.0001	Yes
	Current goal	Maintain gambling abstinence vs. gamble in a non-problematic way	-0.51	(-0.64 - -0.32)	<0.0001	Yes
Money Lost	Current goal dich.	Control over gambling vs. quit	-0.54	(-0.67 - -0.35)	<0.0001	Yes
	Current goal	Maintain gambling abstinence vs. quit all types of gambling	-0.63	(-0.76 - -0.44)	<0.0001	Yes
	Current goal	Maintain gambling abstinence vs. quit some types of gambling	-0.76	(-0.86 - -0.58)	<0.0001	Yes
	Current goal	Maintain gambling abstinence vs. gamble in a non-problematic way	-0.55	(-0.72 - -0.28)	<0.01	Yes
Kessler- 10	Current goal dich.	Control over gambling vs. quit	-4.32	(-6.34 - -2.30)	<0.0001	Yes
	Legal difficulties	Had legal difficulties vs. not	4.19	(1.00 - 7.37)	0.05	Yes
	Injury/illness	Had injury/illness vs. not	4.73	(2.50 - 6.96)	<0.0001	Yes
	Arguments	Had increase in arguments with close person vs. not	7.31	(5.07 - 9.55)	<0.0001	Yes
	Current goal	Maintain gambling abstinence vs. quit all types of gambling	-4.28	(-6.89 - -1.67)	0.01	Yes
	Current goal	Maintain gambling abstinence vs. quit some types of gambling	-4.92	(-8.31 - -1.54)	0.03	Yes
	Current goal	Gamble in a non-problematic way vs. quit all types of gambling	-4.93	(-7.75 - -2.10)	0.01	Yes

Outcome	Risk factor	Contrast*	Estimate of contrast	(95% CI)^	FWER adjusted p-value	Alternative accepted
Control over gambling	Current goal	Gamble in a non-problematic way vs. quit some types of gambling	-5.57	(-9.12 - -2.02)	0.02	Yes
	Current goal dich.	Control over gambling vs. quit	1.91	(1.09 - 2.74)	<0.0001	Yes
	Legal difficulties	Had legal difficulties vs. not	-2.00	(-3.22 - -0.79)	0.01	Yes
	Arguments	Had increase in arguments with close person vs. not	-1.61	(-2.55 - -0.67)	0.01	Yes
PGSI-3	Current goal	Maintain gambling abstinence vs. quit all types of gambling	2.67	(1.61 - 3.73)	<0.0001	Yes
	Current goal	Maintain gambling abstinence vs. quit some types of gambling	2.12	(0.75 - 3.48)	0.02	Yes
	Current goal dichotomised	Control over gambling vs. quit	-5.05	(-6.97 - -3.12)	<0.0001	Yes
	Divorce/separation	Had divorce/separation vs. not	4.42	(2.01 - 6.84)	<0.0001	Yes
	Legal difficulties	Had legal difficulties vs. not	6.00	(3.08 - 8.92)	<0.0001	Yes
	Arguments	Had increase in arguments with close person vs. not	5.24	(3.06 - 7.42)	<0.0001	Yes
	Current goal	Other goal vs. quit all types of gambling	-5.93	(-9.91 - -1.96)	0.02	Yes
	Current goal	Maintain gambling abstinence vs. quit all types of gambling	-6.50	(-8.98 - -4.02)	<0.0001	Yes
	Current goal	Maintain gambling abstinence vs. quit some types of gambling	-4.96	(-8.22 - -1.69)	0.02	Yes
	Current goal	Gamble in a non-problematic way vs. quit all types of gambling	-4.02	(-6.68 - -1.36)	0.02	Yes

FWER adjustment family: Primary Outcomes Hypothesis 3 for days gambled and money lost; Secondary Outcomes Hypothesis 3 for Kessler-10, control over gambling and PGSI-3

* Results are for the first listed risk factor group minus the second listed risk factor group

^ Confidence intervals correspond to the nominal significance level (unadjusted for multiple testing) and may be considered anti-conservative

4.5.3. Dichotomous outcomes

A statistically significant relative difference was noted in the Odds for gambling-quit or improved between receiving any additional assistance versus receiving none, and between receiving formal (professional) assistance for gambling versus not receiving formal assistance at 36 months, with the Odds being lower for the receiving any assistance and receiving formal assistance groups (i.e. the Odds Ratios were <1). Major life events experienced in the previous 12 months were also statistically significant with the Odds for gambling-quit or improved being significantly relatively different for those who experienced a divorce/ separation, major injury/illness or financial change event, compared with not experiencing the event. For the former two events the Odds were lower for having experienced the event whilst for the latter event the Odds were higher. Generally higher Odds of gambling-quit or improved were also noted for controlling/maintaining gambling/other goal, when compared to the various permutations of quitting gambling; however, lower Odds were noted for quitting some types of gambling compared with quitting all types of gambling.

Some statistically significant relative differences were noted in the Odds for major depression between experiencing some major life events and not experiencing those events. Odds were higher for having experienced divorce/separation, legal difficulties, major injury/illness or an increase in the number of arguments with a close person. Lower Odds for major depression were noted for controlling gambling compared with quitting gambling, and for maintaining gambling abstinence compared with quitting all or some forms of gambling.

For motivation to achieve gambling goal, statistically significant Odds Ratios above 1 were noted when comparing maintaining gambling abstinence to quitting all or some forms of gambling or to gambling in a non-problematic manner, showing the Odds were higher for the maintaining abstinence group. Also, a significant Odds Ratio below 1 was noted for having an other goal compared with maintaining gambling abstinence, showing that the Odds were lower for the other goal group. *However, the results assessing the individual current goal categories as risk factors for motivation came from a model where some Odds Ratios were extremely small or extremely large (likely due to small sample size) so these findings should be treated with caution and should not be considered conclusive.*

Statistically significant data are presented in Table 18; all data are presented in Appendix 9, Tables 9: 1 to 9: 3.

Table 18: Hypothesis 3 for gambling-quit or improved, motivation and major depressive disorder at 36 months

Outcomes	Risk factor	Contrast (Odds Ratio)**	Estimate of contrast	(95% CI)^	FWER adjusted p-value	Alternative accepted
Gambling-quit or improved	Any assistance	Any assistance vs. none	0.28	(0.19 - 0.41)	<0.0001	Yes
	Formal assistance	Formal assistance vs. not	0.50	(0.30 - 0.83)	0.03	Yes
	Current goal dichotomised	Control over gambling vs. quit	2.97	(2.07 - 4.26)	<0.0001	Yes
	Divorce/separation	Had divorce/separation vs. not	0.27	(0.18 - 0.39)	<0.0001	Yes
	Injury/illness	Had injury/illness vs. not	0.60	(0.42 - 0.86)	0.03	Yes
	Financial change	Had financial change vs. not	1.64	(1.15 - 2.32)	0.03	Yes
	Loan	Had mortgage/loan event vs. not	3.83	(2.06 - 7.12)	<0.0001	Yes
	Arguments	Had increase in arguments with close person vs. not	0.62	(0.43 - 0.90)	0.05	Yes
	Earthquake	Experienced earthquake/natural disaster vs. not	2.82	(1.52 - 5.24)	<0.01	Yes
	Current goal	Other goal vs. quit some types of gambling	5.41	(2.11 - 13.88)	<0.01	Yes
	Current goal	Maintain gambling abstinence vs. quit all types of gambling	6.05	(3.15 - 11.59)	<0.0001	Yes
	Current goal	Maintain gambling abstinence vs. quit some types of gambling	11.73	(5.83 - 23.58)	<0.0001	Yes
	Current goal	Maintain gambling abstinence vs. gamble in a non-problematic way	5.13	(2.59 - 10.17)	<0.0001	Yes

Outcomes	Risk factor	Contrast (Odds Ratio)**	Estimate of contrast	(95% CI)^	FWER adjusted p-value	Alternative accepted
Major depression	Current goal	Gamble in a non-problematic way vs. quit some types of gambling	2.29	(1.36 - 3.85)	0.01	Yes
	Current goal	Quit some types of gambling vs. quit all types of gambling	0.52	(0.32 - 0.83)	0.03	Yes
	Current goal dichotomised	Control over gambling vs. quit	0.19	(0.08 - 0.47)	<0.0001	Yes
	Divorce/separation	Had divorce/separation vs. not	3.06	(1.32 - 7.10)	0.05	Yes
	Legal difficulties	Had legal difficulties vs. not	3.91	(1.50 - 10.15)	0.03	Yes
	Injury/illness	Had injury/illness vs. not	4.25	(1.87 - 9.64)	0.01	Yes
	Arguments	Had increase in arguments with close person vs. not	8.34	(3.58 - 19.45)	<0.0001	Yes
Motivation*	Current goal	Maintain gambling abstinence vs. quit all types of gambling	0.14	(0.04 - 0.55)	0.03	Yes
	Current goal	Maintain gambling abstinence vs. quit some types of gambling	0.11	(0.02 - 0.50)	0.03	Yes
	Current goal	Other goal vs. maintain gambling abstinence	0.12*	(0.02 - 0.58)*	0.05*	Yes*
	Current goal	Maintain gambling abstinence vs. quit all types of gambling	6.79*	(2.38 - 19.39)*	<0.0001*	Yes*
	Current goal	Maintain gambling abstinence vs. quit some types of gambling	11.16*	(3.07 - 40.55)*	<0.0001*	Yes*
	Current goal	Maintain gambling abstinence vs. gamble in a non-problematic way	11.58*	(3.76 - 35.65)*	<0.0001*	Yes*

FWER adjustment family: Primary Outcomes Hypothesis 3 for gambling-quit or improve; Secondary Outcomes Hypothesis 3 for major depression and motivation to achieve goal

* These results come from a model where some Odds Ratios are extremely small or extremely large

** The second listed risk factor group is the reference group

^ Confidence intervals correspond to the nominal significance level (unadjusted for multiple testing) and may be considered anti-conservative

All three Hypotheses further separated into primary and secondary outcomes were found to be insignificant at the 5% level as not all sub-hypotheses within each composite were retained.

4.6 Collateral assessments

At the three, 12 and 36 month assessments, collateral participants were asked about the respective gambler's gambling (days gambled and dollars gambled) over the previous two months. At the three and 12 month assessments, there was moderate correlation between gambler participants' self-reports of gambling and collateral reports in relation to how long gambling had been a problem for the participant (data presented previously, Abbott et al., 2012). At the 36 month assessment, the number of collateral participants re-contacted was small with 67% missing; this number was reduced to a sample size of less than five in regard

to questions around days and dollars gambled by the corresponding participant. Thus it has not been possible to conduct meaningful data analysis for correlation between gambler and collateral participants' self-reports of gambling at 36 months.

5. OVERVIEW, DISCUSSION AND CONCLUSIONS

As discussed earlier in this report and elsewhere (Abbott et al., 2014a, 2014b; Hodgins et al., 2011) problem gambling and related harms to individuals, families and communities are substantial and constitute a significant public health challenge. Heavy and problematic gambling are concentrated in population sectors that experience high levels of other health morbidities and social problems. It is highly likely that heavy and problematic gambling adds to, and exacerbates, many of these morbidities and problems, thereby increasing ethnic and other disparities in health and wellbeing. Governments and communities have taken various measures to counter these adverse impacts. Measures include the provision of information, referral and treatment services for problem gamblers. Many countries have established gambling helplines. Specialist treatment provision is more sporadic and services are rudimentary, at best, in most parts of the world.

New Zealand was one of the first countries to introduce services for problem gamblers, with a national helpline established in late 1992 (Sullivan, Abbott, McAvoy, & Arroll, 1994). Face-to-face counselling services were set up in major centres during the next few years and subsequently expanded to provide nationwide coverage. Substantial financial resources are currently allocated to problem gambling treatment. Funding is provided for a national gambling helpline and a variety of face-to-face services. The New Zealand 2012 National Gambling Study (NGS) (Abbott et al., 2014b) found that most people who reported seeking help for gambling problems, both from gambling-specific and other services, considered it beneficial. However, this information is general and partial. Overall, very little is known about how effective these services are and whether or not comparable or better outcomes could be achieved more cost effectively. It is also not known whether effectiveness varies across different population groups, including those with the highest rates of problem gambling. This information is required to inform policy decisions regarding service development and enhancement.

As outlined in Abbott et al. (2012, 2013) and this report, the evidence base for problem gambling treatment is not only weak in New Zealand, it is weak internationally, with only a few forms of psychological intervention shown to be 'possibly efficacious' and none demonstrated to be effective when conducted independently in clinical or community settings. Additionally, again as discussed earlier, most clinical trials and outcome studies have been compromised by a raft of methodological shortcomings including small sample size, high attrition and lack of longer-term follow-up to assess the durability of treatment effects. The present study and preceding clinical trial (Abbott et al., 2012) were designed to address these shortcomings and provide information about the effectiveness of a variety of interventions when delivered by national gambling helpline counsellors. Two of the interventions (MI+W and MI+W+B) had been evaluated previously in efficacy studies that included waitlist controls. The major purpose of the 36 month follow-up assessment was to assess the durability of outcomes assessed at the end of the 12 month trial, across the study as a whole and in the different treatment conditions.

The trial interventions were readily integrated into the everyday operations of the helpline and delivered with a high degree of integrity and consistency (Abbott et al., 2012). At the 12 month trial conclusion, substantial clinically significant improvement had occurred in all four treatment groups. At this time, despite the variation in treatment content and duration, there were no differences between treatment groups on all but one secondary outcome measure. Most improvement occurred during the first three months and was maintained at subsequent assessment points. Contrary to expectation, the most intensive MI+W+B treatment did not lead to better outcomes overall. It had been hypothesised that this intervention, while producing similar outcomes to the others at three months, would be superior at the final 12 month

assessment. Given that this was not the case it was concluded, consistent with the findings of a number of previous gambling and addictions studies, that 'more' treatment is not necessarily better than 'less'.

Trial participants had high problem gambling severity and comorbidity rates. The outcomes achieved appear to be similar to outcomes obtained in clinical trials and other studies involving much longer face-to-face treatments. This raises the possibility that brief interventions could be used as a more cost-effective alternative to longer term face-to-face therapy for many clients, perhaps the majority. Interventions of this type have potential to be the preferred first treatment in a comprehensive stepped care model. If demonstrated to be similarly effective when delivered online, both telephone and internet delivery could provide ready access to large populations. However, helpline clients made a choice to contact the helpline rather than face-to-face problem gambling or other services. While helpline and face-to-face clients may have comparable gambling problems and comorbidities, this needs to be examined more fully. Furthermore, these client groups may vary in other ways that have an impact on treatment outcomes.

Relevant to the foregoing consideration is the finding that trial participants who obtained additional (face-to-face) specialist problem gambling treatment did not have better outcomes than those who did not (Abbott et al., 2013). However, seeking additional treatment was a choice participants made. It is possible that participants who required additional treatment and obtained it may have done better than they otherwise would have. In other words, had they not received this treatment they might have had worse outcomes. A moderate number of trial participants received additional treatment and similar proportions received treatment for other mental health disorders. Had they not done so, it is possible that the substantial treatment gains would have been diminished. Demonstration of the equivalence of brief telephone interventions to longer duration face-to-face treatments requires random allocation of treatment seeking problem gamblers to both types of intervention and outcome comparisons. Cost-effectiveness also needs to be considered, including the costs of other treatment and services that participants access. Durability is a further consideration. Outcomes from brief interventions might be less durable than outcomes from longer duration therapies.

Large sample size (N=451) and relatively high retention (81%, 74% and 64% at 3, 6 and 12 months respectively) made it possible to assess whether some groups did better in some treatment conditions than they did in others. At 12 months, the only overall difference between the four treatment groups was that participants in the more intensive MI+W+B and MI+W conditions reported more control over gambling, time averaged throughout the trial, than those in the MI condition. As mentioned, there were no outcome differences between treatment groups on other measures considered. Differences were found, however, when the outcomes of a number of subgroups were compared. Māori, for example, did better in the most intensive MI+W+B condition than they did in the least intensive MI condition. However, this was only the case for one of the primary outcomes, money lost in the past 12 months. The following groups (as assessed at intake) also did better in the most intensive MI+W+B condition than they did in the MI condition: higher problem gambling severity, higher psychological distress, not misusing alcohol, controlled gambling treatment goal and low belief in treatment success. Higher proportions of participants in the greater problem gambling severity and psychological distress categories attained their treatment goal and also reported lower gambling losses at 12 months. For participants with a controlled gambling treatment goal, significant differences were found for these two outcome measures as well as the number of days gambled. MI+W+B participants with higher problem gambling severity at intake also did better than their TAU counterparts. As in the MI+W+B and MI comparison, this applied to both treatment goal attained and money lost.

Although subgroup outcome differences were generally found on just one or two of the primary measures, these findings suggest that the most intensive intervention assisted some people to do better than they would have if they had just received MI or, in some cases, TAU. Interestingly this included people with more serious gambling problems and greater psychological distress and disorder. It does not, however, include people with alcohol problems. People without alcohol problems did better when they received MI+W+B than when they received MI alone. It is unclear why this was the case. It is of interest that clients with low belief in treatment success also did better with the most intensive intervention. Self-efficacy has been shown in previous studies to predict better treatment outcomes for problem gamblers (Hodgins et al., 2009; Abbott et al., 2013). The workbook and additional motivational booster sessions may have enhanced client belief in achieving treatment goals. However, self-efficacy was only assessed at baseline. In future studies it could be measured during and following therapy to assess whether it is a moderator and/or mediator of treatment outcome. In the wider psychological treatment field there is increasing interest in understanding why therapies work. Examination of differential response by subgroups can assist in this regard. In the problem gambling field, as well as more generally, further research is required to better understand therapy processes and relationships between therapy components, mediators and moderators of treatment effects.

It is of interest that clients with controlled gambling goals also did better in the MI+W+B condition than they did in the MI condition. This difference appears to be particularly robust as it was found on three primary outcome measures. MI+W+B participants with controlled gambling goals also did better than their counterparts who received MI+W, albeit on only one outcome measure. Additionally, participants in the MI+W condition, again on one outcome measure, did better than those who received MI alone. This suggests a dose response relationship. It will be recalled that participants, generally, in the MI+W+B and MI+W conditions (not just those with controlled gambling goals) reported greater time-averaged control over gambling throughout the trial. This increases our confidence in concluding that these more intensive interventions, particularly with the addition of booster sessions, enhance outcomes for clients who seek to control rather than stop gambling. It is also of interest that while there were no overall outcome differences between MI and TAU participants, clients with abstinence treatment goals did better in TAU than they did in MI. Clients with low belief in treatment success also did better in TAU than in MI. In both cases these differences applied to only one outcome measure.

The foregoing findings require replication and extension in future studies. However, they strongly suggest that while 'more' is probably not better than 'less' for a substantial number of problem gamblers, this is not the case for some groups. It seems likely that in future it will be possible to better tailor interventions to particular client groups. The helpline trial findings suggest that these groups could include those based on ethnicity, problem gambling severity, degree and nature of comorbidities, treatment goals and confidence in treatment success.

Given that all four treatment groups showed similar improvements on the primary outcome measures and that there were no significant between-group differences at 12 months, it was predicted that this would also be the case at 36 months. More specifically, it was hypothesised that the MI+W+B group would have the same efficacy outcomes at 36 months as each of the other groups and that any differences in outcome differences between the MI+W+B group and each of the other groups at 36 months would be the same as they were at 12 months.

One hundred and seventy-two participants were re-assessed at 36 months. While this exceeds the number of participants in many, if not most, previous problem gambling clinical trials, it is substantially less than the number assessed at 12 months. Follow-up retention, from the trial baseline, was only 37%. At 12 months retention was 64%. As mentioned, high attrition is

commonplace in gambling treatment research. It reduces statistical power and increases the likelihood that outcomes could have been at least in part a consequence of differential attrition. Retaining contact with problem gamblers presents a challenge in the best of circumstances, especially over long time periods. In the trial and follow-up, almost all contact was via telephone and counsellor-client contact was minimal. This may have partially compromised the establishment of rapport and obtaining contacts for family members and others who could assist in maintaining participant contact information.

The large majority of participants lost to the study from 12 to 36 months had either moved residence and/or had their telephone disconnected. Relatively small numbers withdrew. Somewhat surprisingly, at both 12 and 36 months, on a range of problem gambling severity, demographic and other measures assessed at baseline, there were no differences between those who remained in the study and those who were lost to it. There was also no differential loss between the four treatment groups. This means there is no evidence from the available data that the outcomes were a consequence of differential attrition. However, it is possible that those who remained, differed in some significant ways that were not measured.

On the three primary outcome measures (days gambled, money lost and treatment goal met) and secondary measures considered at 36 months, participants in all treatment groups did as well, or better, than they did at 12 months. This included psychological distress and depression as well as the gambling measures. Across all treatment groups there was a trend for problem gambling severity (PGSI-3) to decrease at each successive assessment point throughout the trial and at follow-up. These assessments focus on overall group outcomes at different time points following treatment. They do not consider individual client trajectories over time. From inspection of the scatterplots (Figures A to D) it is evident that there is substantial variability at an individual level. While most individuals follow the median over time, others have more variable pathways. Consideration of individual trajectories including transitions between different gambling intensity states is outside the scope of this report. Analysis of this type has potential to advance understanding of how treatment works as well as longer term recovery and relapse processes. Additional analyses could also examine relationships between changes on different measures over time. It appears likely that gambling involvement and problems, psychological distress and depression are strongly linked and change together over time, while smoking and alcohol misuse are independent or only weakly linked to changes in gambling participation.

Study participants had high rates of smoking and hazardous alcohol use. While there were substantial reductions in gambling participation and problems, as well as reductions in psychological distress and disorder, relatively little or no change was found for smoking and hazardous alcohol use. Further research is required to better understand relationships between gambling, problem gambling and these two forms of substance use/misuse. Again, examination of individual trajectories would be helpful. Among other things this could assess the extent to which changes in gambling behaviour (decreases and increases) leads to changes in substance use and misuse. Future studies could also assess the impact of the addition of substance use/misuse interventions to problem gambling treatments.

As hypothesised, on most measures, differences in efficacy outcomes between the MI+W+B group and each of the other groups were the same at 36 months as they were at 12 months. However, in the case of problem gambling (PGSI-12), there are some notable differences. This measure is of particular interest because an important treatment objective is to cease being a problem gambler. At baseline, almost all participants scored above the PGSI-12 cut score of 8 and were classified as problem gamblers. The median score in all four treatment groups was 17, indicating very serious problems. At the end of the trial, while there were substantial improvements on a number of gambling participation and other outcome measures, more than

half (range of 55% to 67% across the four groups) remained problem gamblers. Consistent with this, median PGSI-12 scores also decreased, but remained just above the cut score (range of 9 to 10).

Discrepancy between outcome measures was not unexpected. The PGSI-12 is a past 12 months measure whereas the others are of much shorter duration. Even if a participant has ceased or greatly reduced gambling for a period of many months or longer, a number of the adverse consequences of their previous gambling may persist. In comparison to the other groups, the percentage of past 12 months problem gamblers in the MI+W+B condition decreased markedly from 12 to 36 months (from 67% to 24%). This change was also reflected in the reduction in median score from 10 to one. More modest reductions occurred in the other, less intensive conditions (range of 55% to 64% at 12 months; 41% to 48% at 36 months). At 36 months, median scores for these groups ranged from three to seven. People with PGSI scores from three to seven are classified as moderate-risk gamblers. MI+W+B participants, relative to their MI and TAU counterparts, also reported greater treatment success (quit or improved) at 36 months than they did at 12 months.

As mentioned, in the clinical trial it was hypothesised that while the treatments would have similar effects short-term, the MI+W+B intervention would perform better longer term. For the most part, all treatments were similarly effective during this period. However, the greater perceived control over gambling finding considered in conjunction with the finding that some MI+W+B subgroups obtained better outcomes in that treatment, suggested that the most intensive treatment might outperform the others in the longer term. The follow-up results indicate that while all treatment groups evidenced similar or somewhat superior outcomes at 36 months compared to 12 months, some clinically significant differences emerged in the MI+W+B group, most notably a substantial reduction from 12 to 36 months in the proportion still meeting the PGSI-12 criteria for problem gambling, and an increase in the proportion reporting treatment success. This finding underlines the importance of examining treatment outcomes beyond the typical 12 to 24 month period. It also indicates that while 'more' is not better than 'less' in the short to medium term, it can be in the longer term.

It is uncertain why MI+W+B participants continued to improve relatively more after 12 months with respect to problem gambling symptomatology and treatment success. One possibility is that it was, at least in part, a consequence of the increase over time in the proportion of participants with a controlled gambling treatment goal. At baseline around a fifth had this goal. This increased to over half at 12 and 36 months. As mentioned, at 12 months, MI+W+B participants with controlled gambling goals did significantly better on a number of measures than participants with this goal who were in other treatment groups. Participants with a current goal of controlling rather than abstaining from gambling at 36 months had lower levels of gambling participation, substantially lower PGSI-12 scores, reported greater control over gambling, experienced less psychological distress and had lower rates of major depression.

It was hoped that it would be possible to examine potential 36 months subgroup differences in response to the different treatments. This was possible to some extent but was constrained by reduced sample size. There are indications that participants with low hazardous alcohol use and non-Māori in the MI+W+B condition did better at 36 months than their counterparts in MI and TAU. However this was only with respect to one outcome measure (treatment goal achieved) and the statistical model was somewhat unstable. Consequently these findings should be treated with caution. However, the 36 month alcohol findings are consistent with what was found at 12 months.

At 36 months, participants were asked about major life events experienced during the past two years and whether or not they considered that particular events had influenced their level of

gambling. They were also asked if anything else had influenced their gambling or abstinence from gambling. Responses to open-ended questions were assessed qualitatively. Additionally, life events were examined quantitatively in relation to gambling and a number of other 36 month outcome measures. In most treatment groups, proportionately more problem gamblers than non-problem gamblers reported a number of events including divorce/separation, injury/illness, increase in arguments, moved city and change in working/living conditions. Differences were not apparent for other events. Participants who experienced some events (namely legal difficulties and an increase in arguments) relative to those who did not had significantly higher levels of psychological distress and problem gambling severity and less control over gambling at 36 months. Divorce/separation was also associated with problem gambling severity. Having a major illness or injury was associated with higher psychological distress.

All of the events mentioned in the preceding paragraph were also associated with major depression. Caution is required in interpreting these results. Sample size was often small and all measures were assessed at 36 months, meaning that the analyses were cross-sectional. This means that the temporal nature of these relationships is uncertain and causation cannot be inferred. From the qualitative commentary it appears that a number of these events contributed to relapse or continued gambling problems. About a fifth of participants believed that life events had contributed to reductions in their gambling and a similar proportion were of the view that they had led to increased gambling. It appears that a number of the events, (e.g. a relationship breakup or change in financial situation) had positive outcomes for some clients and negative outcomes for others. Participants mentioned a number of factors, additional to major life events that they believed contributed to their gambling outcomes. This information, while exploratory and qualitative, has relevance to relapse prevention and the maintenance of therapy gains.

The 12 month trial findings are consistent with those of a number of other studies in the gambling and wider addictions field that indicate that brief interventions, at least in some circumstances, can be as effective as longer term, more intensive therapies (Carlbring et al., 2010; Toneatto & Dragonetti, 2008). The trial's initial large sample size allowed potential subgroup outcome differences to be identified as well as assessment of treatment durability. As discussed, at 12 months there were no outcome differences between the four treatment groups with respect to the primary and most secondary outcome measures. However, at that assessment point, some subgroups within the group that had received the most intensive MI+W+B intervention did better than their counterparts who received less intensive interventions, albeit generally on only one or two measures. The 36 month sample was not sufficiently large to adequately examine potential subgroup differences within and across the treatment groups. At 36 months, there were substantially less problem gamblers in the most intensive group than in the other groups, and participants in this group also reported higher levels of treatment success. While requiring replication and further investigation, on the basis of these findings consideration could be given to offering MI+W+B type interventions to most or all helpline callers, with particular encouragement being given to those subgroups that were found to have better 12 month outcomes in this condition. These groups included people with more serious gambling problems and associated morbidities, as well as those with controlled gambling treatment goals.

Although the MI+W+B intervention is referred to as intensive, this is only relative to other interventions in the trial. All are brief interventions. Interestingly, the outcomes achieved, especially in the MI+W+B intervention, appear to be comparable to those found in trials of more intensive, multi-session therapies. This is unlikely to be because helpline callers had less serious gambling problems than participants in other trials. Most had very high PGSI scores as well as high levels of psychological distress, depressive symptomatology, alcohol misuse and

other morbidities. However, uncertainty will remain regarding the effectiveness of the trial interventions relative to longer duration therapies until they have been compared directly in clinical trials. The research team that conducted the present study has recently been contracted to undertake a study of this type, comparing the MI+W+B intervention with multi-session CBT therapy. Like the present study, this randomised clinical trial (RCT) will be embedded within the operations of a gambling treatment provider, in this case delivered face-to-face rather than via telephone. Additionally, the new trial has been powered to ensure that sufficient Māori and Pacific participants are recruited into the study, which will enable subgroup analyses of treatment effects for these ethnicities. This should address some of the knowledge gaps regarding optimal treatment approaches for these populations.

While there were significant improvements at 12 and 36 months, moderately high rates of problem gambling remained at 12 months for all intervention groups and at 36 months for groups other than MI+W+B. However, even in the latter group, nearly a quarter remained problem gamblers. Additionally, by 36 months there was no reduction in rates of alcohol misuse. Motivational interviewing and helplines are generally regarded as entry points into a process of change that includes more structured face-to-face therapy as well as other formal and informal intervention and support. Given that only a third of study participants reported accessing additional gambling treatment and that these people had similar outcomes to those who did not, it is probable that many, perhaps most, problem gamblers can make significant improvements without receiving further treatment. This is consistent with the findings of general population studies that find quite high rates of natural recovery, albeit that people with more severe problems and co-morbidities appear to be more prone to relapse (Abbott, Williams & Volberg, 1994; Abbott, Bellringer, Garrett & Mundy-McPherson, in press). Given that this is probably the case, offering medium to long-term treatment to most or all problem gamblers would be inefficient and unnecessary. Nevertheless, a substantial minority of clients will require additional assistance to attain their treatment goals.

From the foregoing, in addition to considering using MI+W+B as the starting point for the majority of helpline callers, it would be worth considering its use as the initial intervention offered to people seeking face-to-face gambling treatment services. The results of the new clinical trial will inform this consideration. In either context, telephone or face-to-face, those who do not make progress could be stepped up to more intensive face-to-face or other interventions for problem gambling and/or other morbidities. Given that most change occurred during the first three months, this would seem an optimal time to assess progress and reach a decision regarding the recommendation of additional intervention or not. From analyses to date there is insufficient information to identify which clients at three months are likely to remain problem gamblers at 12 or 36 months and which are likely to recover. Examination of individual client trajectories over time in the present study, the associated outcome study and the planned face-to-face RCT should provide relevant information. In the meantime, it would be prudent to assess client outcomes at three months and inform clients who have not made substantial progress that they may require additional assistance to attain their treatment goals.



6. OTHER INFORMATION

6.1 Registration

The trial is registered with the Australian New Zealand Clinical Trials Registry (ANZCTR), study registration number: ACTRN12609000560291.

6.2 Protocol

Full details of the trial protocol are maintained by the Gambling and Addictions Research Centre, National Institute for Public Health and Mental Health Research, School of Public Health and Psychosocial Studies, Faculty of Health and Environmental Sciences, Auckland University of Technology, Private Bag 92006, Auckland 1142, New Zealand.

6.3 Funding

The trial and 36 month follow-up assessment were funded by the New Zealand Ministry of Health. The funder had no role in study design, data collection and analysis, or reporting, although they approved each of those stages and had the right to suggest changes. Final decision on content was exclusively retained by the trial investigators.



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APPENDIX 1

Ethical approval



Health and Disability Ethics Committees
1 the Terrace
PO Box 5013
Wellington
0800 4 ETHICS
hdec@mh.govt.nz

22 August 2012

Professor Max Abbott
Auckland University of Technology
National Institute for Public Health & mental Health
Private Bag 92006
Auckland 1142

Dear Professor Abbott

Ethics ref: **MEC/09/04/043** (please quote in all correspondence)
Study title: Effectiveness study of problem gambling standard and brief interventions

I am pleased to advise that this amendment has been approved by the Northern B Health and Disability Ethics Committee. This decision was made through the expedited review pathway.

Please don't hesitate to contact the HDEC secretariat for further information.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'R. Sporle'.

Mrs Raewyn Sporle
Chairperson
Northern B Health and Disability Ethics Committee

Encl: appendix A: documents submitted

APPENDIX 2

List of primary and secondary efficacy outcomes

Primary outcomes

Name	Full name	Description	Availability					Inferential/ Descriptive
			BL	3 m	6m	12m	36m	
P1_Days_Gambled	Self-reported number of days when gambling occurred	Positive real, expressed as days per month	√	√	√	√	√	I
P2_Money_Lost	Self-reported amount of money lost per day	Positive real, expressed as dollars per day	√	√	√	√	√	I
P3_Gambling_QorI	Self-reported gambling	Dichotomous 0=no/1=yes	--	√	√	√	√	I

Secondary outcomes

Name	Full name	Description	Availability					Inferential/ Descriptive
			BL	3m	6m	12m	36m	
Gambling severity								
S1_1_3_PGSI-12	Problem Gambling Severity Index 12 months	Nine-item score	√	--	--	√	√	D
S1_1_2_PGSI-3	Problem Gambling Severity Index 3 months	Nine-item score	√	√	√	√	√	I
S1_2_Control	Control over gambling behaviour	Control over gambling behaviour	√	√	√	√	√	I
Comorbidity and substance use								
S2_1_Kessler-10	Mental Health Kessler - 10, past 4 weeks	Score	√	√	√	√	√	I
S2_2_AUDIT-C	AUDIT-C	Score 0-12	√	√	√	√	√	D
S2_3_DAST	Drug Abuse Screening Test	Score, 10 items	√	--	--	√	√	D
S2_4_1_PRIME-MD_PHQ-9	PRIME-MD Major depressive disorder	Dichotomous 0=No/1=Yes	√	--	--	√	√	I
S2_4_2_PRIME-MD_Dysth	PRIME-MD Dysthymia	Dichotomous 0=No/1=Yes	√	--	--	√	√	D
S2_4_3_PRIME-MD_MinorDep	PRIME-MD Minor depressive disorder	Dichotomous 0=No/1=Yes	√	--	--	√	√	D
S2_4_5_PRIME-MD_Bipolar	PRIME-MD Bipolar disorder	Dichotomous 0=No/1=Yes	√	--	--	√	√	D
S2_6_TxMH12	Treatment received for mental health problem in previous 12 months	Dichotomous 0=No/1=Yes	√	--	--	√	√	D
S2_7_RxMH12	Prescription received for mental health in previous 12 months	Dichotomous 0=No/1=Yes	√	--	--	√	√	D
Goal setting and motivation								
S5_2_Motivation	How motivated	10-point Likert	√	√	√	√	√	I

APPENDIX 3

Subgroups and alternative risk factors

Demographic and baseline severity covariates used for subgroup analyses (applies to Hypothesis 1 and Hypothesis 2 sub-hypotheses)

Name	Full name	Description	Original variable name(s)
<i>Demographic covariates</i>			
C2_4_2_Eth_ Māori	Māori ethnicity	Dichotomous 0=No/1=Yes	BLQ5_6a-BLQ5_6d
<i>Gambling severity</i>			
S1_1_1_PGSI-12	PGSI-12 (at baseline only)	Problem Gambling Severity Index 12 months (dichotomised by median)	BLQ1_15-BLQ1_23
<i>Comorbidities</i>			
C9_1_K10MH_dich	Mental health comorbidities based in Kessler-10 score	K-10 score (dichotomised by cut point of 20)	BLQ4_6-BLQ4_15
C9_2_AUDITC_dich	Alcohol abuse based in AUDIT-C score	AUDIT-C score (dichotomised by cut point of 4 for males and 3 for females)	BLQ3_4

Risk factors collected at 36 months for alternate analyses (Hypothesis 3)

Variable name	Variable description	Values	Original name
<i>Assistance</i>			
C4_5_Assist_any	Received any assistance in past 6 months	Dichotomous 0=No/1=Yes	F4Q_Q2.4a-Q2.4j
C5_6_Assist_informal	Received assistance from any person in past 6 months	Dichotomous 0=No/1=Yes	F4Q_Q2.4g-Q2.4j
E3_7_Assist_formal	Received assistance from any treatment service in the past six months	Dichotomous 0=No/1=Yes	F4Q_Q2.4a-Q2.4f
<i>Goal setting</i>			
C6_1_Current_goal	Current goal	Categorical, 5 levels	F4Q_Q2.1
C6_1_1_Current_goal_dich	Current goal, dichotomised	Dichotomous, 0=Quit 1=Control	F4Q_Q2.2
<i>Significant life events</i>			
CA_01_Death	Death of someone close	Dichotomous 0=No/1=Yes	F4Q_Q1.6
CA_02_DivSep	Legal difficulties	Dichotomous 0=No/1=Yes	F4Q_Q1.7
CA_03_Legal	Death of someone close	Dichotomous 0=No/1=Yes	F4Q_Q1.8
CA_04_InjIll	Injury or illness	Dichotomous 0=No/1=Yes	F4Q_Q1.9
CA_05_Marriage	Marriage or new relationship	Dichotomous 0=No/1=Yes	F4Q_Q1.10
CA_06_WorkTrouble	Troubles with work, boss, superiors	Dichotomous 0=No/1=Yes	F4Q_Q1.11

Variable name	Variable description	Values	Original name
CA_07_Retire	Retirement	Dichotomous 0=No/1=Yes	F4Q_Q1.12
CA_08_Preg	Pregnancy or new family additions	Dichotomous 0=No/1=Yes	F4Q_Q1.13
CA_09_Financial	Major change to financial situation	Dichotomous 0=No/1=Yes	F4Q_Q1.14
CA_10_Loan	Mortgage, loan, big purchase	Dichotomous 0=No/1=Yes	F4Q_Q1.15
CA_11_Arguments	Increase in number of arguments	Dichotomous 0=No/1=Yes	F4Q_Q1.16
CA_12_MovingHouse	Moving house	Dichotomous 0=No/1=Yes	F4Q_Q1.17
CA_13_MovingCity	Moving to a new town/city	Dichotomous 0=No/1=Yes	F4Q_Q1.18
CA_14_MajorChange	Major change in living or working conditions	Dichotomous 0=No/1=Yes	F4Q_Q1.19
CA_15_EQ	Earthquake/natural disaster	Dichotomous 0=No/1=Yes	F4Q_Q1.20

APPENDIX 4

Descriptive statistics

Table 4: 1: Socio-demographics

Group 1: TAU		Assessment month				
		0	3	6	12	36
Gender	Male	41.4%	41.0%	41.3%	41.0%	45.7%
	Female	58.6%	59.0%	58.7%	59.0%	54.4%
	N	116	100	92	78	46
Marital status	Never married	25.2%	25.0%	23.9%	24.4%	26.1%
	Married	23.5%	25.0%	25.0%	24.4%	17.4%
	De facto	24.3%	22.0%	22.8%	20.5%	19.6%
	Separated	13.9%	14.0%	12.0%	12.8%	17.4%
	Divorced	8.7%	10.0%	10.9%	12.8%	13.0%
	Widowed	4.3%	4.0%	5.4%	5.1%	6.5%
	N	115	100	92	78	46
Age group	18-24 years	15.2%	14.1%	14.3%	9.0%	8.9%
	25-34 years	22.3%	20.2%	20.9%	20.5%	22.2%
	35-44 years	23.2%	23.2%	19.8%	23.1%	24.4%
	45-54 years	24.1%	26.3%	27.5%	29.5%	33.3%
	55+ years	15.2%	16.2%	17.6%	18.0%	11.1%
	N	112	99	91	78	45
Prioritised ethnicity	Māori	40.5%	40.0%	40.2%	37.2%	43.5%
	Pacific	11.2%	10.0%	8.7%	6.4%	2.2%
	Asian & Other	3.0%	3.0%	3.3%	3.9%	4.4%
	European	47.0%	47.0%	47.8%	52.6%	50.0%
	N	116	100	92	78	46
Employment status	Full time	44.3%	48.0%	50.0%	52.6%	54.4%
	Part time	13.0%	12.0%	10.9%	12.8%	13.0%
	Homemaker	7.8%	8.0%	7.6%	5.1%	4.4%
	Student	5.2%	4.0%	4.4%	3.9%	6.5%
	Retired	2.6%	3.0%	2.2%	1.3%	2.2%
	Unemployed	11.3%	10.0%	10.9%	11.5%	6.5%
	Illness/sick leave	6.1%	7.0%	4.4%	6.4%	6.5%
	Other	9.6%	8.0%	9.8%	6.4%	6.5%
	N	115	100	92	78	46
Highest educational qualification achieved	None	25.9%	27.0%	23.9%	24.4%	19.6%
	Secondary school qualification	33.6%	33.0%	34.8%	34.6%	32.6%
	Trade or technical certificate	18.1%	18.0%	18.5%	18.0%	19.6%
	Professional qualification	3.4%	2.0%	2.2%	2.6%	-
	Undergrad. Dip. or Cert.	7.8%	8.0%	7.6%	7.7%	8.7%
	Undergrad. Degree	6.0%	7.0%	7.6%	7.7%	8.7%
	Postgrad. Dip. or Cert.	1.7%	1.0%	1.1%	1.3%	2.2%
	Postgrad. Degree	3.4%	4.0%	4.4%	3.9%	8.7%
	N	116	100	92	78	46
Gross family income in last 12 months	≤\$20,000	26.9%	24.4%	21.7%	23.2%	26.8%
	\$20,001-\$30,000	16.3%	16.7%	14.5%	14.5%	9.8%
	\$30,001-\$50,000	23.1%	23.3%	26.5%	21.7%	22.0%
	\$50,001-\$100,000	24.0%	24.4%	26.5%	29.0%	31.7%
	\$100,001-\$200,000	7.7%	8.9%	8.4%	8.7%	4.9%
	\$200,001+	1.9%	2.2%	2.4%	2.9%	4.9%
	N	104	90	83	69	41

Group 2: MI		Assessment month				
		0	3	6	12	36
Gender	Male	47.3%	45.5%	51.3%	48.5%	47.5%
	Female	52.7%	54.5%	48.7%	51.5%	52.5%
	N	112	88	78	66	40
Marital status	Never married	30.3%	31.8%	32.9%	31.3%	30.8%
	Married	21.1%	22.4%	22.4%	25.0%	18.0%
	De facto	21.1%	21.2%	21.1%	17.2%	23.1%
	Separated	14.7%	10.6%	9.2%	9.4%	7.7%
	Divorced	12.8%	14.1%	14.5%	17.2%	20.5%
	Widowed	0.0%	31.8%	32.9%	31.3%	30.8%
	N	109	85	76	64	39
Age group	18-24 years	11.6%	10.2%	12.8%	9.1%	10.0%
	25-34 years	33.0%	31.8%	25.6%	25.8%	30.0%
	35-44 years	19.6%	21.6%	21.8%	22.7%	17.5%
	45-54 years	22.3%	21.6%	24.4%	25.8%	20.0%
	55+ years	13.4%	14.8%	15.4%	16.7%	22.5%
	N	112	88	78	66	40
Prioritised ethnicity	Māori	39.3%	33.0%	32.1%	30.3%	32.5%
	Pacific	16.1%	15.9%	15.4%	12.1%	7.5%
	Asian & Other	2.7%	2.3%	2.6%	3.0%	2.5%
	European	42.0%	48.9%	50.0%	54.6%	57.5%
	N	112	88	78	66	40
Employment status	Full time	44.1%	43.7%	49.4%	46.2%	43.6%
	Part time	11.7%	11.5%	13.0%	12.3%	15.4%
	Homemaker	8.1%	9.2%	9.1%	9.2%	5.1%
	Student	3.6%	3.5%	2.6%	3.1%	5.1%
	Retired	1.8%	2.3%	2.6%	3.1%	5.1%
	Unemployed	18.0%	16.1%	10.4%	12.3%	12.8%
	Illness/sick leave	3.6%	3.5%	3.9%	3.1%	-
	Other	9.0%	10.3%	9.1%	10.8%	12.8%
	N	111	87	77	65	39
Highest educational qualification achieved	None	19.6%	20.5%	19.2%	18.2%	17.5%
	Secondary school qualification	31.3%	31.8%	29.5%	31.8%	20.0%
	Trade or technical certificate	24.1%	27.3%	29.5%	24.2%	32.5%
	Professional qualification	7.1%	5.7%	6.4%	7.6%	10.0%
	Undergrad. Dip. or Cert.	6.3%	4.6%	5.1%	6.1%	7.5%
	Undergrad. Degree	3.6%	3.4%	3.9%	4.6%	7.5%
	Postgrad. Dip. or Cert.	1.8%	2.3%	2.6%	3.0%	2.5%
	Postgrad. Degree	6.3%	4.6%	3.9%	4.6%	2.5%
	N	112	88	78	66	40
Gross family income in last 12 months	≤\$20,000	17.6%	15.5%	13.5%	12.5%	10.5%
	\$20,001-\$30,000	22.2%	26.2%	24.3%	26.6%	26.3%
	\$30,001-\$50,000	19.4%	20.2%	21.6%	18.8%	21.1%
	\$50,001-\$100,000	31.5%	29.8%	31.1%	31.3%	31.6%
	\$100,001-\$200,000	7.4%	7.1%	8.1%	9.4%	10.5%
	\$200,001+	1.9%	1.2%	1.4%	1.6%	-
	N	108	84	74	64	38

Group 3: MI+W		Assessment month				
		0	3	6	12	36
Gender	Male	45.3%	47.4%	44.8%	44.2%	52.5%
	Female	54.7%	52.6%	55.2%	55.8%	47.5%
	N	117	97	87	77	40
Marital status	Never married	34.2%	30.5%	30.2%	29.0%	30.8%
	Married	22.8%	25.3%	24.4%	25.0%	30.8%
	De facto	25.4%	25.3%	26.7%	23.7%	15.4%
	Separated	10.5%	12.6%	12.8%	14.5%	18.0%
	Divorced	4.4%	3.2%	3.5%	5.3%	-
	Widowed	2.6%	3.2%	2.3%	2.6%	5.1%
	N	114	95	86	76	39
Age group	18-24 years	8.5%	5.1%	6.8%	6.4%	5.0%
	25-34 years	27.1%	24.5%	23.9%	20.5%	17.5%
	35-44 years	30.5%	32.7%	30.7%	32.1%	25.0%
	45-54 years	22.0%	24.5%	26.1%	26.9%	35.0%
	55+ years	11.9%	13.3%	12.5%	14.1%	17.5%
	N	118	98	88	78	40
Prioritised ethnicity	Māori	43.2%	39.8%	43.2%	43.6%	55.0%
	Pacific	7.6%	9.2%	9.1%	7.7%	7.5%
	Asian & Other	4.2%	5.1%	3.4%	3.8%	5.0%
	European	44.9%	45.9%	44.3%	44.9%	32.5%
	N	118	98	88	78	40
Employment status	Full time	41.5%	40.8%	40.9%	39.7%	35.0%
	Part time	14.4%	16.3%	15.9%	18.0%	17.5%
	Homemaker	5.1%	5.1%	4.6%	3.9%	2.5%
	Student	5.1%	6.1%	6.8%	6.4%	7.5%
	Retired	2.5%	3.1%	3.4%	3.9%	5.0%
	Unemployed	11.9%	9.2%	8.0%	10.3%	7.5%
	Illness/sick leave	5.9%	5.1%	5.7%	3.9%	7.5%
	Other	13.6%	14.3%	14.8%	14.1%	17.5%
	N	118	98	88	78	40
Highest educational qualification achieved	None	21.4%	18.4%	19.5%	19.5%	12.5%
	Secondary school qualification	36.8%	39.8%	39.1%	36.4%	30.0%
	Trade or technical certificate	21.4%	20.4%	19.5%	20.8%	30.0%
	Professional qualification	4.3%	5.1%	5.8%	6.5%	5.0%
	Undergrad. Dip. or Cert.	6.0%	7.1%	6.9%	5.2%	5.0%
	Undergrad. Degree	6.0%	6.1%	5.8%	7.8%	10.0%
	Postgrad. Dip. or Cert.	1.7%	2.0%	2.3%	2.6%	5.0%
	Postgrad. Degree	2.6%	1.0%	1.2%	1.3%	2.5%
	N	117	98	87	77	40
Gross family income in last 12 months	≤\$20,000	23.0%	22.3%	22.6%	21.6%	21.6%
	\$20,001-\$30,000	14.2%	14.9%	14.3%	13.5%	21.6%
	\$30,001-\$50,000	32.7%	29.8%	31.0%	32.4%	32.4%
	\$50,001-\$100,000	23.0%	25.5%	26.2%	27.0%	21.6%
	\$100,001-\$200,000	7.1%	7.5%	6.0%	5.4%	2.7%
	\$200,001+	-	-	-	-	-
	N	113	94	84	74	37

Group 4: MI+W+B		Assessment month				
		0	3	6	12	36
Gender	Male	55.2%	54.0%	51.2%	49.3%	56.5%
	Female	44.8%	46.0%	48.8%	50.7%	43.5%
	N	116	87	82	73	46
Marital status	Never married	32.8%	32.8%	33.3%	29.3%	24.7%
	Married	25.0%	25.0%	25.3%	28.1%	28.8%
	De facto	26.7%	26.7%	25.3%	24.4%	27.4%
	Separated	10.3%	10.3%	10.3%	12.2%	12.3%
	Divorced	3.4%	3.5%	4.6%	4.9%	5.5%
	Widowed	1.7%	1.7%	1.2%	1.2%	1.4%
	N	116	87	82	73	46
Age group	18-24 years	19.0%	17.2%	14.6%	13.7%	15.2%
	25-34 years	29.3%	28.7%	28.1%	26.0%	23.9%
	35-44 years	17.2%	14.9%	15.9%	15.1%	19.6%
	45-54 years	25.0%	28.7%	30.5%	34.3%	34.8%
	55+ years	9.5%	10.3%	11.0%	11.0%	6.5%
	N	116	87	82	73	46
Prioritised ethnicity	Māori	36.2%	35.6%	36.6%	38.4%	37.0%
	Pacific	10.3%	10.3%	11.0%	9.6%	8.7%
	Asian & Other	6.0%	4.6%	3.7%	4.1%	2.2%
	European	47.4%	49.4%	48.8%	48.0%	52.2%
	N	116	87	82	73	46
Employment status	Full time	48.7%	50.6%	47.6%	49.3%	60.9%
	Part time	9.6%	9.2%	12.2%	13.7%	6.5%
	Homemaker	9.6%	11.5%	12.2%	11.0%	8.7%
	Student	3.5%	4.6%	3.7%	1.4%	2.2%
	Retired	3.5%	2.3%	2.4%	1.4%	2.2%
	Unemployed	11.3%	12.6%	12.2%	15.1%	10.9%
	Illness/sick leave	3.5%	2.3%	2.4%	1.4%	2.2%
	Other	10.4%	6.9%	7.3%	6.9%	6.5%
	N	115	87	82	73	46
Highest educational qualification achieved	None	18.3%	17.2%	17.1%	17.8%	10.9%
	Secondary school qualification	36.5%	36.8%	36.6%	38.4%	45.7%
	Trade or technical certificate	22.6%	19.5%	22.0%	20.6%	17.4%
	Professional qualification	4.3%	4.6%	4.9%	4.1%	6.5%
	Undergrad. Dip. or Cert.	8.7%	9.2%	8.5%	8.2%	8.7%
	Undergrad. Degree	7.0%	9.2%	7.3%	6.9%	8.7%
	Postgrad. Dip. or Cert.	0.0%	3.5%	3.7%	4.1%	2.2%
	Postgrad. Degree	2.6%	17.2%	17.1%	17.8%	10.9%
	N	115	87	82	73	46
Gross family income in last 12 months	≤\$20,000	19.3%	14.8%	16.9%	12.9%	11.4%
	\$20,001-\$30,000	13.8%	16.1%	15.6%	17.1%	13.6%
	\$30,001-\$50,000	33.9%	30.9%	29.9%	30.0%	27.3%
	\$50,001-\$100,000	23.9%	29.6%	28.6%	31.4%	36.4%
	\$100,001-\$200,000	8.3%	8.6%	9.1%	8.6%	11.4%
	\$200,001+	0.9%	-	-	-	-
	N	109	81	77	70	44

Table 4: 2: Significant life events experienced in past two years, assessed at 36 months

	TAU	MI	MI+W	MI+W+B
Death of someone close (%)	45.7	40.0	30.0	43.5
Divorce or separation (%)	21.7	15.0	25.0	21.7
Legal difficulties (%)	17.4	12.5	12.5	10.9
Major injury or illness to self or someone close (%)	34.8	45.0	22.5	23.9
Marriage or finding a relationship (%)	26.1	20.0	12.5	17.4
Troubles with work, boss or superiors (%)	32.6	22.5	17.5	17.4
Retirement (%)	2.2	0.0	2.5	2.2
Pregnancy or new family additions (%)	19.6	22.5	17.5	23.9
Major change to financial situation (%)	50.0	45.0	40.0	47.8
Taking on mortgage, loan or making a big purchase (%)	23.9	25.0	15.0	13.0
Increased arguments with someone close (%)	28.3	25.0	25.0	23.9
Moving house (%)	41.3	27.5	32.5	41.3
Moving to new town/city (%)	15.2	7.5	17.5	17.4
Major change in living or work (%)	52.2	42.5	52.5	50.0
Experienced earthquake or other natural disaster (%)	15.2	12.5	22.5	17.4
Experienced other significant event (%)	6.5	15.0	12.5	8.7
<i>N</i>	46	40	40	46
<i>N MISSING</i>	0	0	0	0

Table 4: 3: Primary efficacy outcomes - gambling, money lost and gambling-quit or improved

		TAU					MI					MI+W					MI+W+B				
		Base-line	3m	6m	12m	36m	Base-line	3m	6m	12m	36m	Base-line	3m	6m	12m	36m	Base-line	3m	6m	12m	36m
Days gambled per month	MEAN	9.0	3.2	2.6	3.0	2.4	8.2	3.3	3.4	3.5	2.2	8.8	3.5	3.4	3.2	2.5	8.3	3.1	2.6	2.7	2.4
	STD	7.2	4.3	3.5	4.0	2.9	6.0	4.4	4.8	4.8	2.6	6.6	5.2	5.7	4.4	3.2	6.2	3.8	3.1	3.2	2.9
	MIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0
	Q1	3.5	0.3	0.0	0.5	0.0	4.0	0.8	0.7	0.3	0.1	4.5	0.3	0.0	0.5	0.0	4.5	0.3	0.0	0.2	0.0
	MEDIAN	7.5	1.7	1.0	1.5	1.8	7.0	2.2	2.0	2.0	1.8	6.0	1.7	1.0	1.8	1.0	6.5	1.7	1.5	1.5	1.9
	Q3	13.0	4.7	4.0	4.3	4.2	11.5	4.3	4.3	4.3	4.0	12.0	4.7	4.5	4.3	4.0	10.0	5.0	4.3	4.5	4.0
	MAX	30.0	25.3	16.7	25.3	12.5	30.0	28.7	30.0	29.7	13.0	31.5	30.0	30.0	24.0	12.7	30.0	18.0	16.3	13.2	16.0
	N	111	100	92	78	46	95	88	78	66	40	109	98	88	78	40	109	87	82	73	46
	N MISSING	5	0	0	0	0	17	0	0	0	0	9	0	0	0	0	7	0	0	0	0
Money lost per day (\$)	MEAN	42.9	9.5	7.2	9.7	7.4	53.2	9.8	14.3	13.4	6.8	48.6	9.2	9.0	7.5	6.5	49.2	9.0	10.6	8.4	5.0
	STD	45.7	20.8	13.2	18.3	12.1	58.8	17.4	42.2	35.4	11.2	69.1	18.3	20.9	12.0	11.4	59.5	14.6	25.0	16.1	11.5
	MIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
	Q1	14.1	0.6	0.0	0.4	0.0	16.4	0.4	0.7	0.3	0.0	18.1	0.2	0.0	0.3	0.0	16.5	0.0	0.0	0.1	0.0
	MEDIAN	29.3	2.6	1.6	2.7	3.2	33.1	2.9	2.9	2.5	2.6	32.1	3.2	1.7	1.8	1.3	31.8	2.5	2.1	2.2	1.2
	Q3	60.6	9.3	6.3	7.3	6.6	70.7	11.5	8.6	9.3	7.5	52.6	9.9	7.4	6.6	6.4	59.5	9.8	10.7	10.1	4.4
	MAX	263.6	166.7	52.6	85.4	52.1	327.2	99.1	320.7	260.1	42.8	646.4	131.6	156.8	55.8	52.6	388.2	66.0	168.9	110.7	57.0
	N	111	100	92	78	46	95	88	78	66	40	109	98	88	78	40	110	87	82	73	46
	N MISSING	5	0	0	0	0	17	0	0	0	0	9	0	0	0	0	6	0	0	0	0
Gambling-quit or improved	YES (%)	-	82.0	71.7	87.2	82.6	-	83.0	87.2	84.8	80.0	-	82.7	71.6	84.6	87.5	-	75.9	73.2	75.3	84.8
	N	-	100	92	78	46	-	88	78	66	40	-	98	88	78	40	-	87	82	73	46
	N MISSING	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0

Table 4: 4: Secondary efficacy outcomes - Problem Gambling Severity Index

		TAU					MI					MI+W					MI+W+B				
		Base-line	3m	6m	12m	36m	Base-line	3m	6m	12m	36m	Base-line	3m	6m	12m	36m	Base-line	3m	6m	12m	36m
Problem Gambling Severity Index - 12 month time frame	MEAN	16.8	-	-	9.2	8.5	17.2	-	-	9.7	6.9	17.3	-	-	9.3	7.0	16.6	-	-	10.0	4.9
	STD	4.6	-	-	6.3	7.6	4.7	-	-	7.3	7.7	4.8	-	-	6.1	7.1	4.6	-	-	6.4	6.6
	MIN	3.0	-	-	0.0	0.0	7.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	5.0	-	-	0.0	0.0
	Q1	14.0	-	-	3.0	1.0	14.0	-	-	4.0	0.0	14.0	-	-	4.0	0.0	13.0	-	-	5.5	0.0
	MEDIAN	17.0	-	-	9.0	7.0	17.0	-	-	9.0	3.0	17.0	-	-	10.0	5.0	17.0	-	-	10.0	1.0
	Q3	20.0	-	-	13.0	13.0	21.0	-	-	14.0	11.0	20.0	-	-	13.0	12.0	20.0	-	-	15.0	7.0
	MAX	25.0	-	-	23.0	27.0	26.0	-	-	25.0	26.0	27.0	-	-	25.0	23.0	25.0	-	-	24.0	22.0
	N	111	-	-	74	46	104	-	-	65	39	106	-	-	77	39	110	-	-	72	45
	N MISSING	5	-	-	4	0	8	-	-	1	1	12	-	-	1	1	6	-	-	1	1
Problem Gambling Severity Index, 3 month time frame	MEAN	17.3	7.8	6.9	6.4	6.5	17.5	8.5	7.5	7.1	6.2	18.2	7.6	6.7	5.3	4.2	17.2	7.6	5.6	5.8	3.7
	STD	5.3	7.0	6.7	6.2	7.3	5.3	6.9	6.8	7.5	7.8	4.7	6.3	7.0	6.1	5.8	5.2	5.8	6.2	6.7	6.1
	MIN	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0
	Q1	14.0	1.0	1.0	0.0	0.5	14.0	3.0	1.0	0.0	0.0	15.0	2.0	0.0	0.0	0.0	14.0	2.0	1.0	0.0	0.0
	MEDIAN	18.0	7.0	5.0	6.0	3.5	17.0	7.0	6.0	4.5	3.0	18.0	6.0	4.0	2.5	1.5	18.0	7.0	3.0	2.0	1.0
	Q3	21.0	13.0	11.0	10.0	13.0	22.0	13.0	12.0	13.0	10.0	22.0	13.0	12.0	10.5	7.0	21.0	12.0	9.0	11.0	4.0
	MAX	27.0	26.0	24.0	23.0	25.0	27.0	27.0	26.0	22.0	26.0	27.0	23.0	25.0	21.0	20.0	27.0	19.0	21.0	27.0	22.0
	N	110	92	85	76	44	106	82	71	66	37	110	89	83	76	36	111	83	77	73	41
	N MISSING	6	8	7	2	2	6	6	7	0	3	8	9	5	2	4	5	4	5	0	5
PGSI, 12 month time frame, dichotomised (≥8 vs. <8)	≥ 8 (%)	97.2	-	-	60.8	47.8	97.7	-	-	55.4	41.0	96.9	-	-	63.6	46.2	95.2	-	-	66.7	24.4
	N	111	-	-	74	46	104	-	-	65	39	106	-	-	77	39	110	-	-	72	45
	N MISSING	5	-	-	4	0	8	-	-	1	1	12	-	-	1	1	6	-	-	1	1
PGSI, 3 month time frame, dichotomised (≥8 vs. <8)	≥ 8 (%)	96.2	43.5	40.0	40.8	36.4	94.4	48.8	43.7	39.4	35.1	99.0	44.9	36.1	34.2	25.0	96.2	48.2	35.1	37.0	19.5
	N	110	92	85	76	44	106	82	71	66	37	110	89	83	76	36	111	83	77	73	41
	N MISSING	6	8	7	2	2	6	6	7	0	3	8	9	5	2	4	5	4	5	0	5

Table 4: 5: Secondary efficacy outcomes - Control over gambling behaviour

		TAU					MI					MI+W					MI+W+B				
		Base-line	3m	6m	12m	36m	Base-line	3m	6m	12m	36m	Base-line	3m	6m	12m	36m	Base-line	3m	6m	12m	36m
Control over gambling behaviour (10-point scale)	MEAN	3.4	6.9	7.2	7.1	7.0	2.8	6.7	6.6	6.7	7.0	2.4	6.9	7.4	7.6	7.5	2.5	7.3	7.7	7.2	8.0
	STD	2.9	2.6	2.8	2.8	2.8	2.3	2.8	3.0	2.9	3.1	2.3	2.8	3.0	2.4	2.9	2.4	2.5	2.3	3.0	2.7
	MIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Q1	1.0	5.0	5.0	6.0	5.0	0.0	5.0	5.0	5.0	5.0	0.0	5.0	5.5	7.0	7.0	0.0	5.0	7.0	5.0	7.0
	MEDIAN	3.0	7.0	8.0	8.0	8.0	2.5	7.0	7.0	7.5	7.0	2.0	7.5	8.5	8.0	8.0	2.0	8.0	8.0	8.0	9.0
	Q3	5.0	9.0	10.0	10.0	10.0	5.0	9.0	9.0	9.0	10.0	4.0	9.0	10.0	10.0	10.0	4.0	10.0	10.0	10.0	10.0
	MAX	10.0	10.0	10.0	10.0	10.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
	N	114	93	87	78	46	109	84	74	66	40	118	94	84	78	40	113	84	77	73	45
	N MISSING	2	7	5	0	0	3	4	4	0	0	0	4	4	0	0	3	3	5	0	1

Table 4: 6: Secondary efficacy outcomes - Co-existing issues

		TAU					MI					MI+W					MI+W+B				
		Base-line	3m	6m	12m	36m	Base-line	3m	6m	12m	36m	Base-line	3m	6m	12m	36m	Base-line	3m	6m	12m	36m
Psychological distress (Kessler-10) 4 week time frame (50-point score)	MEAN	30.2	18.3	18.2	16.2	17.0	29.5	19.1	17.5	17.1	14.9	32.1	19.6	18.7	15.9	15.4	30.3	16.7	16.6	15.1	15.9
	STD	8.1	8.4	7.7	8.6	7.0	9.3	8.0	8.4	7.7	7.8	8.9	9.6	8.8	7.4	7.1	9.2	7.0	7.5	6.7	7.6
	MIN	14.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	12.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
	Q1	24.0	12.0	12.0	10.0	12.0	24.0	13.0	11.0	11.0	10.0	26.0	11.0	12.0	10.0	10.0	23.0	11.0	10.0	10.0	10.0
	MEDIAN	31.0	16.0	16.0	13.0	15.0	28.5	17.0	15.0	14.0	11.0	32.0	16.0	16.0	13.0	12.0	31.0	14.5	14.0	11.5	12.0
	Q3	36.0	22.0	24.0	19.0	21.0	36.0	25.0	21.0	24.0	16.0	39.0	26.0	23.0	20.0	16.0	37.0	20.0	21.0	19.0	18.0
	MAX	50.0	48.0	39.0	50.0	37.0	50.0	38.0	45.0	36.0	40.0	50.0	43.0	47.0	41.0	35.0	49.0	42.0	39.0	34.0	37.0
	N	111	92	87	78	46	104	83	73	65	39	117	93	84	78	40	114	84	76	72	46
	N MISSING	5	8	5	0	0	8	5	5	1	1	1	5	4	0	0	2	3	6	1	0
Hazardous alcohol use (AUDIT-C) (12-point score)	MEAN	4.5	3.5	3.3	3.7	3.8	5.1	3.8	3.5	3.6	3.1	4.9	3.5	3.6	3.6	3.5	5.2	4.4	4.0	4.5	5.0
	STD	3.5	3.2	3.2	3.1	3.4	3.5	3.3	3.4	3.4	3.2	3.6	3.2	3.6	3.4	3.3	3.7	2.8	3.1	3.4	3.1
	MIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Q1	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.5	2.0	2.0	2.0	2.0	3.0
	MEDIAN	5.0	4.0	3.0	3.0	3.0	5.0	4.0	3.0	3.0	2.0	5.0	3.0	3.0	3.0	3.0	5.0	4.0	4.0	5.0	5.0
	Q3	7.0	6.0	6.0	6.0	6.0	8.0	7.0	6.0	6.0	5.0	8.0	6.0	7.0	6.0	6.0	8.0	7.0	6.0	7.0	7.0
	MAX	12.0	12.0	10.0	10.0	10.0	12.0	12.0	12.0	12.0	10.0	12.0	11.0	11.0	12.0	12.0	12.0	10.0	10.0	12.0	12.0
	N	109	93	87	78	46	104	83	73	66	39	109	93	84	78	40	110	83	77	70	44
	N MISSING	7	7	5	0	0	8	5	5	0	1	9	5	4	0	0	6	4	5	3	2
Drug Abuse Screening Test (DAST) (10-point score)	MEAN	0.8	-	-	0.2	0.5	0.9	-	-	0.4	0.5	0.8	-	-	0.4	0.4	0.8	-	-	0.5	0.3
	STD	1.8	-	-	1.2	1.4	2.2	-	-	1.1	1.3	1.9	-	-	1.4	1.4	1.9	-	-	1.3	0.7
	MIN	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
	Q1	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
	MEDIAN	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
	Q3	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
	MAX	8.0	-	-	10.0	8.0	10.0	-	-	6.0	5.0	8.0	-	-	8.0	7.0	9.0	-	-	6.0	3.0
	N	106	-	-	77	46	105	-	-	66	40	108	-	-	78	39	110	-	-	71	45
	N MISSING	10	-	-	1	0	7	-	-	0	0	10	-	-	0	1	6	-	-	2	1
PRIME-MD Major depressive disorder	Yes (%)	57.4	-	-	17.9	28.3	49.0	-	-	22.7	12.5	62.9	-	-	16.7	20.0	50.9	-	-	20.5	17.4
	N	108	-	-	78	46	96	-	-	66	40	105	-	-	78	40	110	-	-	73	46
	N MISSING	8	-	-	0	0	16	-	-	0	0	13	-	-	0	0	6	-	-	0	0
PRIME-MD Dysthymia	Yes (%)	43.5	-	-	32.1	32.6	44.2	-	-	30.3	25.0	44.2	-	-	39.7	30.0	39.1	-	-	29.2	21.7
	N	108	-	-	78	46	95	-	-	66	40	104	-	-	78	40	110	-	-	72	46
	N MISSING	8	-	-	0	0	17	-	-	0	0	14	-	-	0	0	6	-	-	1	0
PRIME-MD Minor depressive disorder	Yes (%)	13.0	-	-	3.8	0	15.8	-	-	4.5	2.5	15.4	-	-	2.6	0	16.4	-	-	1.4	0
	N	108	-	-	78	46	95	-	-	66	40	104	-	-	78	40	110	-	-	72	46
	N MISSING	8	-	-	0	0	17	-	-	0	0	14	-	-	0	0	6	-	-	1	0

Table 4. 6: Secondary efficacy outcomes - Co-existing issues - continued

		TAU					MI					MI+W					MI+W+B				
		Base-line	3m	6m	12m	36m	Base-line	3m	6m	12m	36m	Base-line	3m	6m	12m	36m	Base-line	3m	6m	12m	36m
PRIME-MD Bipolar disorder	Yes (%)	2.9	-	-	4.1	2.2	3.2	-	-	3.1	5.1	3.9	-	-	6.8	2.6	4.5	-	-	7.2	4.5
	N	105	-	-	74	46	94	-	-	65	39	102	-	-	73	38	110	-	-	69	44
	N MISSING	11	-	-	4	0	18	-	-	1	1	16	-	-	5	2	6	-	-	4	2
Treatment received for mental health in previous 12 months	Yes (%)	20.9	-	-	17.9	17.4	24.3	-	-	19.7	20.0	18.6	-	-	19.2	15.0	21.6	-	-	16.4	17.4
	N	115	-	-	78	46	111	-	-	66	40	118	-	-	78	40	116	-	-	73	46
	N MISSING	1	-	-	0	0	1	-	-	0	0	0	-	-	0	0	0	-	-	0	0
Prescription received for mental health in previous 12 months	Yes (%)	22.8	-	-	18.2	26.1	27.7	-	-	28.8	20.0	27.6	-	-	26.9	25.0	24.8	-	-	19.4	21.7
	N	101	-	-	77	46	101	-	-	66	40	105	-	-	78	40	105	-	-	72	46
	N MISSING	15	-	-	1	0	11	-	-	0	0	13	-	-	0	0	11	-	-	1	0

Table 4: 7: Secondary efficacy outcomes - Motivation

		TAU					MI					MI+W					MI+W+B				
		Base-line	3m	6m	12m	36m	Base-line	3m	6m	12m	36m	Base-line	3m	6m	12m	36m	Base-line	3m	6m	12m	36m
How motivated are you to overcome your gambling problem? (10-point Likert scale)	MEAN	8.9	8.8	8.9	8.8	8.4	9.2	8.6	8.5	8.5	8.1	9.0	8.9	9.0	8.8	8.3	9.0	8.5	9.1	8.7	9.5
	STD	1.6	1.7	1.9	1.8	2.3	1.4	2.1	2.2	2.2	2.3	1.9	1.8	1.7	2.0	2.8	1.8	2.0	1.4	2.0	1.0
	MIN	4.0	4.0	0.0	1.0	0.0	4.0	1.0	0.0	0.0	0.0	0.0	3.0	2.0	0.0	0.0	2.0	0.0	5.0	0.0	5.0
	Q1	8.0	8.0	8.0	8.0	7.0	9.0	8.0	8.0	8.0	6.5	8.0	8.0	8.0	8.0	8.0	8.0	8.0	9.0	8.0	9.0
	MEDIAN	10.0	10.0	10.0	10.0	9.5	10.0	10.0	10.0	10.0	9.0	10.0	10.0	10.0	10.0	10.0	10.0	9.5	10.0	10.0	10.0
	Q3	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
	MAX	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
	N	116	92	87	78	44	112	84	74	66	40	117	94	84	78	39	115	84	76	73	44
	N MISSING	0	8	5	0	2	0	4	4	0	0	1	4	4	0	1	1	3	6	0	2

Table 4: 8: Risk factors - Treatment service assistance

		TAU					MI					MI+W					MI+W+B				
		Base-line	3m	6m	12m	36m	Base-line	3m	6m	12m	36m	Base-line	3m	6m	12m	36m	Base-line	3m	6m	12m	36m
Received any assistance (formal and informal) in past 6 months [#]	Yes (%)	-	58.1	47.1	37.2	19.6	-	54.8	50.0	48.5	15.0	-	57.4	46.4	50.0	22.5	-	57.1	55.8	43.8	15.2
	N	-	93	87	78	46	-	84	73	66	40	-	94	84	78	40	-	84	77	73	46
	N MISSING	-	7	5	0	0	-	4	5	0	0	-	4	4	0	0	-	3	5	0	0
Received formal assistance from any treatment service in the past 6 months	Yes (%)	-	26.9	18.4	15.4	15.2	-	25.0	23.0	25.8	5.0	-	20.2	15.5	16.7	12.5	-	23.8	18.2	17.8	4.30
	N	-	93	87	78	46	-	84	74	66	40	-	94	84	78	40	-	84	77	73	46
	N MISSING	-	7	5	0	0	-	4	4	0	0	-	4	4	0	0	-	3	5	0	0
Received informal assistance from any person in past 6 months	Yes (%)	-	39.8	31.0	29.5	4.3	-	36.9	31.5	34.8	2.5	-	41.5	32.1	34.6	0	-	41.7	44.2	35.6	6.50
	N	-	93	87	78	46	-	84	73	66	40	-	94	84	78	40	-	84	77	73	46
	N MISSING	-	7	5	0	0	-	4	5	0	0	-	4	4	0	0	-	3	5	0	0

[#] Includes participants reporting “other” assistance received

APPENDIX 5

Hypothesis 1 subgroup analyses (AUDIT-C, Māori ethnicity, psychological distress, PGSI-12) for days gambled and money lost at 36 months

Outcome	Subgroup [†]	Contrast*	Estimate of contrast	(95% CI) [^]	FWER adjusted p-value	Alternative accepted
Days gambled	Low base AUDIT-C	TAU vs. MI+W+B	0.32	(-0.23 - 1.28)	0.97	No
	High base AUDIT-C	TAU vs. MI+W+B	-0.17	(-0.43 - 0.21)	0.97	No
	Low base AUDIT-C	MI vs. MI+W+B	0.14	(-0.38 - 1.10)	0.97	No
	High base AUDIT-C	MI vs. MI+W+B	-0.04	(-0.35 - 0.44)	0.97	No
	Low base AUDIT-C	MI+W vs. MI+W+B	0.17	(-0.31 - 1.00)	0.97	No
	High base AUDIT-C	MI+W vs. MI+W+B	-0.07	(-0.38 - 0.40)	0.97	No
	Non-Māori	TAU vs. MI+W+B	-0.06	(-0.37 - 0.39)	0.97	No
	Māori	TAU vs. MI+W+B	0.05	(-0.35 - 0.71)	0.97	No
	Non-Māori	MI vs. MI+W+B	-0.14	(-0.42 - 0.29)	0.97	No
	Māori	MI vs. MI+W+B	0.36	(-0.21 - 1.33)	0.97	No
	Non-Māori	MI+W vs. MI+W+B	-0.09	(-0.41 - 0.41)	0.97	No
	Māori	MI+W vs. MI+W+B	0.13	(-0.30 - 0.83)	0.97	No
	Low base Kessler-10	TAU vs. MI+W+B	0.85	(-0.21 - 3.36)	0.97	No
	High base Kessler-10	TAU vs. MI+W+B	-0.13	(-0.37 - 0.21)	0.97	No
	Low base Kessler-10	MI vs. MI+W+B	0.38	(-0.37 - 2.05)	0.97	No
	High base Kessler-10	MI vs. MI+W+B	-0.04	(-0.33 - 0.37)	0.97	No
	Low base Kessler-10	MI+W vs. MI+W+B	0.07	(-0.56 - 1.63)	0.97	No
	High base Kessler-10	MI+W vs. MI+W+B	-0.04	(-0.32 - 0.35)	0.97	No
	Low base PGSI-12	TAU vs. MI+W+B	0.02	(-0.32 - 0.53)	0.97	No
	High base PGSI-12	TAU vs. MI+W+B	-0.11	(-0.44 - 0.42)	0.97	No
	Low base PGSI-12	MI vs. MI+W+B	0.14	(-0.27 - 0.77)	0.97	No
	High base PGSI-12	MI vs. MI+W+B	-0.15	(-0.48 - 0.40)	0.97	No
	Low base PGSI-12	MI+W vs. MI+W+B	-0.06	(-0.39 - 0.44)	0.97	No
	High base PGSI-12	MI+W vs. MI+W+B	0.02	(-0.37 - 0.66)	0.97	No
Money lost	Low base AUDIT-C	TAU vs. MI+W+B	0.85	(-0.16 - 3.07)	0.97	No
	High base AUDIT-C	TAU vs. MI+W+B	0.00	(-0.42 - 0.73)	0.99	No
	Low base AUDIT-C	MI vs. MI+W+B	0.58	(-0.34 - 2.79)	0.97	No
	High base AUDIT-C	MI vs. MI+W+B	-0.04	(-0.46 - 0.71)	0.97	No
	Low base AUDIT-C	MI+W vs. MI+W+B	0.36	(-0.38 - 1.96)	0.97	No
	High base AUDIT-C	MI+W vs. MI+W+B	0.15	(-0.37 - 1.09)	0.97	No
	Non-Māori	TAU vs. MI+W+B	0.29	(-0.28 - 1.29)	0.97	No
	Māori	TAU vs. MI+W+B	0.15	(-0.43 - 1.32)	0.97	No
	Non-Māori	MI vs. MI+W+B	0.25	(-0.30 - 1.23)	0.97	No
	Māori	MI vs. MI+W+B	-0.10	(-0.59 - 0.98)	0.97	No
	Non-Māori	MI+W vs. MI+W+B	0.56	(-0.17 - 1.92)	0.97	No
	Māori	MI+W vs. MI+W+B	-0.10	(-0.55 - 0.80)	0.97	No
	Low base Kessler-10	TAU vs. MI+W+B	1.65	(-0.24 - 8.20)	0.97	No
	High base Kessler-10	TAU vs. MI+W+B	0.09	(-0.33 - 0.76)	0.97	No
	Low base Kessler-10	MI vs. MI+W+B	0.13	(-0.64 - 2.57)	0.97	No
	High base Kessler-10	MI vs. MI+W+B	0.14	(-0.32 - 0.93)	0.97	No
	Low base Kessler-10	MI+W vs. MI+W+B	0.48	(-0.60 - 4.50)	0.97	No
	High base Kessler-10	MI+W vs. MI+W+B	0.10	(-0.33 - 0.81)	0.97	No
	Low base PGSI-12	TAU vs. MI+W+B	0.06	(-0.41 - 0.92)	0.97	No
	High base PGSI-12	TAU vs. MI+W+B	0.49	(-0.25 - 1.93)	0.97	No
	Low base PGSI-12	MI vs. MI+W+B	0.22	(-0.36 - 1.31)	0.97	No
	High base PGSI-12	MI vs. MI+W+B	-0.02	(-0.52 - 1.02)	0.98	No
	Low base PGSI-12	MI+W vs. MI+W+B	0.02	(-0.45 - 0.89)	0.98	No
	High base PGSI-12	MI+W vs. MI+W+B	0.34	(-0.33 - 1.68)	0.97	No

FWER adjustment family: Primary Outcomes Hypothesis 1 | * Contrast is first intervention group listed minus the second | † High base AUDIT-C dichotomised ≥ 4 (male), ≥ 3 (female); Low base AUDIT-C dichotomised < 4 (male), < 3 (female) / High base Kessler-10 dichotomised ≥ 20 ; Low base Kessler-10 dichotomised < 20 / High base PGSI-12 dichotomised > 17 ; Low base PGSI-12 dichotomised ≤ 17 | ^ Confidence intervals correspond to the nominal significance level (unadjusted for multiple testing) and may be considered anti-conservative

APPENDIX 6

Hypothesis 2 subgroup analyses (AUDIT-C, Māori ethnicity, psychological distress, PGSI-12) for days gambled and money lost between 36 months and 12 months

Outcome	Subgroup [†]	Contrast (increase from 12 months to 36 months)*	Estimate of contrast	(95% CI) [^]	FWER adjusted p-value	Alternative accepted
Days gambled	Low base AUDIT-C	TAU vs. MI+W+B	0.28	(-0.29 - 1.32)	0.82	No
	High base AUDIT-C	TAU vs. MI+W+B	-0.20	(-0.47 - 0.21)	0.82	No
	Low base AUDIT-C	MI vs. MI+W+B	0.21	(-0.36 - 1.29)	0.86	No
	High base AUDIT-C	MI vs. MI+W+B	-0.24	(-0.50 - 0.16)	0.82	No
	Low base AUDIT-C	MI+W vs. MI+W+B	0.02	(-0.42 - 0.82)	0.99	No
	High base AUDIT-C	MI+W vs. MI+W+B	-0.04	(-0.38 - 0.50)	0.98	No
	Non-Māori	TAU vs. MI+W+B	-0.18	(-0.47 - 0.26)	0.82	No
	Māori	TAU vs. MI+W+B	0.18	(-0.31 - 1.01)	0.86	No
	Non-Māori	MI vs. MI+W+B	-0.22	(-0.50 - 0.20)	0.82	No
	Māori	MI vs. MI+W+B	0.01	(-0.44 - 0.85)	0.99	No
	Non-Māori	MI+W vs. MI+W+B	-0.11	(-0.45 - 0.42)	0.86	No
	Māori	MI+W vs. MI+W+B	0.13	(-0.33 - 0.91)	0.86	No
	Low base Kessler-10	TAU vs. MI+W+B	0.43	(-0.44 - 2.65)	0.82	No
	High base Kessler-10	TAU vs. MI+W+B	-0.14	(-0.40 - 0.23)	0.82	No
	Low base Kessler-10	MI vs. MI+W+B	0.09	(-0.54 - 1.59)	0.98	No
	High base Kessler-10	MI vs. MI+W+B	-0.15	(-0.43 - 0.26)	0.82	No
	Low base Kessler-10	MI+W vs. MI+W+B	-0.36	(-0.76 - 0.68)	0.82	No
	High base Kessler-10	MI+W vs. MI+W+B	-0.03	(-0.33 - 0.41)	0.98	No
	Low base PGSI-12	TAU vs. MI+W+B	-0.02	(-0.37 - 0.54)	0.99	No
	High base PGSI-12	TAU vs. MI+W+B	-0.18	(-0.51 - 0.36)	0.82	No
	Low base PGSI-12	MI vs. MI+W+B	0.07	(-0.33 - 0.72)	0.95	No
	High base PGSI-12	MI vs. MI+W+B	-0.34	(-0.62 - 0.13)	0.61	No
	Low base PGSI-12	MI+W vs. MI+W+B	-0.24	(-0.52 - 0.20)	0.82	No
	High base PGSI-12	MI+W vs. MI+W+B	0.22	(-0.28 - 1.06)	0.82	No
Money lost	Low base AUDIT-C	TAU vs. MI+W+B	1.11	(0.07 - 3.76)	0.39	No
	High base AUDIT-C	TAU vs. MI+W+B	-0.14	(-0.52 - 0.53)	0.86	No
	Low base AUDIT-C	MI vs. MI+W+B	0.85	(-0.25 - 3.55)	0.78	No
	High base AUDIT-C	MI vs. MI+W+B	-0.25	(-0.58 - 0.37)	0.82	No
	Low base AUDIT-C	MI+W vs. MI+W+B	0.41	(-0.36 - 2.13)	0.82	No
	High base AUDIT-C	MI+W vs. MI+W+B	0.35	(-0.27 - 1.50)	0.82	No
	Non-Māori	TAU vs. MI+W+B	0.12	(-0.38 - 1.03)	0.92	No
	Māori	TAU vs. MI+W+B	0.27	(-0.39 - 1.63)	0.86	No
	Non-Māori	MI vs. MI+W+B	0.11	(-0.39 - 1.02)	0.93	No
	Māori	MI vs. MI+W+B	-0.27	(-0.68 - 0.67)	0.82	No
	Non-Māori	MI+W vs. MI+W+B	0.85	(0.03 - 2.54)	0.36	No
	Māori	MI+W vs. MI+W+B	0.01	(-0.51 - 1.07)	0.99	No
	Low base Kessler-10	TAU vs. MI+W+B	1.09	(-0.43 - 6.64)	0.82	No
	High base Kessler-10	TAU vs. MI+W+B	0.04	(-0.37 - 0.71)	0.98	No
	Low base Kessler-10	MI vs. MI+W+B	0.20	(-0.63 - 2.86)	0.95	No
	High base Kessler-10	MI vs. MI+W+B	-0.01	(-0.42 - 0.71)	0.99	No
	Low base Kessler-10	MI+W vs. MI+W+B	0.80	(-0.52 - 5.85)	0.82	No
	High base Kessler-10	MI+W vs. MI+W+B	0.20	(-0.28 - 1.00)	0.85	No
	Low base PGSI-12	TAU vs. MI+W+B	0.17	(-0.37 - 1.17)	0.86	No
	High base PGSI-12	TAU vs. MI+W+B	0.10	(-0.46 - 1.23)	0.96	No
	Low base PGSI-12	MI vs. MI+W+B	0.20	(-0.37 - 1.32)	0.86	No
	High base PGSI-12	MI vs. MI+W+B	-0.24	(-0.64 - 0.60)	0.82	No
	Low base PGSI-12	MI+W vs. MI+W+B	-0.01	(-0.48 - 0.88)	0.99	No
	High base PGSI-12	MI+W vs. MI+W+B	0.77	(-0.14 - 2.67)	0.61	No

FWER adjustment family: Primary Outcomes Hypothesis 2 | *Contrast is first intervention group listed minus the second | [†] High base AUDIT-C dichotomised ≥ 4 (male), ≥ 3 (female); Low base AUDIT-C dichotomised < 4 (male), < 3 (female) / High base Kessler-10 dichotomised ≥ 20 ; Low base Kessler-10 dichotomised < 20 / High base PGSI-12 dichotomised > 17 ; Low base PGSI-12 dichotomised ≤ 17 | [^] Confidence intervals correspond to the nominal significance level (unadjusted for multiple testing) and may be considered anti-conservative

APPENDIX 7

Hypothesis 3: Descriptive statistics

Table 7: 1: PGSI score by treatment assistance

		Any assistance - No					Any assistance - Yes				
		TAU	MI	MI+W	MI+W+B	Total	TAU	MI	MI+W	MI+W+B	Total
PGSI (past 12 month time frame)	MEAN	7.9	6.3	6.1	4.4	6.2	11.1	10.3	10.6	7.6	10.0
	STD	7.2	7.1	6.3	6.2	6.8	9.0	10.5	9.1	8.3	8.8
	MIN	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
	Q1	1.0	0.0	0.0	0.0	0.0	3.0	3.0	1.5	0.0	3.0
	MEDIAN	7.0	3.0	4.0	1.0	4.0	12.0	6.5	11.5	4.0	9.0
	Q3	12.0	11.0	9.0	7.0	10.0	16.0	20.0	18.0	18.0	18.0
	MAX	27.0	24.0	23.0	22.0	27.0	25.0	26.0	23.0	20.0	26.0
	N	37	33	31	38	139	9	6	8	7	30
	N MISSING	0	1	0	1	2	0	0	1	0	1

		Informal assistance - No					Informal assistance - Yes				
		TAU	MI	MI+W	MI+W+B	Total	TAU	MI	MI+W	MI+W+B	Total
PGSI (past 12 month time frame)	MEAN	8.8	7.1	7.0	4.9	7.0	3.5	0.0	-	5.0	3.7
	STD	7.7	7.7	7.1	6.8	7.4	0.7	-	-	2.7	2.6
	MIN	0.0	0.0	0.0	0.0	0.0	3.0	0.0	-	3.0	0.0
	Q1	1.0	0.0	0.0	0.0	0.0	3.0	0.0	-	3.0	3.0
	MEDIAN	7.5	4.0	5.0	1.0	5.0	3.5	0.0	-	4.0	3.5
	Q3	13.0	11.0	12.0	7.0	12.0	4.0	0.0	-	8.0	4.0
	MAX	27.0	26.0	23.0	22.0	27.0	4.0	0.0	-	8.0	8.0
	N	44	38	39	42	163	2	1	-	3	6
	N MISSING	0	1	1	1	3	0	0	-	0	0

		Formal assistance - No					Formal assistance - Yes				
		TAU	MI	MI+W	MI+W+B	Total	TAU	MI	MI+W	MI+W+B	Total
PGSI (past 12 month time frame)	MEAN	7.9	7.2	7.0	4.7	6.6	12.1	3.0	6.8	9.0	9.1
	STD	7.1	7.8	7.2	6.4	7.1	9.8	0.0	6.4	12.7	8.5
	MIN	0.0	0.0	0.0	0.0	0.0	1.0	3.0	0.0	0.0	0.0
	Q1	1.0	0.0	0.0	0.0	0.0	3.0	3.0	1.5	0.0	3.0
	MEDIAN	7.0	5.0	5.0	1.0	5.0	13.0	3.0	6.5	9.0	4.0
	Q3	12.0	11.0	12.0	7.0	11.0	23.0	3.0	12.0	18.0	16.0
	MAX	27.0	26.0	23.0	22.0	27.0	25.0	3.0	14.0	18.0	25.0
	N	39	37	35	43	154	7	2	4	2	15
	N MISSING	0	1	0	1	2	0	0	1	0	1

Table 7: 2: PGSI score by dichotomised current goal

		Current goal - Quit all or some gambling					Current goal - Control gambling				
		TAU	MI	MI+W	MI+W+B	Total	TAU	MI	MI+W	MI+W+B	Total
PGSI (past 12 month time frame)	MEAN	12.4	10.1	9.7	6.8	10.0	4.7	4.5	5.3	2.7	4.2
	STD	7.3	8.6	7.3	6.7	7.6	5.8	6.0	6.5	4.9	5.8
	MIN	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Q1	7.0	3.0	4.0	1.0	4.0	0.0	0.0	0.0	0.0	0.0
	MEDIAN	12.0	9.0	9.0	6.0	9.0	3.0	0.5	2.5	0.0	1.0
	Q3	16.0	16.0	14.0	11.0	15.0	8.0	9.0	10.0	4.0	8.0
	MAX	27.0	26.0	23.0	20.0	27.0	21.0	18.0	23.0	21.0	23.0
	N	22	17	15	15	69	22	22	24	27	95
	N MISSING	0	0	0	1	1	0	1	0	0	1

Table 7: 3: PGSI score by significant life event in past two years

		Death - No					Death - Yes				
		TAU	MI	MI+W	MI+W+B	Total	TAU	MI	MI+W	MI+W+B	Total
PGSI (past 12 month time frame)	MEAN	8.1	7.7	5.9	5.0	6.6	9.0	5.8	9.7	4.8	7.1
	STD	7.2	7.7	6.3	7.2	7.1	8.1	7.9	8.5	5.8	7.6
	MIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Q1	1.0	0.5	0.0	0.0	0.0	3.0	0.0	2.0	0.0	0.0
	MEDIAN	7.0	6.5	4.5	2.0	4.5	8.0	3.0	8.0	1.0	5.0
	Q3	12.0	11.5	9.5	6.0	11.0	13.0	11.0	16.0	9.5	13.0
	MAX	25.0	26.0	23.0	22.0	26.0	27.0	24.0	23.0	17.0	27.0
	N	25	24	28	25	102	21	15	11	20	67
	N MISSING	0	0	0	1	1	0	1	1	0	2

		Divorce or separation - No					Divorce or separation - Yes				
		TAU	MI	MI+W	MI+W+B	Total	TAU	MI	MI+W	MI+W+B	Total
PGSI (past 12 month time frame)	MEAN	7.4	6.3	7.0	4.4	6.3	12.6	10.5	6.9	6.6	9.0
	STD	7.2	7.4	7.0	6.0	6.9	7.8	8.9	7.8	8.2	8.2
	MIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Q1	1.0	0.0	0.0	0.0	0.0	9.0	0.0	0.0	0.0	0.5
	MEDIAN	6.0	3.0	6.0	1.0	4.0	12.0	12.5	4.5	4.0	8.0
	Q3	12.0	10.0	10.0	8.0	10.0	16.0	18.0	13.0	7.0	15.5
	MAX	27.0	26.0	23.0	20.0	27.0	25.0	20.0	23.0	22.0	25.0
	N	36	33	29	35	133	10	6	10	10	36
	N MISSING	0	1	1	1	3	0	0	0	0	0

		Legal difficulties - No					Legal difficulties - Yes				
		TAU	MI	MI+W	MI+W+B	Total	TAU	MI	MI+W	MI+W+B	Total
PGSI (past 12 month time frame)	MEAN	8.5	5.4	6.4	4.0	6.0	8.8	17.8	11.2	12.0	12.0
	STD	7.4	6.4	6.8	5.8	6.8	8.9	7.4	8.2	8.3	8.5
	MIN	0.0	0.0	0.0	0.0	0.0	0.0	9.0	4.0	0.0	0.0
	Q1	2.0	0.0	0.0	0.0	0.0	0.0	12.0	4.0	9.0	4.0
	MEDIAN	7.0	3.0	4.5	1.0	4.0	8.5	18.0	9.0	12.0	12.0
	Q3	13.0	10.0	10.0	6.0	10.0	14.0	24.0	16.0	17.0	18.0
	MAX	27.0	20.0	23.0	21.0	27.0	25.0	26.0	23.0	22.0	26.0
	N	38	34	34	40	146	8	5	5	5	23
	N MISSING	0	1	1	1	3	0	0	0	0	0

		Major injury or illness - No					Major injury or illness - Yes				
		TAU	MI	MI+W	MI+W+B	Total	TAU	MI	MI+W	MI+W+B	Total
PGSI (past 12 month time frame)	MEAN	7.2	5.5	6.5	4.2	5.8	11.1	8.8	8.8	7.0	9.1
	STD	7.6	7.4	6.4	6.3	6.9	7.1	7.8	9.4	7.3	7.7
	MIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Q1	0.0	0.0	0.0	0.0	0.0	6.5	0.0	1.5	1.0	3.0
	MEDIAN	5.0	2.5	6.0	0.5	3.0	10.0	9.0	4.5	6.0	7.5
	Q3	13.0	9.0	10.0	7.0	10.0	14.5	15.0	17.5	12.0	14.0
	MAX	25.0	26.0	23.0	21.0	26.0	27.0	24.0	23.0	22.0	27.0
	N	30	22	31	34	117	16	17	8	11	52
	N MISSING	0	0	0	1	1	0	1	1	0	2

Table 7: 3: PGSI score by significant life event in past two years - continued

		Became partnered - No					Became partnered - Yes				
		TAU	MI	MI+W	MI+W+B	Total	TAU	MI	MI+W	MI+W+B	Total
PGSI (past 12 month time frame)	MEAN	8.5	7.1	6.1	5.2	6.7	8.8	6.3	13.4	3.0	7.6
	STD	7.1	7.6	6.7	6.9	7.1	9.1	8.5	6.7	4.0	8.1
	MIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0
	Q1	2.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0
	MEDIAN	7.0	5.0	4.0	1.5	4.0	8.5	2.5	13.0	0.0	5.5
	Q3	13.0	11.0	9.0	8.0	11.0	13.0	10.5	16.0	6.0	12.5
	MAX	25.0	26.0	23.0	22.0	26.0	27.0	24.0	23.0	10.0	27.0
	N	34	31	34	38	137	12	8	5	7	32
	N MISSING	0	1	1	0	2	0	0	0	1	1

		Work trouble - No					Work trouble - Yes				
		TAU	MI	MI+W	MI+W+B	Total	TAU	MI	MI+W	MI+W+B	Total
PGSI (past 12 month time frame)	MEAN	8.8	7.2	7.1	4.2	6.7	8.1	6.1	6.7	8.0	7.4
	STD	8.0	7.6	7.5	6.2	7.4	6.8	8.3	4.8	7.5	6.7
	MIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Q1	2.0	0.0	0.0	0.0	0.0	1.0	0.0	3.0	2.5	1.0
	MEDIAN	7.0	3.0	4.5	1.0	4.0	9.0	2.5	6.0	6.0	6.0
	Q3	15.0	11.0	11.5	6.0	11.0	13.0	12.0	12.0	13.0	13.0
	MAX	27.0	26.0	23.0	22.0	27.0	21.0	20.0	13.0	21.0	21.0
	N	31	31	32	37	131	15	8	7	8	38
	N MISSING	0	0	1	1	2	0	1	0	0	1

		Retirement - No					Retirement - Yes				
		TAU	MI	MI+W	MI+W+B	Total	TAU	MI	MI+W	MI+W+B	Total
PGSI (past 12 month time frame)	MEAN	8.4	6.9	7.1	5.0	6.8	17.0	4.0	0.0	7.0	8.4
	STD	7.5	7.7	7.1	6.6	7.3	.	.	.	8.9	7.5
	MIN	0.0	0.0	0.0	0.0	0.0	17.0	4.0	0.0	0.0	0.0
	Q1	1.0	0.0	0.0	0.0	0.0	17.0	4.0	0.0	0.0	1.0
	MEDIAN	7.0	3.0	5.5	1.5	5.0	17.0	4.0	0.0	4.0	7.0
	Q3	13.0	11.0	12.0	7.5	11.0	17.0	4.0	0.0	17.0	13.0
	MAX	27.0	26.0	23.0	22.0	27.0	17.0	4.0	0.0	17.0	27.0
	N	45	39	38	44	166	1	1	1	3	45
	N MISSING	0	1	1	1	3	0	0	0	0	0

		Pregnancy or new baby - No					Pregnancy or new baby - Yes				
		TAU	MI	MI+W	MI+W+B	Total	TAU	MI	MI+W	MI+W+B	Total
PGSI (past 12 month time frame)	MEAN	8.7	7.1	7.5	4.4	6.9	8.0	6.5	4.3	6.4	6.5
	STD	8.2	7.9	7.4	5.6	7.4	4.3	7.1	4.4	9.1	6.7
	MIN	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
	Q1	1.0	0.0	0.0	0.0	0.0	5.0	0.5	0.0	0.0	0.0
	MEDIAN	7.0	3.0	6.0	2.0	4.0	9.0	5.5	3.5	0.0	5.0
	Q3	15.0	12.0	13.0	7.0	12.0	12.0	10.0	9.0	15.0	11.0
	MAX	27.0	26.0	23.0	20.0	27.0	13.0	20.0	10.0	22.0	22.0
	N	37	31	33	34	135	9	8	6	11	34
	N MISSING	0	0	0	1	1	0	1	1	0	2

Table 7: 3: PGSI score by significant life event in past two years - continued

		Major financial change - No					Major financial change - Yes				
		TAU	MI	MI+W	MI+W+B	Total	TAU	MI	MI+W	MI+W+B	Total
PGSI (past 12 month time frame)	MEAN	8.1	7.7	6.4	2.6	6.1	9.0	6.0	8.0	7.5	7.7
	STD	7.3	7.2	6.7	4.7	6.8	7.9	8.4	7.7	7.5	7.8
	MIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Q1	1.0	2.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
	MEDIAN	7.0	6.5	4.5	0.0	4.0	8.0	0.0	6.0	6.0	6.0
	Q3	12.0	10.0	9.0	4.0	10.0	15.0	11.0	13.0	12.0	13.0
	MAX	25.0	26.0	23.0	20.0	26.0	27.0	24.0	23.0	22.0	27.0
	N	23	22	24	24	93	23	17	15	21	76
	N MISSING	0	0	0	0	0	0	1	1	1	3

		Mortgage or loan - No					Mortgage or loan - Yes				
		TAU	MI	MI+W	MI+W+B	Total	TAU	MI	MI+W	MI+W+B	Total
PGSI (past 12 month time frame)	MEAN	7.4	6.9	7.5	4.4	6.4	12.3	7.2	4.3	8.8	8.7
	STD	7.2	7.2	7.4	6.3	7.1	7.8	9.3	4.1	8.1	8.0
	MIN	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0
	Q1	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	1.0	0.5
	MEDIAN	7.0	5.0	6.0	1.0	4.0	13.0	1.5	4.0	10.0	7.0
	Q3	12.0	11.0	13.0	6.5	11.0	16.0	17.0	8.0	15.0	15.0
	MAX	25.0	26.0	23.0	22.0	26.0	27.0	24.0	10.0	18.0	27.0
	N	35	29	33	40	137	11	10	6	5	32
	N MISSING	0	1	1	0	2	0	0	0	1	1

		Increase in number of arguments - No					Increase in number of arguments - Yes				
		TAU	MI	MI+W	MI+W+B	Total	TAU	MI	MI+W	MI+W+B	Total
PGSI (past 12 month time frame)	MEAN	6.4	4.8	6.6	3.1	5.2	13.9	13.2	8.1	10.3	11.5
	STD	5.9	6.9	7.0	4.7	6.2	8.8	6.7	7.5	8.5	8.1
	MIN	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0
	Q1	1.0	0.0	0.0	0.0	0.0	9.0	9.0	0.0	1.0	3.5
	MEDIAN	6.0	1.0	4.0	0.5	3.0	15.0	13.0	8.0	11.0	11.5
	Q3	11.0	9.0	9.0	6.0	9.0	21.0	18.0	14.0	18.0	17.5
	MAX	23.0	26.0	23.0	20.0	26.0	27.0	24.0	22.0	22.0	27.0
	N	33	29	29	34	125	13	10	10	11	44
	N MISSING	0	1	1	1	3	0	0	0	0	0

		Moved house - No					Moved house - Yes				
		TAU	MI	MI+W	MI+W+B	Total	TAU	MI	MI+W	MI+W+B	Total
PGSI (past 12 month time frame)	MEAN	7.9	6.8	5.7	3.0	5.9	9.4	7.4	9.7	7.5	8.5
	STD	7.9	7.4	6.5	4.4	6.9	7.1	8.7	7.7	8.1	7.7
	MIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Q1	1.0	0.0	0.0	0.0	0.0	3.0	0.0	4.0	0.0	1.0
	MEDIAN	6.0	4.5	4.0	0.5	4.0	9.0	3.0	9.0	5.0	7.0
	Q3	12.0	11.0	9.0	6.0	10.0	15.0	15.0	14.0	15.0	15.0
	MAX	27.0	24.0	23.0	17.0	27.0	23.0	26.0	23.0	22.0	26.0
	N	27	28	26	26	107	19	11	13	19	62
	N MISSING	0	1	1	1	3	0	0	0	0	0

Table 7: 3: PGSI score by significant life event in past two years - continued

		Moved city - No					Moved city - Yes				
		TAU	MI	MI+W	MI+W+B	Total	TAU	MI	MI+W	MI+W+B	Total
PGSI (past 12 month time frame)	MEAN	8.1	6.8	6.1	3.9	6.3	11.0	9.0	11.0	9.1	10.2
	STD	7.7	7.7	6.7	5.9	7.1	6.5	9.0	8.0	8.2	7.3
	MIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Q1	1.0	0.0	0.0	0.0	0.0	8.0	0.0	4.0	2.0	4.0
	MEDIAN	6.0	3.0	4.0	1.0	4.0	11.0	9.0	14.0	8.0	11.0
	Q3	13.0	11.0	9.5	6.0	10.0	15.0	18.0	16.0	16.0	15.0
	MAX	27.0	26.0	23.0	22.0	27.0	21.0	18.0	23.0	21.0	23.0
	N	39	36	32	37	144	7	3	7	8	25
	N MISSING	0	1	1	1	3	0	0	0	0	0

		Change in living or working conditions - No					Change in living or working conditions - Yes				
		TAU	MI	MI+W	MI+W+B	Total	TAU	MI	MI+W	MI+W+B	Total
PGSI (past 12 month time frame)	MEAN	7.4	5.7	5.1	4.9	5.8	9.6	8.8	8.7	4.9	7.9
	STD	7.9	6.5	6.8	7.5	7.1	7.3	9.0	7.0	5.6	7.3
	MIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Q1	1.0	0.0	0.0	0.0	0.0	3.5	0.0	3.0	0.0	0.0
	MEDIAN	6.0	3.0	3.0	1.0	3.0	9.0	7.0	9.0	3.0	7.0
	Q3	12.0	10.0	8.0	6.0	9.0	14.0	16.0	13.0	8.0	13.0
	MAX	27.0	20.0	23.0	22.0	27.0	25.0	26.0	23.0	20.0	26.0
	N	22	23	18	22	85	24	16	21	23	84
	N MISSING	0	0	1	1	2	0	1	0	0	1

		Earthquake or other natural disaster - No					Earthquake or other natural disaster - Yes				
		TAU	MI	MI+W	MI+W+B	Total	TAU	MI	MI+W	MI+W+B	Total
PGSI (past 12 month time frame)	MEAN	8.4	7.3	6.8	5.2	7.0	9.1	4.6	7.8	3.3	6.3
	STD	7.8	7.9	6.3	7.1	7.4	6.3	6.3	9.6	2.9	7.0
	MIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Q1	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
	MEDIAN	7.0	4.0	5.5	1.0	4.5	11.0	0.0	2.0	4.0	5.0
	Q3	13.0	11.0	10.0	9.0	11.0	15.0	11.0	13.0	6.0	11.0
	MAX	27.0	26.0	23.0	22.0	27.0	15.0	12.0	23.0	6.0	23.0
	N	39	34	30	37	140	7	5	9	8	29
	N MISSING	0	1	1	1	3	0	0	0	0	0

		Other major event - No					Other major event - Yes				
		TAU	MI	MI+W	MI+W+B	Total	TAU	MI	MI+W	MI+W+B	Total
PGSI (past 12 month time frame)	MEAN	8.4	6.3	6.5	4.5	6.4	10.7	10.5	10.4	9.0	10.2
	STD	7.3	7.2	6.9	6.4	7.0	12.7	9.9	7.9	7.7	8.6
	MIN	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
	Q1	1.0	0.0	0.0	0.0	0.0	1.0	3.0	8.0	3.0	3.0
	MEDIAN	7.0	3.0	4.0	1.0	4.0	6.0	8.0	10.0	9.0	9.0
	Q3	13.0	10.0	10.0	7.0	11.0	25.0	18.0	12.0	15.0	18.0
	MAX	27.0	24.0	23.0	22.0	27.0	25.0	26.0	22.0	18.0	26.0
	N	43	33	34	41	151	3	6	5	4	18
	N MISSING	0	1	1	1	3	0	0	0	0	0

Table 7: 3: PGSI score by significant life event in past two years - continued

		Any significant event - No					Any significant event - Yes				
		TAU	MI	MI+W	MI+W+B	Total	TAU	MI	MI+W	MI+W+B	Total
PGSI (past 12 month time frame)	MEAN	10.5	3.3	5.1	1.2	4.1	8.5	7.3	7.4	5.4	7.2
	STD	0.7	4.9	7.3	1.6	5.6	7.7	7.8	7.1	6.9	7.4
	MIN	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Q1	10.0	0.0	0.0	0.0	0.0	1.0	0.0	0.5	0.0	0.0
	MEDIAN	10.5	1.0	0.0	0.5	1.0	7.0	4.0	5.5	2.0	5.0
	Q3	11.0	9.0	9.0	2.0	9.0	13.0	11.5	12.5	9.0	12.0
	MAX	11.0	9.0	19.0	4.0	19.0	27.0	26.0	23.0	22.0	27.0
	N	2	3	7	6	18	44	36	32	39	151
	N MISSING	0	0	0	0	0	0	1	1	1	3

APPENDIX 8

Hypothesis 3 continuous outcomes by various risk factors at 36 months

Table 8: 1: Outcome - Days gambled

Risk factor	Risk factor	Contrast*	Estimate of contrast	(95% CI)^	FWER adjusted p-value	Alternative accepted
Additional assistance received	Any assistance	Any assistance vs. none	0.05	(-0.23 - 0.44)	0.79	No
	Informal assistance	Informal assistance vs. not	-0.27	(-0.62 - 0.41)	0.59	No
	Formal assistance	Formal assistance vs. not	-0.18	(-0.46 - 0.24)	0.59	No
Current goal dichotomised	Current goal dichotomised	Control over gambling vs. quit	-0.27	(-0.43 - -0.07)	0.05	Yes
Major life event	Death	Had death event vs. not	0.06	(-0.17 - 0.36)	0.73	No
	Divorce/separation	Had divorce/separation vs. not	0.16	(-0.14 - 0.56)	0.59	No
	Legal difficulties	Had legal difficulties vs. not	0.11	(-0.23 - 0.59)	0.71	No
	Injury/illness	Had injury/illness vs. not	0.15	(-0.12 - 0.51)	0.56	No
	Marriage	Became partnered vs. not	-0.09	(-0.34 - 0.25)	0.69	No
	Work trouble	Had work trouble event vs. not	0.11	(-0.17 - 0.48)	0.62	No
	Retirement	Had retirement event vs. not	-0.36	(-0.75 - 0.62)	0.59	No
	Pregnancy	Had pregnancy/new additions vs. not	-0.06	(-0.30 - 0.27)	0.75	No
	Financial change	Had financial change vs. not	-0.03	(-0.24 - 0.24)	0.86	No
	Loan	Had mortgage/loan event vs. not	-0.06	(-0.31 - 0.27)	0.74	No
	Arguments	Had increase in arguments with close person vs. not	0.14	(-0.13 - 0.51)	0.59	No
	Moving house	Moved house vs. not	0.10	(-0.15 - 0.42)	0.62	No
	Moving city	Moved city vs. not	0.31	(-0.07 - 0.85)	0.30	No
	Major change	Had major change event vs. not	0.11	(-0.13 - 0.41)	0.60	No
	Earthquake	Experienced earthquake/natural disaster vs. not	-0.09	(-0.34 - 0.25)	0.69	No
	Other	Had other major event vs. not	0.18	(-0.21 - 0.77)	0.60	No
	Any major event	Had any major event vs. not	0.32	(-0.11 - 0.95)	0.38	No
Current goal	Current goal	Other goal vs. quit all types of gambling	0.09	(-0.34 - 0.80)	0.77	No
		Other goal vs. quit some types of gambling	-0.12	(-0.49 - 0.54)	0.74	No
		Other goal vs. gamble in a non-problematic way	-0.03	(-0.42 - 0.62)	0.91	No
		Other goal vs. maintain gambling abstinence	0.97	(0.20 - 2.22)	0.03	Yes
		Maintain gambling abstinence vs. quit all types of gambling	-0.44	(-0.59 - -0.25)	<0.001	Yes
		Maintain gambling abstinence vs. quit some types of gambling	-0.55	(-0.69 - -0.34)	<0.0001	Yes
		Maintain gambling abstinence vs. gamble in a non-problematic way	-0.51	(-0.64 - -0.32)	<0.0001	Yes

Risk factor	Risk factor	Contrast*	Estimate of contrast	(95% CI)^	FWER adjusted p-value	Alternative accepted
		Gamble in a non-problematic way vs. quit all types of gambling	0.13	(-0.18 - 0.57)	0.62	No
		Gamble in a non-problematic way vs. quit some types of gambling	-0.09	(-0.39 - 0.37)	0.74	No
		Quit some types of gambling vs. quit all types of gambling	0.24	(-0.16 - 0.82)	0.53	No

FWER adjustment family: Primary Outcomes Hypothesis 3

* Results are for the first listed risk factor group minus the second listed risk factor group

^ Confidence intervals correspond to the nominal significance level (unadjusted for multiple testing) and may be considered anti-conservative

Table 8: 2: Outcome - Money lost

Risk factor	Risk factor	Contrast*	Estimate of contrast	(95% CI)^	FWER adjusted p-value	Alternative accepted
Additional assistance received	Any assistance	Any assistance vs. none	0.62	(0.03 - 1.55)	0.12	No
	Informal assistance	Informal assistance vs. not	-0.47	(-0.80 - 0.39)	0.41	No
	Formal assistance	Formal assistance vs. not	0.17	(-0.37 - 1.17)	0.73	No
Current goal dichotomised	Current goal dichotomised	Control over gambling vs. quit	-0.54	(-0.67 - -0.35)	<0.0001	Yes
Major life event	Death	Had death event vs. not	0.13	(-0.22 - 0.62)	0.65	No
	Divorce/separation	Had divorce/separation vs. not	0.46	(-0.06 - 1.25)	0.25	No
	Legal difficulties	Had legal difficulties vs. not	0.28	(-0.25 - 1.18)	0.60	No
	Injury/illness	Had injury/illness vs. not	0.39	(-0.06 - 1.06)	0.26	No
	Marriage	Became partnered vs. not	0.09	(-0.31 - 0.73)	0.77	No
	Work trouble	Had work trouble event vs. not	0.16	(-0.25 - 0.78)	0.64	No
	Retirement	Had retirement event vs. not	-0.45	(-0.86 - 1.10)	0.60	No
	Pregnancy	Had pregnancy/new additions vs. not	-0.16	(-0.46 - 0.31)	0.62	No
	Financial change	Had financial change vs. not	-0.14	(-0.39 - 0.23)	0.61	No
	Loan	Had mortgage/loan event vs. not	0.07	(-0.32 - 0.69)	0.79	No
	Arguments	Had increase in arguments with close person vs. not	0.45	(-0.04 - 1.17)	0.21	No
	Moving house	Moved house vs. not	0.18	(-0.19 - 0.71)	0.60	No
	Moving city	Moved city vs. not	0.13	(-0.32 - 0.88)	0.73	No
	Major change	Had major change event vs. not	0.08	(-0.24 - 0.55)	0.74	No
	Earthquake	Experienced earthquake/ natural disaster vs. not	-0.19	(-0.50 - 0.30)	0.60	No
	Other	Had other major event vs. not	0.55	(-0.13 - 1.78)	0.34	No
	Any major event	Had any major event vs. not	0.42	(-0.21 - 1.55)	0.47	No
Current goal	Current goal	Other goal vs. quit all types of gambling	-0.39	(-0.70 - 0.24)	0.38	No
		Other goal vs. quit some types of gambling	-0.59	(-0.82 - -0.10)	0.09	No
		Other goal vs. gamble in a non-problematic way	-0.26	(-0.64 - 0.56)	0.62	No
		Other goal vs. maintain gambling abstinence	0.66	(-0.18 - 2.38)	0.37	No
		Maintain gambling abstinence vs. quit all types of gambling	-0.63	(-0.76 - -0.44)	<0.0001	Yes
		Maintain gambling abstinence vs. quit some types of gambling	-0.76	(-0.86 - -0.58)	<0.0001	Yes
		Maintain gambling abstinence vs. gamble in a non-problematic way	-0.55	(-0.72 - -0.28)	<0.01	Yes

Risk factor	Risk factor	Contrast*	Estimate of contrast	(95% CI)^	FWER adjusted p-value	Alternative accepted
		Gamble in a non-problematic way vs. quit all types of gambling	-0.18	(-0.49 - 0.31)	0.60	No
		Gamble in a non-problematic way vs. quit some types of gambling	-0.46	(-0.70 - -0.02)	0.13	No
		Quit some types of gambling vs. quit all types of gambling	0.51	(-0.14 - 1.63)	0.35	No

FWER adjustment family: Primary Outcomes Hypothesis 3

* Results are for the first listed risk factor group minus the second listed risk factor group

^ Confidence intervals correspond to the nominal significance level (unadjusted for multiple testing) and may be considered anti-conservative

Table 8: 3: Outcome - Kessler-10

Risk factor	Risk factor	Contrast*	Estimate of contrast	(95% CI)^	FWER adjusted p-value	Alternative accepted
Additional assistance received	Any assistance	Any assistance vs. none	0.83	(-2.69 - 4.35)	0.81	No
	Informal assistance	Informal assistance vs. not	2.34	(-0.42 - 5.10)	0.28	No
	Formal assistance	Formal assistance vs. not	1.73	(-1.97 - 5.44)	0.62	No
Current goal dichotomised	Current goal dichotomised	Control over gambling vs. quit	-4.32	(-6.34 - -2.30)	<0.0001	Yes
Major life event	Death	Had death event vs. not	1.85	(-0.33 - 4.03)	0.28	No
	Divorce/separation	Had divorce/separation vs. not	2.07	(-0.55 - 4.70)	0.34	No
	Legal difficulties	Had legal difficulties vs. not	4.19	(1.00 - 7.37)	0.05	Yes
	Injury/illness	Had injury/illness vs. not	4.73	(2.50 - 6.96)	<0.0001	Yes
	Marriage	Became partnered vs. not	-1.62	(-4.33 - 1.10)	0.50	No
	Work trouble	Had work trouble event vs. not	-1.07	(-3.66 - 1.53)	0.66	No
	Retirement	Had retirement event vs. not	-2.48	(-10.68 - 5.73)	0.79	No
	Pregnancy	Had pregnancy/new additions vs. not	1.59	(-1.03 - 4.22)	0.50	No
	Financial change	Had financial change vs. not	2.19	(0.07 - 4.32)	0.15	No
	Loan	Had mortgage/loan event vs. not	0.38	(-2.36 - 3.12)	0.86	No
	Arguments	Had increase in arguments with close person vs. not	7.31	(5.07 - 9.55)	<0.0001	Yes
	Moving house	Moved house vs. not	1.24	(-1.00 - 3.48)	0.52	No
	Moving city	Moved city vs. not	1.02	(-2.04 - 4.08)	0.75	No
	Major change	Had major change event vs. not	0.38	(-1.76 - 2.52)	0.83	No
	Earthquake	Experienced earthquake/ natural disaster vs. not	-0.26	(-3.12 - 2.60)	0.90	No
	Other	Had other major event vs. not	1.75	(-1.74 - 5.25)	0.61	No
	Any major event	Had any major event vs. not	0.83	(-2.69 - 4.35)	0.81	No
Current goal	Current goal	Other goal vs. quit all types of gambling	-1.10	(-5.44 - 3.25)	0.81	No
		Other goal vs. quit some types of gambling	-1.74	(-6.61 - 3.13)	0.72	No
		Other goal vs. gamble in a non-problematic way	3.83	(-0.64 - 8.30)	0.28	No
		Other goal vs. maintain gambling abstinence	3.18	(-1.14 - 7.50)	0.39	No
		Maintain gambling abstinence vs. quit all types of gambling	-4.28	(-6.89 - -1.67)	0.01	Yes
		Maintain gambling abstinence vs. quit some types of gambling	-4.92	(-8.31 - -1.54)	0.03	Yes
		Maintain gambling abstinence vs. gamble in a non-problematic way	0.65	(-2.17 - 3.47)	0.81	No

Risk factor	Risk factor	Contrast*	Estimate of contrast	(95% CI)^	FWER adjusted p-value	Alternative accepted
		Gamble in a non-problematic way vs. quit all types of gambling	-4.93	(-7.75 - -2.10)	0.01	Yes
		Gamble in a non-problematic way vs. quit some types of gambling	-5.57	(-9.12 - -2.02)	0.02	Yes
		Quit some types of gambling vs. quit all types of gambling	0.64	(-2.75 - 4.04)	0.83	No

FWER adjustment family: Secondary Outcomes Hypothesis 3

* Results are for the first listed risk factor group minus the second listed risk factor group

^ Confidence intervals correspond to the nominal significance level (unadjusted for multiple testing) and may be considered anti-conservative

Table 8: 4: Outcome - Control over gambling

Risk factor	Risk factor	Contrast*	Estimate of contrast	(95% CI)^	FWER adjusted p-value	Alternative accepted
Additional assistance received	Any assistance	Any assistance vs. none	-0.65	(-1.74 - 0.45)	0.50	No
	Informal assistance	Informal assistance vs. not	0.26	(-2.04 - 2.56)	0.88	No
	Formal assistance	Formal assistance vs. not	-0.04	(-1.51 - 1.42)	0.97	No
Current goal dichotomised	Current goal dichotomised	Control over gambling vs. quit	1.91	(1.09 - 2.74)	<0.0001	Yes
Major life event	Death	Had death event vs. not	-0.38	(-1.24 - 0.48)	0.63	No
	Divorce/separation	Had divorce/separation vs. not	-1.23	(-2.25 - -0.210)	0.09	No
	Legal difficulties	Had legal difficulties vs. not	-2.00	(-3.22 - -0.79)	0.01	Yes
	Injury/illness	Had injury/illness vs. not	-1.03	(-1.93 - -0.12)	0.11	No
	Marriage	Became partnered vs. not	-0.17	(-1.27 - 0.94)	0.86	No
	Work trouble	Had work trouble event vs. not	0.28	(-0.74 - 1.29)	0.81	No
	Retirement	Had retirement event vs. not	-0.43	(-3.65 - 2.79)	0.86	No
	Pregnancy	Had pregnancy/new additions vs. not	-0.75	(-1.77 - 0.28)	0.39	No
	Financial change	Had financial change vs. not	0.20	(-0.65 - 1.04)	0.81	No
	Loan	Had mortgage/loan event vs. not	0.23	(-0.85 - 1.30)	0.81	No
	Arguments	Had increase in arguments with close person vs. not	-1.61	(-2.55 - -0.67)	0.01	Yes
	Moving house	Moved house vs. not	-0.73	(-1.61 - 0.15)	0.30	No
	Moving city	Moved city vs. not	-0.50	(-1.69 - 0.70)	0.66	No
	Major change	Had major change event vs. not	0.17	(-0.67 - 1.02)	0.82	No
	Earthquake	Experienced earthquake/ natural disaster vs. not	0.98	(-0.14 - 2.10)	0.27	No
	Other	Had other major event vs. not	-0.32	(-1.70 - 1.06)	0.81	No
	Any major event	Had any major event vs. not	-0.67	(-2.06 - 0.71)	0.62	No
Current goal	Current goal	Other goal vs. quit all types of gambling	1.98	(0.16 - 3.81)	0.13	No
		Other goal vs. quit some types of gambling	1.43	(-0.60 - 3.46)	0.40	No
		Other goal vs. gamble in a non-problematic way	0.64	(-1.24 - 2.51)	0.74	No
		Other goal vs. maintain gambling abstinence	-0.68	(-2.49 - 1.13)	0.69	No
		Maintain gambling abstinence vs. quit all types of gambling	2.67	(1.61 - 3.73)	<0.0001	Yes
		Maintain gambling abstinence vs. quit some types of gambling	2.12	(0.75 - 3.48)	0.02	Yes
		Maintain gambling abstinence vs. gamble in a non-problematic way	1.32	(0.17 - 2.46)	0.10	No

Risk factor	Risk factor	Contrast*	Estimate of contrast	(95% CI)^	FWER adjusted p-value	Alternative accepted
		Gamble in a non-problematic way vs. quit all types of gambling	1.35	(0.21 - 2.48)	0.09	No
		Gamble in a non-problematic way vs. quit some types of gambling	0.80	(-0.63 - 2.23)	0.52	No
		Quit some types of gambling vs. quit all types of gambling	0.55	(-0.81 - 1.92)	0.66	No

FWER adjustment family: Secondary Outcomes Hypothesis 3

* Results are for the first listed risk factor group minus the second listed risk factor group

^ Confidence intervals correspond to the nominal significance level (unadjusted for multiple testing) and may be considered anti-conservative

Table 8: 5: Outcome - PGSI-3

Risk factor	Risk factor	Contrast*	Estimate of contrast	(95% CI)^	FWER adjusted p-value	Alternative accepted
Additional assistance received	Any assistance	Any assistance vs. none	3.06	(0.43 - 5.69)	0.10	No
	Informal assistance	Informal assistance vs. not	-4.08	(-10.03 - 1.86)	0.43	No
	Formal assistance	Formal assistance vs. not	0.85	(-2.72 - 4.42)	0.81	No
Current goal dichotomised	Current goal dichotomised	Control over gambling vs. quit	-5.05	(-6.97 - -3.12)	<0.0001	Yes
Major life event	Death	Had death event vs. not	0.52	(-1.60 - 2.64)	0.81	No
	Divorce/separation	Had divorce/separation vs. not	4.42	(2.01 - 6.84)	<0.0001	Yes
	Legal difficulties	Had legal difficulties vs. not	6.00	(3.08 - 8.92)	<0.0001	Yes
	Injury/illness	Had injury/illness vs. not	2.55	(0.34 - 4.77)	0.10	No
	Marriage	Became partnered vs. not	0.17	(-2.49 - 2.83)	0.94	No
	Work trouble	Had work trouble event vs. not	0.53	(-1.95 - 3.00)	0.81	No
	Retirement	Had retirement event vs. not	1.62	(-5.99 - 9.22)	0.81	No
	Pregnancy	Had pregnancy/new additions vs. not	-0.03	(-2.56 - 2.50)	0.99	No
	Financial change	Had financial change vs. not	0.62	(-1.47 - 2.71)	0.79	No
	Loan	Had mortgage/loan event vs. not	-0.35	(-2.97 - 2.26)	0.86	No
	Arguments	Had increase in arguments with close person vs. not	5.24	(3.06 - 7.42)	<0.0001	Yes
	Moving house	Moved house vs. not	1.55	(-0.58 - 3.69)	0.39	No
	Moving city	Moved city vs. not	1.84	(-1.00 - 4.69)	0.45	No
	Major change	Had major change event vs. not	0.82	(-1.29 - 2.92)	0.68	No
	Earthquake	Experienced earthquake/ natural disaster vs. not	-1.26	(-3.94 - 1.42)	0.62	No
	Other	Had other major event vs. not	2.40	(-0.87 - 5.67)	0.39	No
	Any major event	Had any major event vs. not	2.53	(-1.95 - 7.02)	0.52	No
Current goal	Current goal	Other goal vs. quit all types of gambling	-5.93	(-9.91 - -1.96)	0.02	Yes
		Other goal vs. quit some types of gambling	-4.39	(-8.93 - 0.15)	0.20	No
		Other goal vs. gamble in a non-problematic way	-1.91	(-6.03 - 2.20)	0.62	No
		Other goal vs. maintain gambling abstinence	0.57	(-3.41 - 4.55)	0.86	No
		Maintain gambling abstinence vs. quit all types of gambling	-6.50	(-8.98 - -4.02)	<0.0001	Yes
		Maintain gambling abstinence vs. quit some types of gambling	-4.96	(-8.22 - -1.69)	0.02	Yes
		Maintain gambling abstinence vs. gamble	-2.48	(-5.19 - 0.23)	0.24	No

Risk factor	Risk factor	Contrast*	Estimate of contrast	(95% CI)^	FWER adjusted p-value	Alternative accepted
		in a non-problematic way				
		Gamble in a non-problematic way vs. quit all types of gambling	-4.02	(-6.68 - -1.36)	0.02	Yes
		Gamble in a non-problematic way vs. quit some types of gambling	-2.48	(-5.87 - 0.92)	0.39	No
		Quit some types of gambling vs. quit all types of gambling	-1.55	(-4.78 - 1.69)	0.62	No

FWER adjustment family: Secondary Outcomes Hypothesis 3

* Results are for the first listed risk factor group minus the second listed risk factor group

^ Confidence intervals correspond to the nominal significance level (unadjusted for multiple testing) and may be considered anti-conservative

APPENDIX 9

Hypothesis 3 dichotomous outcomes by various risk factors at 36 months

Table 9: 1: Outcome - Gambling-quit or improved

Risk factor	Risk factor	Contrast (Odds Ratio*)	Estimate of contrast	(95% CI)^	FWER adjusted p-value	Alternative accepted
Additional assistance received	Any assistance	Any assistance vs. none	0.28	(0.19 - 0.41)	<0.0001	Yes
	Informal assistance	Informal assistance vs. not	1.02	(0.41 - 2.52)	0.97	No
	Formal assistance	Formal assistance vs. not	0.50	(0.30 - 0.83)	0.03	Yes
Current goal dichotomised	Current goal dichotomised	Control over gambling vs. quit	2.97	(2.07 - 4.26)	<0.0001	Yes
Major life event	Death	Had death event vs. not	1.52	(1.06 - 2.18)	0.08	No
	Divorce/separation	Had divorce/separation vs. not	0.27	(0.18 - 0.39)	<0.0001	Yes
	Legal difficulties	Had legal difficulties vs. not	1.22	(0.71 - 2.08)	0.62	No
	Injury/illness	Had injury/illness vs. not	0.60	(0.42 - 0.86)	0.03	Yes
	Marriage	Became partnered vs. not	1.33	(0.84 - 2.11)	0.45	No
	Work trouble	Had work trouble event vs. not	0.86	(0.58 - 1.28)	0.62	No
	Retirement	Had retirement event vs. not				Non estimable
	Pregnancy	Had pregnancy/new additions vs. not	1.46	(0.93 - 2.31)	0.27	No
	Financial change	Had financial change vs. not	1.64	(1.15 - 2.32)	0.03	Yes
	Loan	Had mortgage/loan event vs. not	3.83	(2.06 - 7.12)	<0.0001	Yes
	Arguments	Had increase in arguments with close person vs. not	0.62	(0.43 - 0.90)	0.05	Yes
	Moving house	Moved house vs. not	0.98	(0.69 - 1.39)	0.91	No
	Moving city	Moved city vs. not	1.37	(0.81 - 2.34)	0.47	No
	Major change	Had major change event vs. not	1.26	(0.90 - 1.78)	0.38	No
	Earthquake	Experienced earthquake/ natural disaster vs. not	2.82	(1.52 - 5.24)	<0.01	Yes
	Other	Had other major event vs. not	0.62	(0.37 - 1.02)	0.18	No
	Any major event	Had any major event vs. not	0.69	(0.36 - 1.30)	0.48	No
Current goal	Current goal	Other goal vs. quit all types of gambling	2.79	(1.13 - 6.88)	0.09	No
		Other goal vs. quit some types of gambling	5.41	(2.11 - 13.88)	<0.01	Yes
		Other goal vs. gamble in a non-problematic way	2.37	(0.94 - 5.98)	0.20	No
		Other goal vs. maintain gambling abstinence	0.46	(0.16 - 1.30)	0.34	No

Risk factor	Risk factor	Contrast (Odds Ratio*)	Estimate of contrast	(95% CI)^	FWER adjusted p-value	Alternative accepted
		Maintain gambling abstinence vs. quit all types of gambling	6.05	(3.15 - 11.59)	<0.0001	Yes
		Maintain gambling abstinence vs. quit some types of gambling	11.73	(5.83 - 23.58)	<0.0001	Yes
		Maintain gambling abstinence vs. gamble in a non-problematic way	5.13	(2.59 - 10.17)	<0.0001	Yes
		Gamble in a non-problematic way vs. quit all types of gambling	1.18	(0.75 - 1.86)	0.62	No
		Gamble in a non-problematic way vs. quit some types of gambling	2.29	(1.36 - 3.85)	0.01	Yes
		Quit some types of gambling vs. quit all types of gambling	0.52	(0.32 - 0.83)	0.032	Yes

FWER adjustment family: Primary Outcomes Hypothesis 3

* The second listed risk factor group is the reference group (i.e. the denominator) for the Odds Ratio

^ Confidence intervals correspond to the nominal significance level (unadjusted for multiple testing) and may be considered anti-conservative

Table 9: 2: Outcome - Major depression

Risk factor	Risk factor	Contrast (Odds Ratio*)	Estimate of contrast	(95% CI)^	FWER adjusted P-value	Alternative accepted
Additional assistance received	Any assistance	Any assistance vs. none	1.85	(0.74 - 4.57)	0.43	No
	Informal assistance	Informal assistance vs. not				Non estimable
	Formal assistance	Formal assistance vs. not	1.72	(0.53 - 5.51)	0.62	No
Current goal dichotomised	Current goal dichotomised	Control over gambling vs. quit	0.19	(0.08 - 0.47)	0.00	Yes
Major life event	Death	Had death event vs. not	1.41	(0.65 - 3.05)	0.63	No
	Divorce/separation	Had divorce/separation vs. not	3.06	(1.32 - 7.10)	0.05	Yes
	Legal difficulties	Had legal difficulties vs. not	3.91	(1.50 - 10.15)	0.03	Yes
	Injury/illness	Had injury/illness vs. not	4.25	(1.87 - 9.64)	0.01	Yes
	Marriage	Became partnered vs. not	0.31	(0.09 - 1.13)	0.24	No
	Work trouble	Had work trouble event vs. not	1.45	(0.61 - 3.47)	0.64	No
	Retirement	Had retirement event vs. not	1.83	(0.15 - 21.72)	0.81	No
	Pregnancy	Had pregnancy/new additions vs. not	1.25	(0.50 - 3.12)	0.81	No
	Financial change	Had financial change vs. not	1.90	(0.87 - 4.13)	0.30	No
	Loan	Had mortgage/loan event vs. not	1.10	(0.42 - 2.88)	0.90	No
	Arguments	Had increase in arguments with close person vs. not	8.34	(3.58 - 19.45)	<0.0001	Yes
	Moving house	Moved house vs. not	1.70	(0.78 - 3.70)	0.43	No
	Moving city	Moved city vs. not	1.27	(0.46 - 3.56)	0.81	No
	Major change	Had major change event vs. not	1.14	(0.53 - 2.46)	0.83	No
	Earthquake	Experienced earthquake/ natural disaster vs. not	1.06	(0.38 - 2.90)	0.95	No
	Other	Had other major event vs. not	1.33	(0.39 - 4.46)	0.81	No
	Any major event	Had any major event vs. not	1.18	(0.31 - 4.51)	0.87	No
Current goal	Current goal	Other goal vs. quit all types of gambling	0.29	(0.03 - 2.56)	0.51	No
		Other goal vs. quit some types of gambling	0.22	(0.02 - 2.25)	0.45	No
		Other goal vs. gamble in a non-problematic way	1.04	(0.10 - 11.05)	0.99	No
		Other goal vs. maintain gambling abstinence	2.00	(0.18 - 22.40)	0.80	No
		Maintain gambling abstinence vs. quit all types of gambling	0.14	(0.04 - 0.55)	0.03	Yes
		Maintain gambling abstinence vs. quit some types of gambling	0.11	(0.02 - 0.50)	0.03	Yes
		Maintain gambling abstinence vs. gamble in a non-problematic way	0.52	(0.11 - 2.55)	0.66	No

Risk factor	Risk factor	Contrast (Odds Ratio*)	Estimate of contrast	(95% CI)^	FWER adjusted P-value	Alternative accepted
		Gamble in a non-problematic way vs. quit all types of gambling	0.28	(0.08 - 0.94)	0.14	No
		Gamble in a non-problematic way vs. quit some types of gambling	0.21	(0.05 - 0.87)	0.12	No
		Quit some types of gambling vs. quit all types of gambling	1.28	(0.42 - 3.93)	0.81	No

FWER adjustment family: Secondary Outcomes Hypothesis 3

* The second listed risk factor group is the reference group (i.e. the denominator) for the Odds Ratio

^ Confidence intervals correspond to the nominal significance level (unadjusted for multiple testing) and may be considered anti-conservative

Table 9: 3: Outcome - Motivation to achieve goal

Risk factor	Risk factor	Contrast (Odds Ratio**)	Estimate of contrast	(95% CI)^	FWER adjusted p-value	Alternative accepted
Additional assistance received	Any assistance	Any assistance vs. none	1.75	(0.75 - 4.11)	0.45	No
	Informal assistance	Informal assistance vs. not	1.41	(0.24 - 8.50)	0.83	No
	Formal assistance	Formal assistance vs. not	2.00	(0.64 - 6.27)	0.50	No
Current goal dichotomised	Current goal dichotomised	Control over gambling vs. quit	2.01	(1.04 - 3.90)	0.14	No
Major life event	Death	Had death event vs. not	1.37	(0.71 - 2.64)	0.62	No
	Divorce/separation	Had divorce/separation vs. not	0.63	(0.29 - 1.36)	0.50	No
	Legal difficulties	Had legal difficulties vs. not	0.50	(0.20 - 1.28)	0.39	No
	Injury/illness	Had injury/illness vs. not	0.61	(0.31 - 1.21)	0.39	No
	Marriage	Became partnered vs. not	1.44	(0.63 - 3.31)	0.63	No
	Work trouble	Had work trouble event vs. not	0.83	(0.39 - 1.75)	0.81	No
	Retirement	Had retirement event vs. not				Non-estimable
	Pregnancy	Had pregnancy/new additions vs. not	0.44	(0.20 - 0.96)	0.14	No
	Financial change	Had financial change vs. not	1.37	(0.73 - 2.59)	0.61	No
	Loan	Had mortgage/loan event vs. not	1.64	(0.72 - 3.75)	0.50	No
	Arguments	Had increase in arguments with close person vs. not	0.52	(0.25 - 1.07)	0.24	No
	Moving house	Moved house vs. not	0.82	(0.42 - 1.58)	0.79	No
	Moving city	Moved city vs. not	0.59	(0.24 - 1.43)	0.50	No
	Major change	Had major change event vs. not	0.92	(0.49 - 1.73)	0.86	No
	Earthquake	Experienced earthquake/ natural disaster vs. not	0.96	(0.41 - 2.25)	0.97	No
	Other	Had other major event vs. not	1.01	(0.36 - 2.79)	0.99	No
	Any major event	Had any major event vs. not	0.69	(0.24 - 2.02)	0.74	No
Current goal	Current goal	Other goal vs. quit all types of gambling	0.81	(0.19 - 3.43)	0.86	No*
		Other goal vs. quit some types of gambling	1.34*	(0.26 - 6.78)*	0.83*	No*
		Other goal vs. gamble in a non-problematic way	1.39*	(0.31 - 6.17)*	0.81*	No*
		Other goal vs. maintain gambling abstinence	0.12*	(0.02 - 0.58)*	0.05*	Yes*
		Maintain gambling abstinence vs. quit all types of gambling	6.79*	(2.38 - 19.39)*	<0.0001*	Yes*
		Maintain gambling abstinence vs. quit some types of gambling	11.16*	(3.07 - 40.55)*	<0.0001*	Yes*
		Maintain gambling abstinence vs. gamble in a non-problematic way	11.58*	(3.76 - 35.65)*	<0.0001*	Yes*

Risk factor	Risk factor	Contrast (Odds Ratio**)	Estimate of contrast	(95% CI)^	FWER adjusted p-value	Alternative accepted
		Gamble in a non-problematic way vs. quit all types of gambling	0.59*	(0.23 - 1.47)*	0.50*	No*
		Gamble in a non-problematic way vs. quit some types of gambling	0.96*	(0.30 - 3.13)*	0.97*	No*
		Quit some types of gambling vs. quit all types of gambling	0.61*	(0.20 - 1.85)*	0.63*	No*

FDR adjustment family: Secondary Outcomes Hypothesis 3

* These results come from a model where some Odds Ratios are extremely small or extremely large

** The second listed risk factor group is the reference group (i.e. the denominator) for the Odds Ratio

^ Confidence intervals correspond to the nominal significance level (unadjusted for multiple testing) and may be considered anti-conservative

APPENDIX 10

Explanation of hypotheses

Hypothesis 1

Hypothesis 1 looks at cross-sectional comparisons at 36 months. It is two-sided with a significance threshold set at 5%. It hypothesises that the most intensive intervention has the same efficacy outcomes as the other interventions at 36 months.

Hypothesis 1 - continuous efficacy outcomes¹⁷

- a. The mean efficacy outcome for the MI+W+B group is equal to the mean efficacy outcome for the TAU group at the 36 month follow-up assessment
- b. The mean efficacy outcome for the MI+W+B group is equal to the mean efficacy outcome for the MI group at the 36 month follow-up assessment
- c. The mean efficacy outcome for the MI+W+B group is equal to the mean efficacy outcome for the MI+W group at the 36 month follow-up assessment.

Hypothesis 1 - dichotomous efficacy outcomes¹⁸

- a. The Odds Ratio for the efficacy outcome comparing the MI+W+B group vs. the TAU group equals 1 at the 36 month assessment
- b. The Odds Ratio for the efficacy outcome comparing the MI+W+B group vs. the MI group equals 1 at the 36 month assessment
- c. The Odds Ratio for the efficacy outcome comparing the MI+W+B group vs. the MI+W group equals 1 at the 36 month assessment.

Note that an Odds Ratio compares the Odds for an event (e.g. major depressive disorder) in one group (e.g. the MI+W+B group) with that in another group (e.g. the TAU group), by dividing them by each other (to give an Odds Ratio). An Odds Ratio of 1 indicates no relative difference between the groups (e.g. between the MI+W+B group and the TAU group), in terms of the Odds of the event (e.g. major depressive disorder) occurring.

Hypothesis 2

Hypothesis 2 compares the difference between the groups at the 36 month assessment with the difference at the 12 month assessment for continuous outcomes, and for dichotomous outcomes compares the odds ratio at 36 months with that at 12 months. It is two-sided with a significance threshold set at 5%.

Hypothesis 2 - continuous efficacy outcomes¹⁶

- a. The mean difference in efficacy outcome between the TAU group and the MI+W+B group at 36 months equals the main difference in efficacy outcome at 12 months
- b. The mean difference in efficacy outcome between the MI+W group and the MI+W+B group at 36 months equals the main difference in efficacy outcome at 12 months
- c. The mean difference in efficacy outcome between the MI group and the MI+W+B group at 36 months equals the main difference in efficacy outcome at 12 months.

¹⁷ Continuous efficacy outcomes are: Days gambled, money lost, control over gambling, PGSI-3 and Kessler-10.

¹⁸ Dichotomous efficacy outcomes are: Gambling-quit or improved, motivation, major depressive disorder.

Hypothesis 2 - Dichotomous efficacy outcomes¹⁷

- a. There is no relative change in the Odds Ratios for the efficacy outcome comparing the MI+W+B group vs. the TAU group between 36 months and 12 months
- b. There is no relative change in the Odds Ratios for the efficacy outcome comparing the MI+W+B group vs. the MI group between 36 months and 12 months
- c. There is no relative change in the Odds Ratios for the efficacy outcome comparing the MI+W+B group vs. the MI+W group between 36 months and 12 months.

Note that the Odds Ratio at a given time point (e.g. at 36 months) compares the Odds for an event (e.g. major depressive disorder) in one intervention group (e.g. the MI+W+B group) with that in another group (e.g. the TAU group) by dividing them by each other (to give an Odds Ratio). An Odds Ratio of 1 at 36 months indicates no relative difference in the Odds of the event (e.g. major depressive disorder) happening at 36 months between the intervention groups (e.g. between the MI+W+B group and the TAU group). An Odds Ratio greater than 1 at 36 months in this example would indicate the Odds at 36 months are greater for the MI+W+B group, whereas an Odds Ratio less than 1 at 36 months would indicate the Odds at 36 months are greater for the TAU group. We can see if the relationship between the Odds in the MI+W+B group and the Odds in the TAU group changed over time by comparing the Odds Ratio at 36 months with the same Odds Ratio but at 12 months (by dividing one by the other). If the 'Odds Ratio at 36 months' divided by the 'Odds Ratio at 12 months' is 1, this shows no change over time in the Odds Ratio comparing the two intervention groups.

Hypothesis 3

Hypothesis 3 relates to risk factors detailed in the second table of Appendix 3. It is two-sided with a significance threshold set at 5%.

Hypothesis 3 - Continuous efficacy outcomes

- a. The mean 'days gambled' is equal for the different levels of risk factor at 36 months
- b. The mean 'money lost' is equal for the different levels of risk factor at 36 months
- c. The mean 'control over gambling' is equal for the different levels of risk factor at 36 months
- d. The mean 'PGSI-3' is equal for the different levels of risk factor at 36 months
- e. The mean 'Kessler-10' is equal for the different levels of risk factor at 36 months.

Hypothesis 3 - Dichotomous efficacy outcomes

- a. The Odds Ratio for 'Gambling-quit or improved', comparing the different levels of risk factor at 36 months equals 1
- b. The Odds Ratio for 'motivation', comparing the different levels of risk factor at 36 months equals 1
- c. The Odds Ratio for 'major depressive disorder', comparing the different levels of risk factor at 36 months equals 1.

Note that an Odds Ratio compares the Odds for an event (e.g. major depressive disorder) in one risk factor level (e.g. those with legal difficulties) with that in another risk factor level (e.g. those without legal difficulties) by dividing them by each other. An Odds Ratio of 1 indicates no relative difference between the risk factor levels (e.g. between those with and without legal difficulties) in terms of the Odds of the event (e.g. major depressive disorder) occurring.