Transitions and Stability of Problem Gambling Behaviours

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Background

Researchers around the world have examined the correlates and consequences of problem gambling but few studies have addressed the issue longitudinally. Recent reviews of longitudinal research (e.g., El-Guebaly et al, 2006; LaPlante, Nelson, LaBrie et al. 2008; Slutske, 2007) generally do not support the conventional view that problem gambling is an enduring condition. Although problem gambling population prevalence rates remain relatively steady over time, problem gambling is far less stable at an individual level, but instead, transitory and episodic (Slutske, Jackson & Sher, 2003). To date, little is known about transitions in gambling behaviours, and the factors associated with transitions over time. There is an abundance of cross sectional research, however, that may provide some insight into these factors.

The literature indicates that factors such as co-morbidity, gambling-related cognitions and social networks are important considerations in understanding problem gambling. However, since the research is generally weighted towards studies of a cross-sectional design that only look at the associations at one point in time; we have a limited understanding of the role of these factors over time. Time is particularly important given that problem gambling is a dynamic and transient process.

The longitudinal nature of the current study provides the opportunity to examine varied trajectories of problem gambling in relation to these factors to understand the determinants or temporal ordering of these changes and to identify ways to better understand and assist those who are having gambling problems. This one year study with multiple data collection points makes a significant contribution to the field by examining the dynamic nature of gambling across multiple measurement points to capture important transitions and changes in gambling and the critical antecedent conditions to explain transitions and stability in gambling over time. Lastly, given the generally low use of treatment among those with problems, the study seeks to better understand why people seek help for problem gambling by examining people's perceptions and experiences with problem gambling assistance and their help-seeking behaviour.

Methodology

The longitudinal study examined adults from two distinct groups: a sample of individuals scoring as low-risk, moderate-risk and problem gambling on the Problem Gambling Severity Index (PGSI) from the 2006 Manitoba general population gambling prevalence study (i.e., general population group, N=347), and a sample of clients attending AFM's Gambling Treatment Orientation session due to concerns about their own gambling (i.e., help-seeking group, N=42). To test for reactivity to the survey administration frequency among the general population group, three-quarters of the group received the survey every 6 weeks, for a total of nine collection points. Most participants (80%) completed all nine survey waves. The other 25% were contacted every 3 months, for a total of five collection points. The large majority of

these participants (84%) completed all five surveys. Comparative analyses between the two survey administration groups revealed no significant differences and thus no effect of test reactivity. For the statistical analyses of the general population group then, we combined the two groups and used the common data points between the two survey administration methods. Participants in the help-seeking group were contacted twice, 3 months apart. Of the total help-seeking sample, 81% completed the follow-up survey.

Both the general population and help-seeking surveys included measures of gambling participation and problem gambling levels, gambling cognitions, alcohol consumption, drug use, personal and mental health, perceived social support, and demographic information. Specific screeners used included the Canadian Problem Gambling Index (CPGI), Alcohol Use Disorders Identification Test (AUDIT), Drug Abuse Screening Test (DAST), and Brief Symptom Inventory (BSI-18).

Gambling Involvement and Changes in Problem Gambling

Overall, the participants from the general population group showed considerable variability in problem gambling development over the course of the study. Participants who gambled without problems at baseline were the most likely group to continue gambling in the same way throughout the study while the risky and problem gambling groups exhibited a consistently high rate of change in levels of problem gambling. The non-gambling participants showed the greatest volatility in gambling levels and unlike the other groups, did not show a general linear trend towards increasing or decreasing problem gambling.

The analysis of our gamblers from the general population shows that risky or problematic gambling is not a constant condition and that a gambling level prognosis can change in as little as 3 months. Overall, the results indicate a general improvement over the course of one year for risky or problem gambling. These conclusions are consistent with an emerging body of literature finding that problem gambling is not static or chronic but instead, tends to improve over time (e.g., Abbott et al., 2004; Slutske, Jackson, & Sher, 2003; Slutske, 2006; Wiebe, Cox, & Falkowski-Ham, 2003).

It should be noted, however, that this improvement trend could reflect a subtle recruitment bias in that the sample may have a disproportionate number of people with gambling problems who use participation in research as a non-threatening way to begin to address the issue (versus fully acknowledging a problem and seeking treatment) (Hodgins & el-Guebaly, 2000). Furthermore, the study only observed participants for approximately one year. While there may have been improvement over this period, it is possible that this pattern may be part of a longer term trend (+1 year) where problem gambling is experienced as a type of roller coaster ride with interspersed periods of no gambling, gambling without problems, or problem gambling.
If true, we may have to reconsider the notion of problem gambling transition and stability. Although problem gambling has certainly been shown to be a fluid condition, this fluidity may

be a part of a consistent but longer-term trend where non-problem gambling and problem gambling are never really completely sustained, yet always just around the corner. In this sense, it could be argued that problem gambling does display some consistency and stability. Longitudinal studies for longer periods of time than one year would be needed to investigate this possibility.

Predictors of Problem Gambling and Gambling Transitions

To predict problem gambling, a series of regression analyses were conducted that incorporated both prospective and concurrent factors, as well as analyzed problem gambling as a categorical or a continuous variable. The regression analyses indicate that of all the examined factors, only a perceived inability to stop gambling and illusion of control emerged as significant predictors of problem gambling at some point in all our analytical approaches; that is, whether prospective or concurrent predictions were done or whether problem gambling was measured continuously or a categorically.

This finding argues for a conceptual model of problem gambling that places impairment of control as a central and organizing feature (Corless & Dickerson, 2006). The value of such a model may be that it would help focus our treatment development efforts, both psychosocial and pharmacological treatments, at reducing impairment of control as a therapeutic mechanism. The predictive strength of perceived inability to stop gambling also suggests that notions such as self-efficacy and self-empowerment may play important, even crucial, roles in problem gambling recovery.

Latent growth curve modeling analysis was also conducted, which provides a richer, more complex description of the relationship between problem gambling and the factors over the course of the study than the bivariate analyses. While factors such as depression, illicit drug abuse, interpretive control/bias, and perceived inability to stop gambling predicted higher levels of problem gambling at baseline, they were also associated with a faster rate of reductions in problem gambling over the longer term. Alcohol abuse, on the other hand, was only related to higher initial baseline levels of problem gambling. These findings suggest that problem gambling and alcohol dependency are associated behaviors, whereas problem gambling and illicit drug use are incompatible over longer periods of time. With illicit drug use and gambling, greater participation in one activity necessitates decreasing participation in the other.

Given the high rate of gambling co-morbidity with depression and illicit drug use (Petry & Weinstock, 2007), the literature on gambling and self-recovery could paint a more optimistic picture than what is actually occurring. Although individuals may “recover” from their gambling problems, they could still be far from healthy in a holistic sense, if they are subsequently burdened with another ailment (LaPlante et al., 2008). Such individuals have not truly recovered then; their problems persist but in a different guise. This interpretation of the results supports the need for broad-based treatment outcome assessment including assessment of co-morbidity, mental health and quality of life (Walker et al., 2006).

The replacement of gambling problems by another health problem also has implications for understanding the low utilization of problem gambling treatment. People with gambling problems may be seeking treatment, just not for their gambling problems. Addressing gambling along with their other co-existing problems may be the only way towards true recovery.

Problem Gambling Assistance and Help-seeking Behaviour

Although there was an indication of a high willingness to use problem gambling services, only 1 in 10 people with gambling problems in the general population indicated that they had ever used the problem gambling helpline or community counseling service. Similar results have been found in other general population surveys (Cunningham, 2005; Suurvali et al., 2008). To understand why people seek help for their gambling problems we compared the help-seeking group with the problem gamblers from the general population group. The low sample sizes limited most of our analyses between the help-seeking and general population groups and the results at best, are exploratory and preliminary. Nonetheless, they do provide some direction for understanding why people seek help with their gambling problems.

Most obviously, help-seeking may be due to increased gambling frequency as significantly more of the help-seeking group compared to the general population group reported that their gambling increased over the past year (51% vs. 7%) and 5 years (93% vs. 38%). The most common reasons given for the increases were similar for both groups: personal, work, and financial issues.

The consequences experienced from problem gambling may also have some effect on people's motivation to seek help. Specifically, financial problems may be more of a motivating factor than health problems. We suggest that financial problems may have a greater undermining impact on their ability to gamble. Although a larger sample size would definitely be needed to confirm this conclusion, there is an indication that help-seekers tended to receive some kind of support from family and friends in addressing their gambling or gambling problems.

Perceived inability to stop gambling was another factor found to be consistently related to people's gambling and changes in their levels of gambling. There was some evidence to suggest that people who felt that they could not stop gambling were also less likely to seek help. Although the desire to handle problems on their own has been found to be among the strongest barriers to help-seeking (Hodgins & el-Guebaly, 2000), increasing self-efficacy, self-confidence or simply hope in some cases may be the first step towards getting people to seek help.

There was evidence from our study to indicate that help-seeking behaviour among gamblers with problems may also be related to problematic alcohol consumption. Gamblers with problems may be more likely to seek help when they feel their problems have been compounded by alcohol use. Lastly, demographic characteristics did not predict which individuals attended a lesser or greater number of treatment sessions, suggesting that it is not specific demographic types of individuals who seek treatment but rather individuals seek treatment at different phases of their problem development.

Finally, our research findings provide some insights to treatment effectiveness. While most of the help-seeking group attended very few treatment sessions (mode = 3 sessions) after the initial Treatment Orientation session, there is evidence of treatment effectiveness. By three months, over half of the sample was abstinent and only 19% were categorized as problem gamblers and 9.5% as moderate risk gamblers. The findings from the general population sample suggest that a substantial amount of volatility is expected after three months, even if the overall pattern is maintained improvement.

Furthermore, the majority of the help-seeking group scored in the problem gambling range at baseline, (which was within one month after they attended the Treatment Orientation session), but a substantial number scored in the non-problematic range (17% abstinent; 16.5% low risk or the non-problem gambling). Rapid early improvement in gambling problems has not yet been studied although the “sudden gains” phenomena has garnered interest in substance abuse and mental health disorders (e.g., Hardy et al., 2005; Ilardi & Craighead, 1999; Stiles et al., 2003). Early change in drinking and eating disorder behaviours has been found to predict longer term positive outcome (Breslin et al., 1997; Fairburn et al., 2004). Our sample is too small to examine this phenomenon in detail although only one of the 14 individuals who were “early responders” had relapsed to problem gambling at three months.

This research clearly shows that problem gambling is a changeable condition and that underlying co-morbidities may occupy a more complex role than previously thought. The results also point to the significant role that feeling unable to stop gambling occupies in responses to gambling problems. This is an area deserving of further investigation to better understand how these feelings can be targeted to enhance the effectiveness of treatment and maintenance of recovery from problem gambling.

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Chapter 1

Research Overview

Gambling behaviour lies on a dynamic continuum. Some individuals choose not to gamble while other individuals gamble socially or recreationally. Others may have problems with their gambling and experience these problems in varying degrees both in terms of volume and longevity. Individuals may move forwards or backwards along the continuum over time and movement between gambling may include multiple shifts into and out of any given state. To date, little is known about transitions in gambling behaviours, and the factors associated with transitions over time.

The 2006 Manitoba gambling prevalence study afforded the opportunity for a comprehensive investigation into the nature of problem gambling behaviours. For the current study, two samples were recruited. The first sample included only participants from the 2006 Manitoba prevalence study who were assessed as low-risk, moderate-risk or problem gamblers on the CPGI and who agreed to be contacted for further research. This group was measured repeatedly over a one-year period. The second sample consisted of participants who sought help by attending the gambling orientation session at the Addictions Foundation of Manitoba. The "help-seeking" group was recruited over a one-year period and were re-assessed after three months.

A longitudinal study is not only essential for examining gambling as a dynamic process, but also affords an understanding of the determinants or temporal ordering of these changes. This one year study with multiple data collection points makes a significant contribution to the field by:

- Examining the dynamic nature of gambling across multiple measurement points to capture important transitions and changes in gambling.
- Examining critical antecedent conditions to explain transitions and stability in gambling over time.

Literature Review

Whereas researchers around the world have examined the correlates and consequences of gambling, few studies have addressed the problem longitudinally. There is little understanding of the nature of non-problem, risky and problem gambling in terms of the factors associated with stability and transitions between gambling states.

Transitions in Problem Gambling

There is only a handful of studies that have examined change in gambling patterns over time, and even fewer that have specifically focused on the development of gambling problems among the general population (e.g., Abbott, Williams & Volberg, 2004; Slutske, Jackson & Sher, 2003; Wiebe, Single, Falkowski-Ham, 2003). Recent reviews of longitudinal research have been conducted by LaPlante, Nelson, LaBrie and colleagues (2008) and Slutske (2007).

The findings from this longitudinal research generally do not support the conventional view that problem gambling is relatively enduring. Although problem gambling population prevalence rates remain relatively steady over time, at an individual level, problem gambling is far less stable but instead, "transitory and episodic" (Slutske, Jackson, & Sher, 2003). In a follow-up study of Ontario gamblers, Wiebe, Cox, and Falkowski-Ham (2003) found that only about one-quarter of gamblers who were either at-risk or who were experiencing moderate problems continued to do so one year later.

This instability of problem gambling has been found in other longitudinal studies over longer periods and with more frequent follow-up intervals. A 7-year follow-up study of gamblers in New Zealand reported only 23% and 2% of those diagnosed as probable pathological gamblers and problem gamblers, respectively, had a similar diagnosis 7 years later (Abbott et al., 2004). In another study that followed first year university students for 11 years, surveying them 4 times at 3- and 4-year intervals, more than half of the participants with gambling problems (58%) did not have problems 3 years later, and 83% did not have problems 11 years later (Slutske et al., 2003). The relative lack of stability in problem gambling has also been found in youth samples. In a longitudinal study that assessed 305 adolescents 3 times over 6 years, the researchers reported that 29% of participants with gambling problems continued to have problems over the 6 year period (Winters et al., 2005). When looking at the at-risk gamblers, only 13% either remained at-risk or developed problems during the 6 years. In her analysis of US national survey data (NESARC), Slutske (2006) found that the most common course of pathological gambling was a single episode lasting about 1 year, defined as a cluster of symptoms experienced within a 12-month period. She noted that the persistence of problem gambling for longer periods of time is "exceedingly rare" (Slutske, 2007).

In their review of 5 prospective longitudinal studies, LaPlante and colleagues (2008) found evidence that individuals do recover from problem gambling. These researchers note that recovery from problematic gambling is consistent with recovery from other types of addiction. This is not to suggest, though, that gamblers with problems can only improve. Approximately 10% of Wiebe et al.'s (2003) sample at each problem gambling level progressed to a more serious problematic level. Moreover, if there is any kind of stability among the gambling groups, it tends to be on the extreme ends. That is, just as most who do not gamble or who gamble without problems will continue to do so (see Winters et al., 2005), those with the most severe problems are the most likely to continue to have problems. Eight out of the 10 gamblers with severe problems in the Ontario study still gambled at severe problematic levels one year later (Wiebe et al. 2003).

Despite a general tendency towards improvement, particularly in the long-run, the trajectory of an individual's problem gambling should still be seen as variable and multi-directional (LaPlante et al., 2008; Slutske, 2007). Given this view, what factors could potentially contribute to transition and stability in problem gambling? The study of such factors unfortunately has not been adequately addressed with longitudinal research (Nathan 2003; Slutske, 2007) but there is cross sectional research in problem gambling literature that may shed some light on reasons for change and stability in problem gambling.

Factors Associated with Stability and Transition in Problem Gambling

Co-morbidity

Research suggests that problem gambling rarely occurs in isolation from other mental health struggles (Petry & Weinstock, 2007). In the largest national epidemiological study (NESARC) ever conducted (N=43,093), Petry, Stinson, and Grant (2005) found that 38.1% of lifetime pathological gamblers had a lifetime drug use disorder compared to only 8.8% of non-gamblers, indicating that pathological gamblers were 4.4 times more likely than non-gamblers to have any drug use disorder. The lifetime rate of alcohol use disorder was 73% among lifetime pathological gamblers compared to 25% of non-gamblers (Petry et al., 2005), which translates to pathological gamblers being at 6 times greater risk of having any alcohol use disorder than non-gamblers in their lifetimes. These findings are consistent with research conducted in Canada (el-Guebaly, Patten, Currie et al., 2006), and with young adult and treatment populations (e.g., Wanner et al., 2006; Winters et al., 2002; Stinchfield and Winters, 2001; Specker et al., 1996).

There is also evidence showing a relationship between problem gambling and mood disorders (e.g., depression, dysthymia) and anxiety disorders (e.g., general anxiety, panic disorder). In the U.S. national NESARC study, the lifetime rate of mood disorders was 50% among lifetime pathological gamblers, which placed them at over 4 times greater risk of having these disorders than non-gamblers. The rate of anxiety disorders was 41%, which represented a relative risk of 3.9 when compared to non-gamblers (Petry et al., 2005). Significant problem gambling co-morbidity with mood or anxiety disorders has also been found in Canadian prevalence studies (e.g., el-Guebaly, Patten, Currie et al., 2006; Edmonton Bland et al., as cited in Petry & Weinstock, 2007), and in treatment populations (e.g., Specker et al., 1996). However, the results for treatment populations should be viewed with caution due to the generally small sample sizes on which they are based (Petry & Weinstock, 2007).

Much of the co-morbidity research is based on cross-sectional research designs that reveal little about the specific nature of the relationship between the co-morbidity factors and problem gambling (Petry & Weinstock, 2007). There are a few longitudinal studies that provide insight into the relationship between co-morbid conditions and problem gambling. Dickerson, Haw, and Shepherd (2003) followed a group of regular electronic gambling machine (EGM) players to identify factors that lead to impaired control over their gambling. They found that depression was a significant independent predictor of impaired gambling control (relative to such factors as social support, impulsivity, alcohol misuse). This finding suggests that mood disorders like depression may exacerbate problem gambling if gambling is a means of coping with depression.

A longitudinal study conducted by Hodgins, Peden and Cassidy (2005) followed 101 pathological gamblers (in or out of treatment) who had recently quit gambling over a 1 year period and did not find evidence to support the view that gambling was being used to modulate mood. These researchers reported that although pathological gamblers with a lifetime mood disorder took a longer time to achieve 3 months of abstinence from gambling compared to pathological gamblers without a lifetime mood disorder, a current mood disorder diagnosis did not affect the time it took to achieve abstinence. This indicates that having a current mood disorder did not prolong gambling and therefore individuals were unlikely to be using gambling to modulate their moods.

In a further four year follow-up of these individuals, Hodgins and el-Guebaly (in press) found that ongoing alcohol abuse led to increased risk of relapse among individuals who successfully quit gambling. Other studies have also found evidence that problem gamblers may continue to experience problems with alcohol consumption even when they no longer report gambling problems (Abbott et al., 2004). In the four year follow-up, Hodgins and el-Guebaly also found that individuals who had a drug use disorder history were less likely to achieve a stable period of abstinence.

The substitution of one addiction for another is known as addiction "hopping" or "switching" (LaPlante et al., 2008). Hodgins and colleagues (2005) found in their study that the age of onset of substance use disorders was earlier than the gambling disorder, which suggests that some study participants may have switched their substance consumption to gambling. However, the researchers also raise another likely possibility for this temporal pattern, which is that the substance use disorder caused the problem gambling.

The different interpretations given by Hodgins et al. (2005) reflect a major issue currently facing research in problem gambling co-morbidity. Despite the few longitudinal studies that have attempted to shed light on the issue (e.g., Hodgins et al., 2005; Shaffer & Hall; Wiebe et al., 2003), the "question that remains unanswered concerns the temporal relationships between pathological gambling and other psychiatric conditions. That is, are people with psychiatric disorders more likely to develop pathological gambling than people without these disorders? Or, does pathological gambling increase the probability of developing these [psychiatric disorders]" (Petry & Weinstock, 2007, p.314-315)?

In sum, although problem gambling is likely to be associated with other co-morbid psychiatric conditions, to date the role of psychiatric disorders in the etiology and outcomes of problem gambling has not been thoroughly investigated (Hodgins et al, 2005; Nathan, 2003).

Gambling-related Cognitions

There has been much research investigating the relationship between problem gambling and gambling cognitions. These cognitions refer to illusions, myths, misperceptions, or misbeliefs that gamblers can have about the nature of gambling (e.g., randomness of outcomes), the probabilities of winning (e.g., chances of winning the jackpot), and their personal gambling skills and experiences (e.g., selectively remember wins over losses). Five general types of gambling-related cognitions have been identified in the research that may lead people to gamble excessively: belief that they can control the outcome; belief that they can predict an outcome; biased interpretations of gambling behaviours and outcomes that encourage more gambling; expectations about gambling's effects; and perceived inability to stop gambling (Raylu & Oei, 2004; Toneatto, Blitz-Miller, Calderwood et al., 1997).

These types of cognitive distortions have been identified in people who gamble frequently. In one study, for example, that required regular and heavy gamblers to describe special strategies, techniques and rituals they used when gambling, 84% of the sample reported being able to actively control gambling outcomes by using gambling systems, lucky numbers, superstitions, and extraordinary skill. On average, participants reported over three specific distortions. Those with a South Oaks Gambling Screen (SOGS) score in the problematic range had significantly more distortions (Toneatto et al., 1997).

Other studies have specifically compared problem and non-problem gambling groups and found support for Toneatto et al.'s (1997) assertion that problem gambling is related to gambling distortions. Joukhador, Blaszcznski, and Maccallum (2004), for instance, found that the problem EGM gambers endorsed more superstitious beliefs than EGM gamblers with no problems. Furthermore, the more superstitious beliefs that problem EGM gamblers had, the greater their gambling frequency.

Other cognitive differences that have been found between these two groups are that problem gambling groups tend to have a poorer understanding of randomness and poorer numerical reasoning ability, and a stronger belief in predictive and outcome control. In addition, they believe that persistence pays off; and they engage in greater personalization of gaming machines (e.g., machines should respond to emotional persuasion) (Turner, Zangeneh, & Littman-Sharp, 2006; Lambos & Delfabbro, 2007; Delfabbro, Lahn, & Gabosky, 2006). Interestingly, several researchers have found that while erroneous beliefs about randomness and probabilities may be related to problem gambling, knowledge of the basic odds for specific games did not appear to differentiate between problem gambling and non-problem gambling individuals (Lambos

& Delfabbro, 2007; Delfabbro, Lahn, & Grabosky, 2006; Turner, Zangeneh, & Littman-Sharp, 2006).

Gambling cognitions have naturally been the target of cognitive-behavioural therapy that aims to increase people's awareness of their faulty thoughts and the effect of these thoughts on their behaviours and emotions. The therapist helps the individual to replace these faulty thoughts and thought processes with a more realistic cognitive understanding and approach to gambling (Hodgins & Holub, 2007). Cognitive behavioural treatment evaluations have shown some success in reducing problem gambling-related behaviours (Hodgins & Holub, 2007). For example, randomized trials of cognitive behavioural treatment conducted by Ladouceur and colleagues have shown that such treatment led to less gambling and increased self control over gambling at 12 months (Ladouceur, Sylvain, Boutin, et al., 2001; Sylvain, Ladouceur, & Boisvert, 1997), fewer DSM-IV pathological gambling symptoms and higher perceived self-efficacy and self-control, which were maintained over 2 years (Ladouceur et al. 2003).

The relationship between problem gambling and cognitive distortions is not clearly established. Some researchers have pointed out that many gamblers have accurate conceptions of gambling in the abstract but tend to engage in distortions when they are caught up in the excitement of gambling (Sevigny & Ladouceur, 2004; Lambos & Delfabbro, 2007). Moodie (2007) points out that many people do not gamble for profit but rather to escape problems or relieve boredom. For these emotion-driven gamblers, cognitive behaviour therapy is likely less successful because their motivation hinges on their emotions, not the substitution of rational cognitions for irrational thoughts. Other researchers maintain that gambling misperceptions are highly prevalent among gamblers and there is no difference in the frequency of gambling misperceptions between problem and non-problem gambling populations (Delfabbro, 2004; Ladouceur, 2004). According to Ladouceur (2004), the difference may be that those with gambling problems have a stronger conviction in their beliefs about gambling.

Social Network

Despite the limited longitudinal research conducted in this area, there is some evidence that social networks and coping behaviours may influence and be influenced by problem gambling transitions and stability. In terms of social networks, relationships with friends may have some impact on problem gambling. For example, in a study that examined factors that were perceived to be important for initiating and maintaining gamblers' recoveries from problem gambling, participants viewed social and family support as important to maintaining desired changes in their gambling behaviours (Hodgins & El-Guebaly, 2000).

One important dynamic within an individual's social network, particularly younger people, is their relationships and interactions with parents. Winters et al. (2005) found that parental gambling history predicted problem gambling in their young adult sample, while Vitaro et al. (2001) reported that lax parental supervision very modestly predicted gambling delinquency. In a longitudinal study that followed 903 adolescent boys (11-16 years old) for 6 years, the less parents knew about their adolescent's involvement in gambling, alcohol and drug use, the more severe the antisocial behaviour became in these youths' subsequent years (Wanner et al., 2006).

The influence of network members may be particularly strong for members of ethnic minority groups who have gambling problems because they may be reluctant to seek formal problem gambling assistance due to cultural attitudes and tensions (Clarke, Abbott, Desouza et al., 2007). In particular, in cultures where the institution of the family is central, people may not seek outside services because it would be perceived as a failure of the family's support. Although the strong social support of the family may impede problem gambling treatment uptake, Clarke and colleagues (2007) suggest that it could be beneficial if the family were informed about resources for problem gambling and encouraged to link family members to them.

Problem Gambling Recovery and Self-Recovery

As reported earlier, there is little evidence to claim that people cannot recover from their gambling problems, even those with more severe problems (Abbott & Clarke, 2008;LaPlante et al., 2008; Slutske, 2006). Hodgins and el-Guebaly (2002) examined resolved and active problem gamblers to understand the process of recovery. Most of the resolved problem gamblers in their study reported that they consciously decided to quit gambling rather than reduce or manage it. One of the most commonly reported ways to achieve and maintain gambling abstinence involved "stimulus control strategies" that limited or eliminated any physical temptations or opportunities to play (e.g., staying away from machines, moving back home) (Hodgins & el-Guebaly, 2000; Hodgins, Wynne, & Makarchuk, 1999).

A number of studies (Cunningham, Hodgins, Toneatto, 2009; Hodgins & el-Guebaly, 2000; Hodgins, 2001; Hodgins et al., 1999; Toneatto et al., 2008) have investigated other characteristics to problem gambling recovery. Their research found that the primary motivations for recovery were financial (e.g., running out of money, bankruptcy) and emotional (e.g., stress, depression) considerations (see also Evans & Delfabbro, 2005; Pulford et al., 2008). Aside from the stimulus control strategies mentioned earlier (e.g., staying away from games), other common methods that problem gamblers reportedly used to recover included treatment enrollment, cognitive strategies (e.g., self-talk, thought analysis), social support reliance (e.g., family, friends), and new activity engagement (e.g., exercise, reading). Hodgins (2001) interviewed 37 recovered problem gamblers to determine the processes that gamblers used to help them overcome their gambling problems. He found that the most frequently reported processes of change involved some type of self-analysis and assessment of their own thoughts, feelings, and behaviours regarding the costs and benefits of their gambling on themselves and others.

There is a substantial amount of evidence supporting the idea that many people with gambling problems recover without the assistance of formal treatment. For instance, about one-third of the respondents gambling at problematic levels in two large U.S. national prevalence survey studies (Gambling Impact and Behaviour Study (N=2,417) and National Epidemiological Survey on Alcohol and Related Conditions (N=49,093) reported that they had naturally recovered (Slutske, 2006). None of the problem gamblers who recovered in the longitudinal study in New Zealand reported receiving specialist help (Abbot et al., 2000). Hodgins, Wynne, and Makarchuk (1999) reviewed 22 gambling prevalence studies conducted between 1986 and 1996 and found roughly 30% to 45% recovery rates for pathological and problem gambling, respectively. Most of the recovery, they reported, was done naturally and not through treatment.

In terms of problem gambling recovery then, as Slutske et al. (2003) state, natural self-recovery "may be the rule rather than the exception". This should not be surprising since natural recovery is common to the resolution of other addictive problems, including alcohol and tobacco (DiClemente & Prochaska, 1982; Sobell et al., 2002).

Utilization of Problem Gambling Treatment and Services

The prevalence of natural self-recovery does not diminish the importance of problem gambling treatment. There is sufficient evidence to suggest that many gamblers would benefit from treatment. Research from Canada (Hodgins & el-Guebaly, 2000; Suurvali et al., 2008) and Australia (Evans & Delfabbro, 2005) suggests that most gamblers with problems seek help as a last resort, when their problems are severe and they are on the verge of a crisis (e.g., physical or psychological breakdown, financial ruin). Furthermore, some current developments and trends in problem gambling treatment hold promise for helping gamblers with problems to recover (see Hodgins & Holub, 2007; Toneatto & Miller, 2004). Lastly, formal treatment may be more appropriate for specific kinds of gamblers such as those with more severe problems (Suurvali et al., 2008; Hodgins & el-Guebaly, 2000) or those who seek abstinence (Hodgins et al., 2005).

Low treatment and service uptake is a significant barrier for those providing such assistance (Hodgins & Holub, 2007). Few problem gamblers seek or receive treatment (Petry & Weinstock, 2007). The Productivity Commission (1999) concluded that 10% of Australian problem gamblers seek help for their problems. Similar low treatment uptake rates have been reported from general population survey studies in the United States (Slutske, 2006) and Canada (Cunningham et al., 2009; Suurvali et al., 2008).

Numerous studies have examined why gamblers with problems do not seek help and one of the major reasons was a belief in independence and self-reliance. For instance, Hodgins and el-Guebaly (2000) reported that the strongest barrier to help-seeking in their study was a desire to handle problems on their own, which their study participants viewed as "considerably important". Almost three-quarters of 365 female gamblers in Ontario who had concerns about their gambling (most of whom were diagnosed with pathological gambling) and felt they needed to make changes were not in treatment because they had a strong belief in self-reliance for effecting any personal changes (Boughton & Brewster, 2002). These findings are consistent with the high rates of self-recovery found among problem gamblers.

Another reason for gamblers not seeking help is that they may not feel they have a problem or at least one that is serious enough to warrant getting help. As discussed earlier, many gamblers with problems seek help only as a last resort to deal with some impending crises related to their gambling. Less problematic situations may not be looked at with the same gravity and therefore would be perceived as not requiring assistance. There is some countering evidence, however, that shows that gamblers do not have to hit "rock bottom" to seek help. A New Zealand study found that 75% of those seeking help from the gambling helpline did so because they wanted to prevent their gambling from becoming a major problem (Pulford et al., 2008).

Some of the other common barriers to help-seeking that have been identified in the literature include embarrassment/pride, social stigma, lack of knowledge or awareness of treatment services, inability to share problems, economic costs, avoidance tendencies, and cognitive distortions about gambling (Boughton & Brewster, 2002; Evans & Delfabbro, 2005; Hodgins & el-Guebaly, 2000; Rockloff & Schofield, 2004; Tavares, Silvia, Zilberman et al., 2002). Clarke and colleagues (2007) reviewed the literature on problem gambling help-seeking behaviours of ethnic minority groups and identified some additional barriers to help-seeking that may be specific to such groups. They include a lack of cultural sensitivity by service providers, culturally-inappropriate treatments (e.g., no family involvement), language difficulties and absence of interpreters, suspicion of mainstream services, and greater degree of shame and social stigma than among Western people (see Scull & Woodstock, 2005 for this last issue among the Chinese and Vietnamese communities in New Zealand).

The research discussed in this review indicates there is much promise with respect to understanding transitions and stability of problem gambling and their related factors. The cross-sectional research designs, self-reported variables, and limited samples and sample sizes are among some of the methodological problems that hinder understanding of these issues (Hodgins et al., 1999 ; Nathan, 2003; Slutske, 2007). For example, the cross sectional nature of much of the research leaves unanswered questions about the causal ordering of psychiatric disorders, gambling-related cognitions, social networking, and problem gambling recovery. Furthermore, the research does not address ways of modifying these factors so as to make problem gambling less likely. If gambling behaviour conforms to the findings for other addictions, then it is likely that these factors are implicated in the diminution, escalation, or maintenance of gambling (Hodgins & el-Guebaly, 2000).

If so, we can expect considerable variation in the trajectory of problem gambling. This would support what Hodgins and el-Guebaly (2000) refer to as a "continuum of severity of gambling problems that require a continuum of responses" (p.788). The longitudinal nature of the current research provides the opportunity to study varied trajectories of problem gambling behaviours in relation to these factors and to identify ways to better understand and assist those who are having gambling problems on any level.

Chapter 2

Methodology

We report on a longitudinal study of adults from two distinct groups: a sample of individuals scoring as low-risk, moderate-risk and problem gambling from the 2006 Manitoba prevalence study, and a sample of clients attending AFM's orientation session due to concerns about their own gambling. Three-quarters of the 2006 gambling prevalence study participants (stratified by PGSI category) were contacted every 6 weeks, for a total of nine collection points. The other 25% were contacted every 3 months, for a total of five collection points. By altering the data collection points within the sample we were able to test reactivity based on the frequency and interval of telephone contact. Clients attending the orientation session were contacted twice, 3 months apart.

I) Sample Recruitment and Characteristics

General Population Group

The general population sample was recruited from a large random telephone survey study (N=6,008) conducted by the Addictions Foundation of Manitoba (AFM) on the prevalence of gambling and problem gambling among adult Manitobans during the spring of 2006 (Lemaire, MacKay & Patton, 2008). The data were weighted by gender, age and income in order to more accurately represent the population of Manitoba. To be eligible for the present study, participants must have been gambling at low to moderate risk or with problems in the past year of the AFM study, as measured by the Problem Gambling Severity Index (PGSI) of the Canadian Problem Gambling Index (Ferris and Wynne, 2001).

At the end of the AFM study interview, eligible respondents were asked if they would be willing to participate in future research and 565 agreed to be contacted. These individuals were telephoned approximately one year later. Those who agreed to enroll in the study were immediately administered the first wave baseline survey.

Table 2.1 presents the outcomes of the initial recruitment calls to those who agreed to be contacted for future research. Of these individuals, 347 (61%) enrolled in the study and completed the baseline survey. The majority of those who did not participate either refused or were unreachable.

Table 2.1: Recruitment Call Outcome for General Population

Recruitment Call Outcomes	% (n)
Enrolled and completed baseline survey (i.e., Wave 1)	61 (347)
Call backs	8 (43)
Refusal	17 (98)
Not in service	7 (41)
Moved/no one by that name	3 (18)
Other	4 (18)
Total potential participants	100 (565)

As shown in Table 2.2, slightly more of the sample were female (60%), lived in Winnipeg (64%) and were married (50%). The majority were classified as low-risk (63%) at the time of the prevalence study.

Table 2.2: Profile of General Population Sample at Enrollment (N=347)

Characteristic	%
Gender	
Male	39
Female	61
Marital Status	
Married	50
Single (never married)	26
Divorced/separated	12
Widow	4
Common-law	9
Region	
Winnipeg	64
Outside Winnipeg	36
PGSI	
Low-risk gambling	63
Moderate-risk gambling	28
Problem gambling	9

Comparing Study Participants with Study Refusers

Using the 2006 AFM prevalence data, we compared those who enrolled in the current study with two groups: a) those who refused to be contacted for future research at the time of the AFM prevalence study, and b) those who refused to participate at the initial recruitment call for the present study. Details of these analyses are located in Appendix A. With few exceptions, the comparisons revealed no significant differences on the socio-demographic, problem gambling, and alcohol and drug consumption variables. This suggests that based on the aforementioned variables, the general population sample used in the study was not obviously biased and represents the general population surveyed in the AFM study.

Help-Seeking Group

The help-seeking sample was recruited from the 106 individuals who attended the gambling orientation session held by AFM between December 2007 and September 2008. Session participants were eligible for the study if they were attending the session for help with their own gambling and not with other people's gambling. At the completion of the orientation session, individuals were asked if they would like to participate in a survey study, which involved completing an initial and follow-up survey. Those who agreed to participate were contacted within a month of attending the gambling orientation session.

In total, 58 individuals provided their contact information. Table 2.3 presents the outcomes for the initial recruitment calls. Individuals who enrolled in the study were administered the Wave 1 survey (i.e., baseline survey) at the time of the call. Approximately 70% of the contact list enrolled and completed the baseline survey. Most of the others either refused or were not successfully contacted during the one month post-orientation survey window.

Table 2.3: Recruitment Call Outcome for Help-seeking Group

Recruitment Call Outcome	% (n)
Enrolled and completed baseline survey (i.e.Wave 1)	72 (42)
Call backs	2 (1)
Refusal	14 (8)
Past the session time frame	10 (6)
Other	2 (2)
Total potential participants	**100 (58)**

In terms of demographics, slightly more than half of the sample was male (55%), approximately one-third (36%) was married, most were employed (64%) with incomes between $20,000 and $40,000/yr.

Table 2.4: Profile of Help-seeking Group at Enrollment

Characteristic	N=42 %
Gender	
Male	55
Female	45
Marital status	
Married	36
Single (never married)	29
Divorced/separated	17
Common-law	12
Widow	–
Employment status	
Employed full-time	64
Retired	12
Unemployed	10
Employed part-time	5
Disability leave	5
Homemaker	2
Other	2
Personal income	
Less than $20,000	17
Between $20,000 and $39,999	48
Between $40,000 and $59,999	21
Between $60,000 and $79,999	7
Between $80,000 and $99,999	–
More than $100,000	2
Don't know/no response	5

Comparing Study Participants with Study Refusers

To determine if the help-seeking individuals who participated in the study were different from those who refused to participate, we compared the groups based on various socio-demographic characteristics that were collected during the Orientation session.[1] The analysis revealed a few differences. The participant group had a higher proportion of individuals who were male (55% vs 44%), divorced (17% vs 11%), employed full-time (64% vs 50%), and retired (12% vs 6%). On the other hand, the non-participant group had a higher percentage of individuals who were married or in common-law relationships (60% vs 48%).

Overall, participants are seen as representative. Given the small sample of individuals, individual differences stand out moreso than in a larger sample.

II) Follow-up Survey Administration

General Population Group Follow-up Surveys

The general population surveys were conducted between February 2007 and August 2008. For the purposes of tracking, the 347 participants in the general population group were randomly divided into two categories according to the frequency in which they would complete the follow-up surveys. After completing the initial enrollment survey, 262 (75%) completed 8 more surveys separated by 6-week intervals, while 85 (25%) completed 4 more surveys separated by 3-month intervals. Two different survey retest intervals were employed to test for reactivity effects whereby participants' responses vary as a function of prior testing.

6-Week Interval Participants

Table 2.5 presents the dates of the survey administration and the percentage of completed surveys for the baseline survey and the 8 waves of follow-up surveys that were administered in 6-week intervals. The completion rate for these follow-up surveys ranged from 89% to 95%. As expected, the completion rates decreased slightly over time.

Table 2.5: Percentage of Surveys Completed for 6 - week Interval Participants

Wave	Period of Survey Administration	% of completed surveys (n)
1 (baseline)	February – April 2007	100 (262)
2	April – June 2007	94 (246)
3	May – August 2007	95 (248)
4	July – October 2007	92 (241)
5	August – November 2007	92 (242)
6	October 2007 – February 2008	92 (242)
7	November 2007 – April 2008	90 (236)
8	December 2007 – June 2008	91 (239)
9	February – August 2008	89 (234)

Table 2.6 summarizes the total number of surveys that each participant completed throughout the follow-up period. Most participants (80%) completed all nine survey waves, with over 90% completing at least seven surveys. Three respondents (1%) completed only the baseline and one follow-up survey.

Table 2.6: Total Number of Surveys Completed for 6-week Interval Participants

Number of surveys completed	% of Participants (n)
1	1 (3)
2	1 (3)
3	2 (4)
4	1 (3)
5	3 (9)
6	1 (2)
7	5 (13)
8	6 (16)
9	80 (209)
Total	**100 (262)**

1. For this comparison, the non-participant group was composed only of those who refused to participate when solicited at the AFM session (n=48). It did not include those who agreed to participate but declined at the initial recruitment call (n=17). We were unable to compare the groups based on income because the session forms asked for household income, while the current study asked for personal income.

Table 2.7 presents a summary of the call outcomes for the 8 follow-up surveys. As shown, many participants did not complete the later wave surveys because their numbers were not in service and they could not be found. These numbers were tried again in subsequent waves in case their phone had been reconnected. Presumably, these individuals had moved.

Table 2.7: Call Outcomes for 6-week Interval Participants by Follow-up Wave

Wave	2 % (n)	3 % (n)	4 % (n)	5 % (n)	6 % (n)	7 % (n)	8 % (n)	9 % (n)
Completed	**94 (246)**	**95 (248)**	**92 (241)**	**92 (242)**	**92 (242)**	**90 (236)**	**91 (238)**	**89 (234)**
Call backs	4 (11)	3 (7)	4 (11)	2 (4)	1 (2)	3 (7)	2 (4)	3 (7)
Refusal	<1 (1)	1 (2)	<1 (1)	2 (4)	2 (5)	3 (7)	2 (6)	3 (7)
Not in service	<1 (1)	2 (4)	2 (6)	3 (9)	3 (9)	4 (10)	3 (9)	3 (8)
Other	1 (3)	<1 (1)	1 (3)	1 (3)	2 (4)	1(2)	2 (5)	2 (6)
Total N=262	99	101	100	100	100	101	100	100

Note: Totals may not sum to 100% due to rounding.

3-Month Interval Participants

Table 2.8 provides the dates of survey administration and the percentage of completed surveys for the initial enrollment survey and the 4 waves of follow-up surveys that were administered in 3-month intervals. The completion rates ranged from 86% to 96%. As expected, the completion rates generally decreased over time with the exception of waves 4 and 5. Some participants who could not be contacted in the Wave 4 survey period were found in Wave 5.

Table 2.8: Percentage of Surveys Completed for 3-month Interval Participants

Wave	Period of Survey Administration	% of completed surveys (n)
1 (baseline)	February 14 – April 2 2007	100 (85)
2	May 16 – June 24 2007	96 (82)
3	August 17 – November 5 2007	92 (78)
4	December 2 2007 – February 11 2008	86 (73)
5	March 5 – July 21 2008	88 (75)

Table 2.9 provides the total number of surveys that each participant completed through the 3-month interval follow-up period. The large majority of participants (84%) completed all five surveys. Only three (4%) completed the initial enrollment and one follow-up survey.

Table 2.9: Total Number of Surveys Completed for 3 - month Interval Participants

Total Number of Surveys Completed	% of Participants (n)
1	4 (3)
2	2 (2)
3	6 (5)
4	5 (4)
5	84 (71)
Total	**101 (85)**

Table 2.10 summarizes the call outcomes for the 4 waves of follow-up surveys. Overall very few refused; most presumably had moved and were not traceable. The "other" category includes respondents who were either too ill to participate, deceased, no longer at that number (and no other number was known), or absent during the fielding period.

Compared to the 6-week follow-up surveys, a slightly lower percentage of respondents refused the 3-month follow-up surveys.

Table 2.10: Call outcomes for 3-month Interval Participants by Follow-up Wave

Wave	2% (n)	3% (n)	4% (n)	5% (n)
Completed	**96 (82)**	**92 (78)**	**86 (73)**	**88 (75)**
Call backs	-	-	1 (1)	1 (1)
Refusal	-	1 (1)	1 (1)	2 (2)
Not in service	2 (2)	5 (4)	8 (7)	7 (6)
Other	1 (1)	2 (2)	4 (3)	1 (1)
Total N=85	99	99	100	99

Note: Totals may not sum to 100% due to rounding.

Comparing across Follow-up Survey Administration Methods

To determine if our results for the general population group were confounded by the problem of reactivity whereby the participants changed their behaviour because they knew they were being studied, we tested for differences between the group who received the follow-up surveys in 6 week intervals versus those who received the surveys in 3 month intervals. We would expect differences between the two groups if the more frequent survey administration (i.e., 6 week intervals) affected their behaviour. Comparisons of responses for individuals receiving 6-week and 3-month measurements indicated no differences as a function of survey program or differences in number of survey administrations. Chi-square analyses revealed no significant differences in the groups' composition in terms of gender, marital status, highest level of education, household income, PGSI problem gambling level, AUDIT alcohol use, and refusal rates in at least one of the follow-up surveys in any of the five common survey administration points. Thus, we conclude that there are no measurement differences and that our novel longitudinal design was successful in yielding valid results.

Since there were no differences on these variables between the two groups that received different survey administration methods, for the statistical analyses of the general population group we combined the two groups and used the common data points between the two survey administration methods.

Help-seeking Group Follow-up Survey

The help-seeking group follow-up surveys were administered between December 2007 and November 2008. After completing the initial survey at enrollment, participants were contacted approximately 3 months later to complete the follow-up survey. Table 2.11 presents the dates of survey administration and the percentage of completed surveys for the initial enrollment survey (i.e., baseline) and the follow-up survey. Ninety percent of participants completed both surveys. Of the total sample, 81% completed the follow-up survey.

Table 2.11: Survey Periods and Percentage of Surveys Completed by Survey Wave

Wave	Period of Survey Administration	% of completed surveys (n)
1 (baseline)	December 10, 2007 – August 7 2008	100 (42)
2	March 2008 to November 2008	90 (38)

Survey Measures

Both the general population and help-seeking surveys included measures of gambling participation and problem gambling levels, gambling cognitions, alcohol consumption, drug use, personal and mental health, perceived social support and background or demographic information.

Gambling and Problem Gambling

a) The Canadian Problem Gambling Index (CPGI) consists of four main sections: gambling involvement, problem gambling behaviour, consequences of problem gambling behaviour, and correlates of problem gambling behaviour (Ferris & Wynne, 2001). A sub-scale, the Problem Gambling Severity Index (PGSI) places gamblers at one of four levels: non-problem, at-risk, moderate and severe problems. Reliability and test-retest correlations are good (α, =.84; r =.78 respectively). Criterion validity was examined by comparing the CPGI to DSM-IV and the South Oaks Gambling Screen (SOGS) (r = .83). Construct validity was demonstrated by expected correlations between CPGI scores and money spent on gambling, gambling frequency, and number of adverse consequences reported.

b) The Gambling Related Cognitions Scale (GRCS; Raylu & Oei, 2004) includes 23 items measuring gambling cognitions. Factors confirmed by factor analysis include: interpretative control/bias, illusion of control, predictive control, gambling-related expectancies and a perceived inability to stop gambling. Interpretive bias/control (4 statements) reflects the degree to which gamblers reframe gambling outcomes to continue gambling despite losses (e.g, "Relating my losses to bad luck and bad circumstances makes me continue gambling"). Predictive control (6 statements) reflects cognitions around the ability to predict gambling outcomes (e.g., "Losses when gambling are bound to be followed by a series of wins"). Illusion of control (4 statements) pertains to beliefs about the ability to control gambling outcomes (e.g., "Specific numbers and colours can help increase my chances of winning"). Perceived inability to stop gambling (5 statements) pertains to gamblers' perceived ability to successfully stop gambling (e.g., "I can't function without gambling"). Lastly, gambling expectations (4 statements) refers to how gamblers expect gambling to positively affect them (e.g., "Gambling makes me happier"). On a 7-point Likert, with 1 being "Strongly disagree" and 7 being "Strongly agree", respondents indicate the extent to which they agree with each statement. Cronbach's alpha coefficients for the factors ranged from .77 to .91, and .93 for the overall scale. The GRCS has been validated against the SOGS, the Motivation Towards Gambling Scale (MTGS) and the Depression Anxiety Stress Scale (DASS-21).

c) A series of questions were developed to gain more insight into motivations for gambling, perceived changes in gambling, events surrounding gambling-related problems, and awareness, attitudes and needs regarding problem gambling treatment and information (see Appendix B).

Health, Mental Health and Co-morbidity

a) Alcohol Use Disorders Identification Test (AUDIT) 10-item standardized self-completion measure of hazardous drinking (AUDIT; Babor et al., 1992).

b) Drug Abuse Screening Test (DAST; Skinner, 1982), twenty self-report items examine consequences of drug use. Reliability (α = .92) and concurrent validity with demographic indicators is good.

c) The Brief Symptom Inventory (BSI-18) measures anxiety, depression, and somatization and also yields a score for the overall level of psychological distress (GSI). The BSI 18 is a reduced version of the 53-item Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983) that was developed from the Symptom Checklist-90 (SCL-90; Derogatis, Rickels, & Rock, 1976) that originally evolved from the Hopkins Symptoms Checklist (HSCL; Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974). Reliability is good with alpha coefficients for the three symptom dimensions and GSI: .74 (Somatization), .84 (Depression), .79 (Anxiety), and .89 (GSI). The construct validity of the BSI 18 was assessed by correlating the three symptom dimension scores and GSI with the corresponding scores on the SCL-90-R. All correlations were high ranging from .91 on the Somatization dimension to .96 on Anxiety (Depression and GSI were both .93) suggesting little information was lost with the reduced number of items.

Network Influences

Ten questions assessed the extent to which a significant other influenced participants to moderate their gambling and to seek help for gambling. This included questions such as "Has a family member or friend suggested ways that you can quit or control your gambling?" and "Has a family member or friend accompanied you to see someone about your gambling?" (see Appendix B).

III) Overview of Analyses and Statistical Procedures

Chapter 3 presents the study participants' perceptions of changes in their gambling involvement over 3 periods of time: past year, duration of the study and past 5 years. It also reports the changes in participants' levels of gambling from the baseline to the follow-up assessment waves. For these analyses, we conducted descriptive statistics that provide frequencies and percentages of occurrences.

Chapter 4 presents the results from our analysis of the predictors of problem gambling and changes in gambling levels over time. Given the low incidence of problem gambling in our sample, we combined the problem gambling group with the moderate-risk gambling group to achieve greater power for statistical analyses.

Models were tested to determine concurrent and prospective factors that predicted problem gambling, as well as the transitions between levels, at each assessment wave. We also used the continuous PGSI score as an outcome measure for problem gambling to assess variable models that predict participants' problem gambling and the stability or change in this behaviour over the multiple assessment waves of the study. Models were tested using stepwise multinomial logistic regression (categorical dependent variable), stepwise OLS multiple regression (continuous dependent variable), and latent growth curve modeling (continuous dependent variable) statistical techniques. For more information on the variables used in the regressions models see Appendix C.

Chapter 5 presents the results of our analysis of participants' perceptions and experiences with problem gambling assistance and their help-seeking behaviour. First, we provide percentages and frequencies to describe the extent of attitudes and use of problem gambling assistance among the general population group, as well as of past treatment participation among the help-seeking group. We then compared the help-seeking group with the problem gambling group from the general population on various characteristics such as gambling activity, PGSI characteristics, significant other assistance and support, gambling-related cognitions, and psychological disorder, to gain insight into why people seek assistance for gambling problems. To increase the sample size of the problem gambling group from the general population, we included any participant who had gambling problems (i.e., PGSI score of 8 or more) at any point in the study period. However, sample sizes were still relatively low for each group, which provided us with, at best, preliminary conclusions. Differences were assessed using chi-square and t-tests.

All statistical tests of significance were assessed at the $p<.05$ level. All statistical analyses were conducted using SPSS 16 (SPSS, 2008).

IV) Limitations

Given the difficulty of recruiting problem gamblers undergoing treatment, our sample of those seeking help was relatively small. Whereas this is a sizable group of treatment seekers compared to prior reports, we could not examine more complicated statistical models to compare the treatment-seekers to the broader sample. Parameter estimates would be unstable and not trustworthy with regard to reliability and generalizability. Therefore, we provide both descriptive statistics and general interpretation of results for the treatment sample.

As with most studies that employ a survey methodology, this study is limited by the recall ability of survey participants, particularly for questions assessing longer time frames (i.e. past 5 years).

Chapter 3

Gambling Involvement and Changes in Problem Gambling

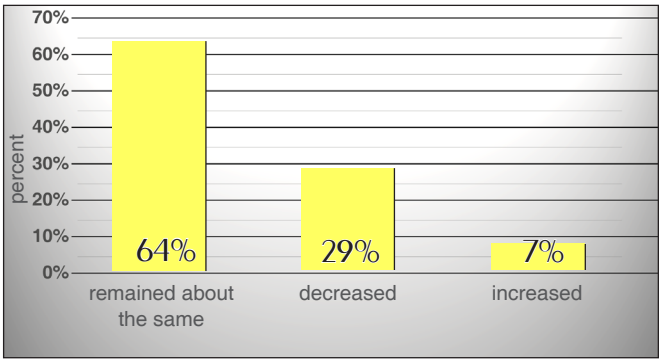
This chapter examines study participants' perceptions of changes in their gambling involvement in the past five years and actual changes in PGSI gambling levels over the course of the study. The results are presented separately for the general population and help-seeking groups.

I) Perceptions of Changes in Gambling Involvement

Perceptions of General Population Group

Participants from the general population group were asked for their perceptions of changes in their gambling involvement over the past year and in the past five years. Sixty-four percent of participants felt that their gambling frequency did not change in the past year, compared to 29% who thought it decreased and 7% who said it increased during this time period (see Figure 3.1).

Figure 3.1: General Population: Over the past year, has how often you gamble increased, decreased, or remained about the same?



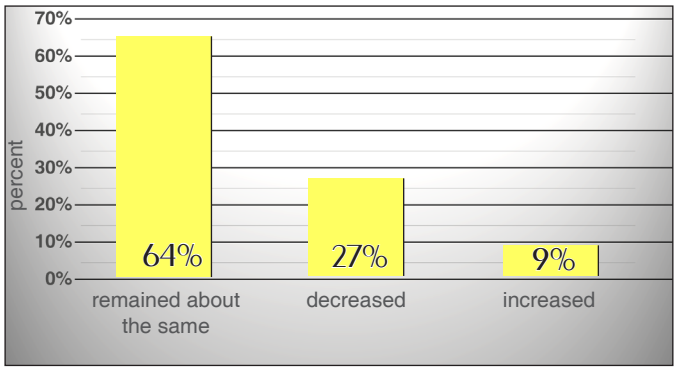
Of gamblers whose past year gambling increased, the majority (63%) stated that the increase just happened as opposed to making the decision (38%). For those whose gambling decreased in the past year, approximately half made the decision to decrease it (44%), while for the other half the decrease just happened.

Participants were also asked what they felt led to the change in gambling, whether it increased or decreased. The most common reason for an increase included a change in friends or social circle, that is, they began to socialize more with other gamblers. Other reasons included chasing losses, gambling to obtain money, and having more money to gamble. Individual mentions included more access to gambling venues, more free time to gamble, emotional issues such as stress, depression or escape, and believing that they were lucky.

A decrease in gambling was most often attributed to financial issues, primarily having less money available for gambling, and getting involved in different activities thereby reducing the amount of time available for gambling. Other reasons included not winning/don't like losing, decreased interest, lifestyle changes such as marriage and having children and changing friends.

Participants were also asked whether the amount they spend on gambling has changed in the past year. As shown in Figure 3.2, most (64%) felt that their gambling expenditures remained about the same. Of gamblers who past year spending increased, the majority (63%) felt that the increase just happened as opposed to making the decision to increase it (38%). In contrast, 61% made the decision to decrease the amount they were spending on gambling, and 39% reported that the decrease just happened.

Figure 3.2: General Population: Over the past year, has how much you spend on gambling increased, decreased, or remained the same?

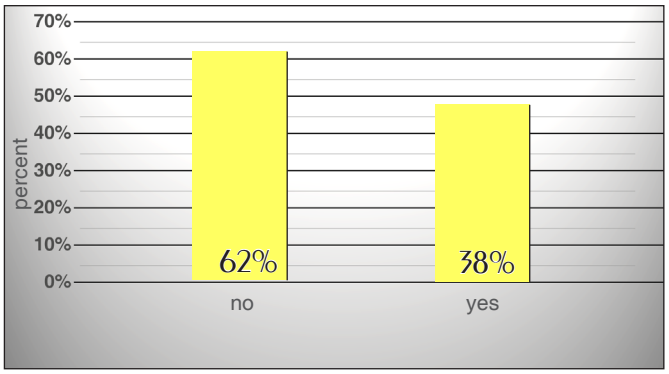


Participants were asked to describe the reasons associated with a decrease in spending. Similar to the reasons attributed to changes in gambling frequency, participants associated increased spending to seeking financial gain, changes to their financial situation that enabled them to spend more on gambling and having more time to gamble. Other reasons included chasing losses, changes in lifestyle with an emphasis on having fun and changes in friends/social circle.

A decrease in spending was primarily a result of financial issues such as having less money for gambling. Other reasons reported included not winning, boredom, getting involved in other activities, lifestyle changes and personal problems.

Lastly, when asked about their gambling in the past 5 years, 38% of the general population group indicated there was a time when their gambling participation increased "a lot". (See Figure 3.3)

Figure 3.3: General Population: In the past 5 years, has there ever been a time when your participation in gambling increased a lot? This could be time spent gambling or money spent on gambling.



Of this 38% (n=133), the most commonly cited reasons for an increase in gambling participation during the past 5 years were related to personal, work or financial issues (36%) and the availability of new slots/VLTs (25%)(See Table 3.1). Among those with gambling problems, (n=24) the large majority of these gamblers cited personal, work, and financial issues (80%) and newly available slots/VLT (50%) as the reasons for their increased gambling participation in the past 5 years.

Table 3.1: General Population: Reasons for Gambling Increase in the Past 5 years Among General Population Group

Reasons	Gambling increased in the past 5 years % Yes (n=133)	Gamblers with Severe Problems % Yes (n=24)
Other Issues: Personal, Work, Financial	36	80
New Slots/VLTs	25	50
New Casino	19	21
Bill Acceptors on Machines	11	33
Extended Hours	11	13
Faster Machines	7	21

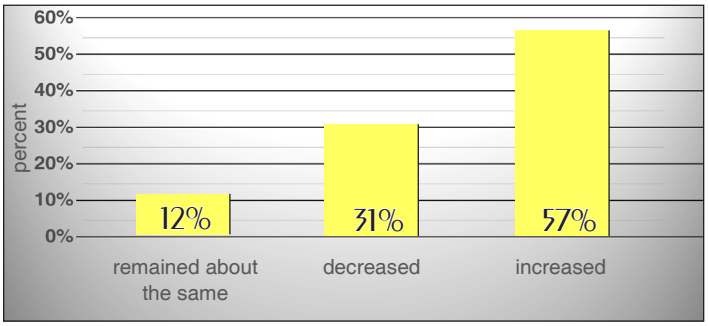
Perceptions of Help-seeking Group

Participants from the help-seeking group were asked for their perceptions of changes in their gambling behaviour over the past year and in the past five years. Over the past year, the majority of the group reported an increase in their gambling frequency (57%), while 31% reported a decrease and 12% said their gambling remained the same (See Figure 3.4).

The most common reasons given for an increase in gambling were emotional issues (stress, depression, or escape) and having more free time available for gambling. Other reasons mentioned included personal issues such as family or work related problems, lack of control with gambling and chasing losses.

Help-seekers who reported decreasing how often they gambled tended to attribute this change to financial issues such as having less money available as a result of spending too much on gambling. The next most common reason was the desire to control gambling. Also mentioned were personal problems, having less, being bored or having lost interest in gambling.

Figure 3.4: Help-seeking Group: Over the past year, has how often you gamble increased, decreased, or remained about the same?

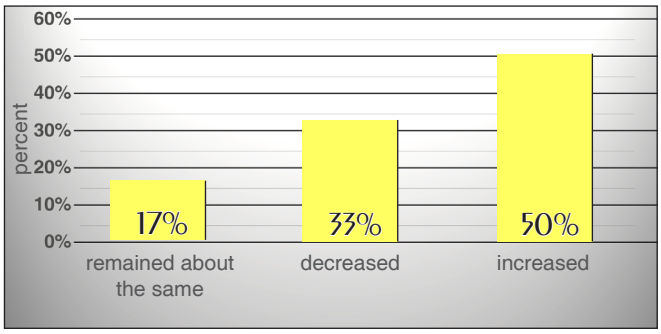


Concomitant with the increased gambling participation over the past year, 50% of the help-seeking group reported an increase in the amount of money spent on gambling during this time period (see Figure 3.5).

Help seekers tended to relate increased gambling spending with chasing losses and experiencing emotional difficulties. Others cited financial gain as the underlying reason.

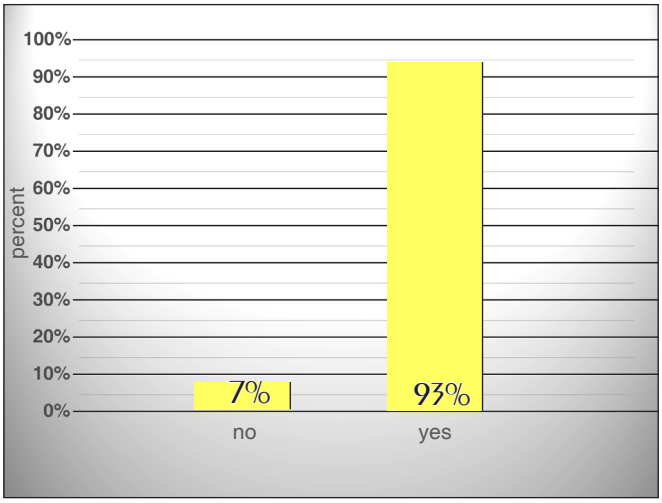
The main reason associated with decreased gambling spending was financial issues, in particular having less money to spend on gambling. Other reasons included avoiding gaming venues and experiencing a lifestyle change that limited their available income for gambling.

Figure 3.5: Help-seeking Group: Over the past year, has how much you spend on gambling increased, decreased, or remained about the same?



In terms of their perceived changes in gambling involvement over the longer term, the vast majority of the help-seeking group (93%) said there had been a time in the past five years when their gambling increased "a lot" (see Figure 3.6).

Figure 3.6: Help-seeking Group: In the past 5 years has there ever been a time when your participation in gambling increased a lot?



When asked about the reasons for the increase in gambling participation in the past five years, the most commonly cited reasons were due to personal, work, and financial issues (79%), followed by newly available slots/VLTs in the area (43%) and extended gaming venue hours (41%).

Table 3.2: Help-seeking Group: Reasons for Gambling Increase in the Past 5 Years

Reasons	Help - seeking Group %
Other Issues: Personal, Work, Financial	79
New Slots/VLTs	43
Extended Hours	41
Bill Acceptors on Machines	34
Faster Machines	29
New Casino	9

II) Changes in Problem Gambling from Baseline to Follow-up

This section shows the changes in participants' PGSI gambling level from baseline to each of the follow-up assessment waves. First, we present the results for the general population group followed by the help-seeking group. For the general population group we combined the two sub-samples that were administered the follow-up surveys at different intervals (i.e., 6-week and 3-month) and used their common data collection points (i.e., 12, 24, 36, and 48 weeks). This provided the largest possible sample for the analysis of the general population group.

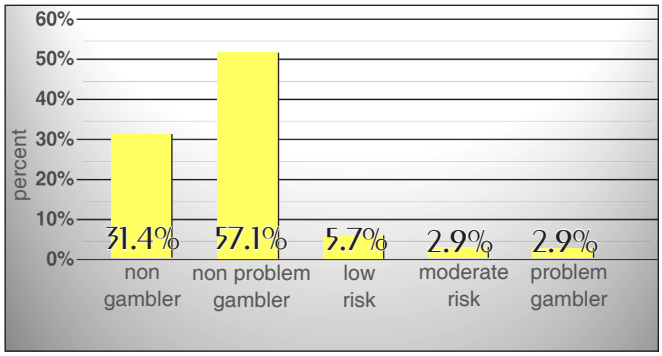
General Population Group

Baseline Non-Gambling Group

The proportion of the non-gamblers at baseline was 11% of the total general population group (n=35)[2]. By 12 weeks, 31% of this non-gambling group continued to not gamble while 57% gambled without problems. Approximately 9% gambled at low or moderate risk while 1 participant (3%) gambled with problems (see Figure 3.7).

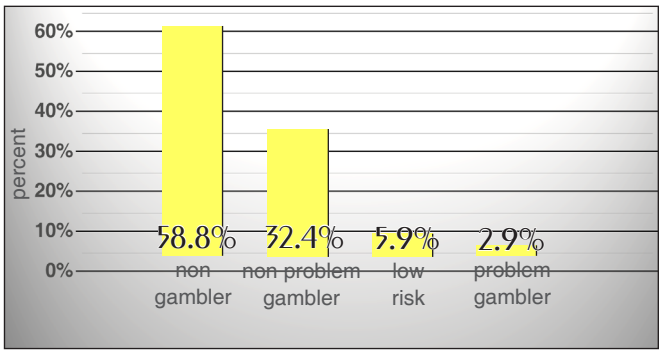
2. The present study recruited individuals who were gambling at-risk, moderate-risk and problem gambling levels at the time of the AFM prevalence study. From the prevalence study to the current study, some of these participants became non-gamblers.

Figure 3.7: Non-Gamblers 12 - Week Transitions



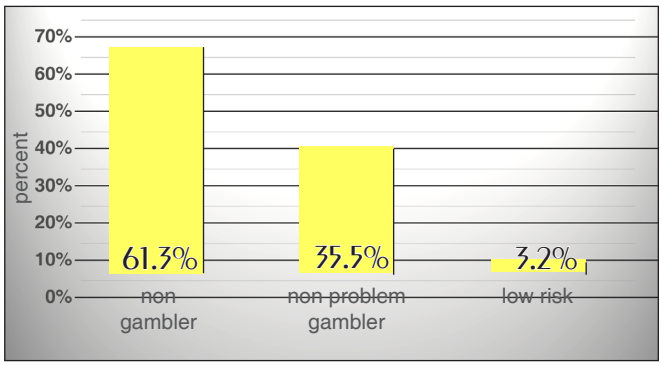
After 24 weeks, 59% of the baseline non-gambling group were not gambling, while 32% gambled without problems. Less than 10% gambled at risky or problematic levels (see Figure 3.8)

Figure 3.8: Non-Gamblers 24-Week Transitions



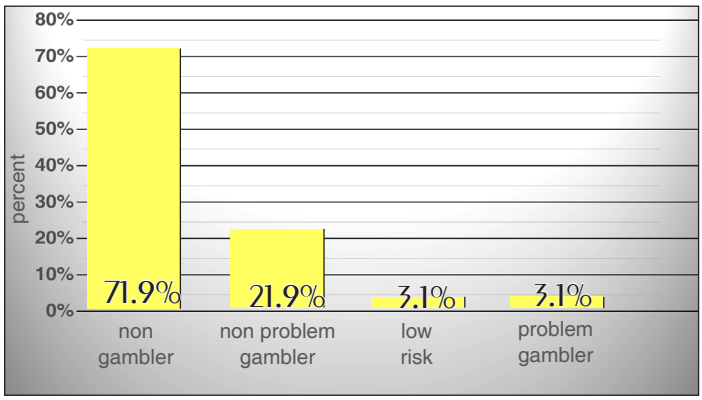
By 36 weeks, 61% of the baseline non-gambling group were not gambling and 36% gambled without problems. Only 1 baseline non-gambler (3.2%) gambled at a risky level (i.e., low-risk) (see Figure 3.9).

Figure 3.9: Non-Gamblers 36-Week Transitions



Lastly, as shown in Figure 3.10, almost three-quarters of the non-gambling group at baseline (72%) were non-gamblers after 48 weeks, while about 1 in 5 (22%) gambled without problems. Only 2 participants (6%) gambled at some risky or problematic level (i.e., low-risk and problem gambling).

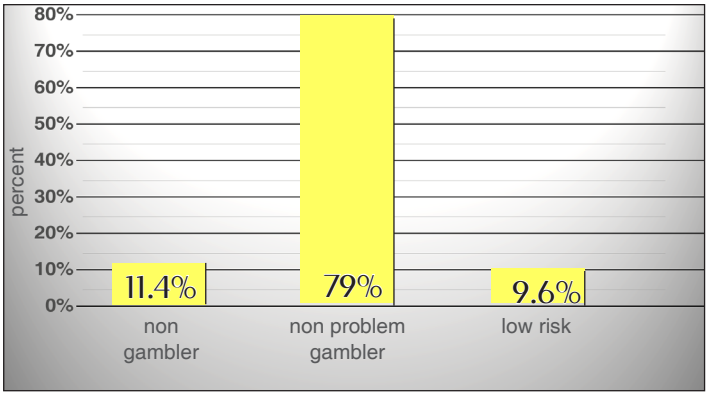
Figure 3.10: Non-Gamblers 48-Week Transitions



Baseline Non-Problem Gambling Group

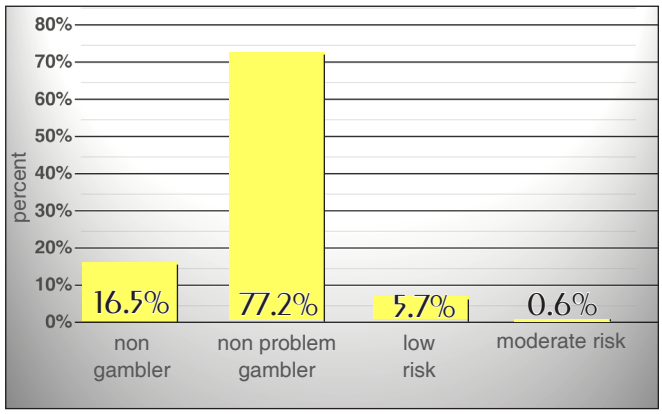
The non-problem gambling group at the beginning of the study constituted almost half (48%) of the total general population group (n=167). Of these 167 participants, almost 80% continued to gamble without problems after 12 weeks, while 11% did not gamble. The remaining 10% progressed to low-risk gambling (see Figure 3.11).

Figure 3.11: Non-Problem Gamblers 12-Week



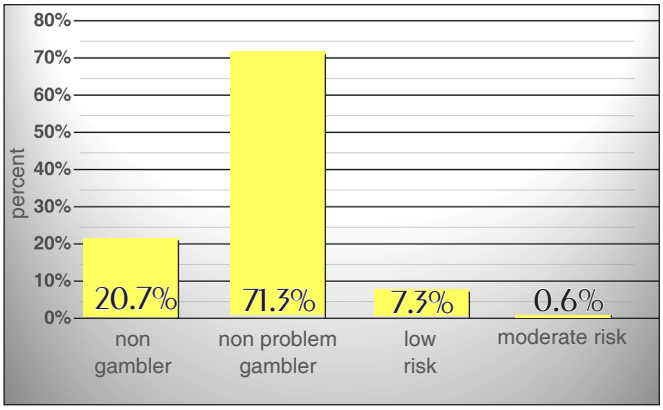
By 24 weeks, 77% of the non-problem group at baseline gambled without problems and a further 17% did not gamble. Only 6% gambled at low risk although 1 participant (.6%) progressed to moderate-risk gambling. No problem gambling participants emerged from the baseline non-problem group at this time (see Figure 3.12).

Figure 3.12: Non-Problem Gamblers 24 - Week Transitions



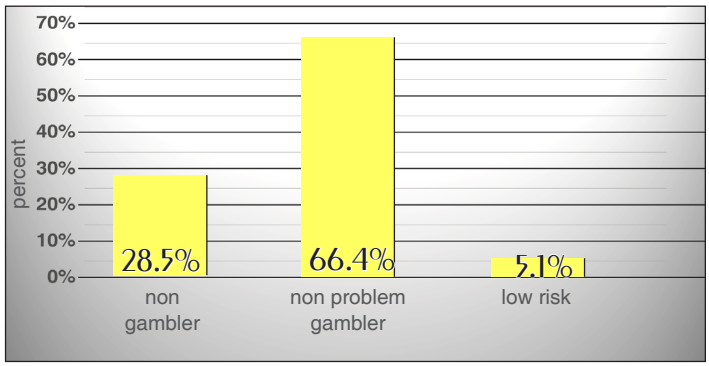
By 36 weeks, 72% of the baseline non-problem group gambled without problems and 21% refrained from gambling altogether. Approximately 8% gambled with low or moderate risk and no participant indicated problem gambling (see Figure 3.13).

Figure 3.13: Non-Problem Gamblers 36 - Week Transitions



Lastly, about one-third of baseline gamblers with no problems moved to a different level of gambling after 48-weeks, as 29% did not gamble and 5% gambled at low risk. By the end of the study period then, approximately two-thirds of the baseline non-problem gambling group continued to gamble without problems (see Figure 3.14).

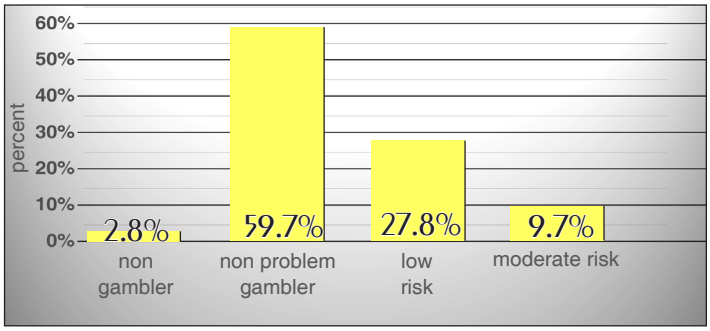
Figure 3.14: Non-Problem Gamblers 48 - Week Transitions



Baseline Low-Risk Gambling Group

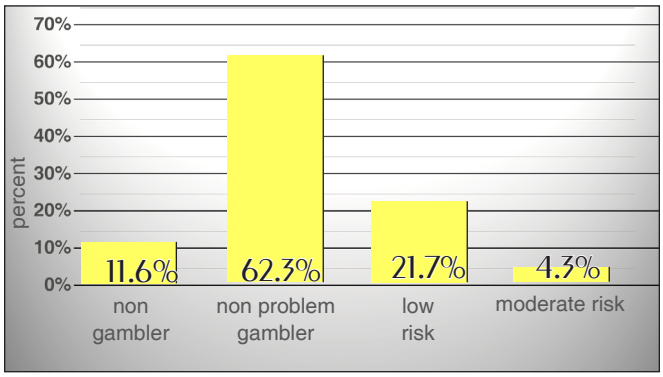
The low-risk gambling group at baseline consisted of 72 participants (20%) from the general population group. About one-quarter (28%) of this group continued to gamble at low risk 12 weeks after baseline. Of the remaining members of this group, the large majority (63%) moved to less problematic levels, either gambling without problems or not gambling at all. About 1 in 10 progressed to the more severe level of moderate-risk gambling, although none gambled with problems at this time (see Figure 3.15).

Figure 3.15: Low-Risk Gamblers 12 - Week Transitions



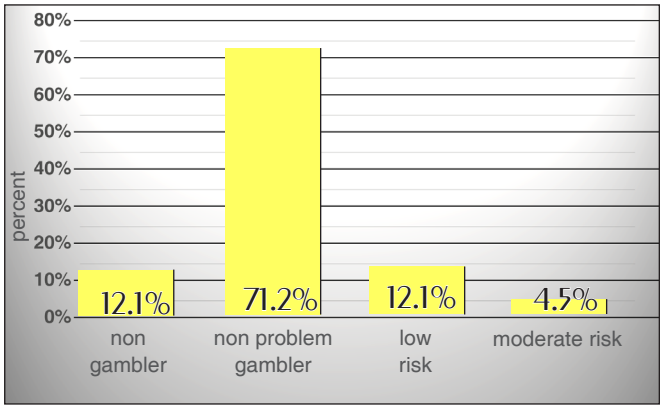
At the 24 week period, 22% of the baseline low-risk gambling group gambled at low-risk levels, while 74% moved to less problematic levels; 12%, in particular, stopped gambling. Only 3 participants (4%) moved to a more problematic level where they gambled with moderate risk (see Figure 3.16).

Figure 3.16: Low-Risk Gamblers 24 - Week Transitions



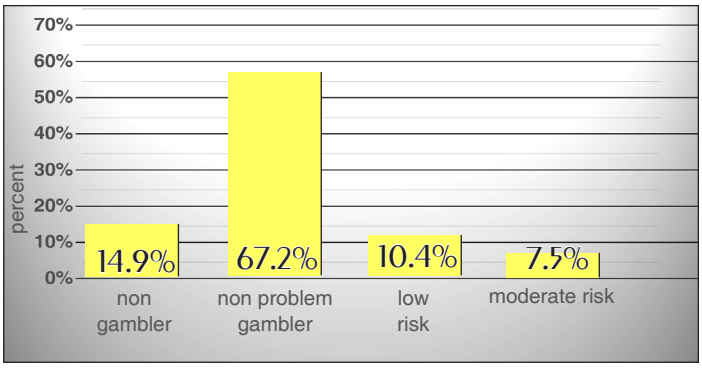
Similar to the movement in the 24-week period, only 3 participants (5%) in the baseline low-risk gambling group gambled at a more problematic level (i.e., moderate risk) after 36 weeks. Eight out of ten participants in the baseline low-risk group (83%) either gambled without problems or did not gamble at all, while 12% continued to gamble at low-risk (see Figure 3.17).

Figure 3.17: Low-Risk Gamblers 36 - Week Transitions



Finally, at the end of the study period of 48 weeks, 82% who gambled at low risk at baseline moved to a less severe problem gambling level. In particular, approximately 15% did not gamble, which was the highest rate of non-gambling for this group during the course of the study. About 1 in 10 participants continued to gamble at low risk while about 8% progressed to moderate risk gambling. No participants gambled with problems (see Figure 3.18).

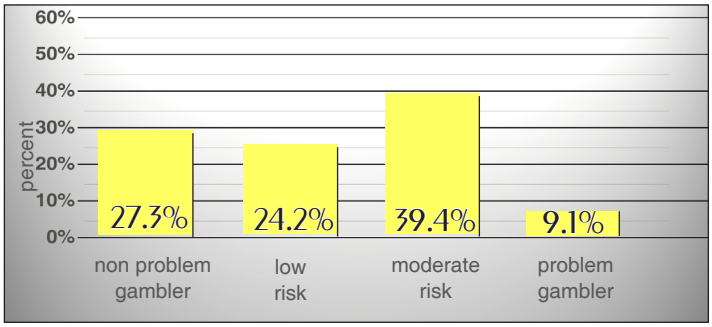
Figure 3.18: Low-Risk Gamblers 48 - Week Transitions



Baseline Moderate-Risk Gambling Group

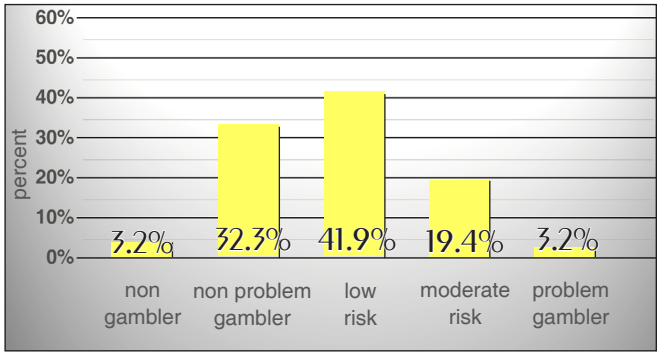
The moderate-risk gambling group at baseline constituted 9.5% of the total general population group (n=33). After 12 months, about 40% of this group continued to gamble with moderate risk and 9% progressed to a more severe level where they gambled with problems. On the other hand, slightly more than half moved to the less severe problem levels of low-risk (24 %) and non-problem (27%) gambling (see Figure 3.19).

Figure 3.19: Moderate-Risk Gamblers 12 - Week Transitions



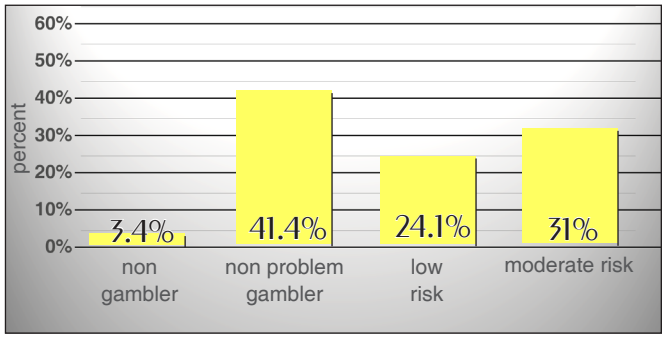
By 24 weeks, almost three-quarters of the baseline moderate-risk group improved their status, with 42% gambling at low-risk, 32% gambling with no problems, and 3% not gambling at all. About 1 in 5 (19%) were gambling at moderate risk, while only one case of problem gambling was found (see Figure 3.20).

Figure 3.20: Moderate-Risk Gamblers 24 - Week Transitions



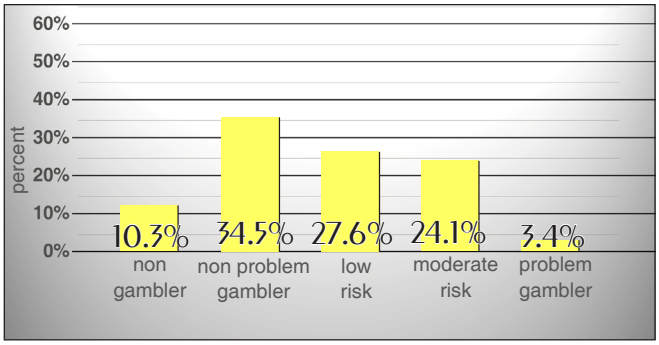
By 36 weeks, the entire baseline moderate-risk gambling group were either gambling at the same level or improved their gambling status. Almost 70% moved to improved levels with more than half of this group gambling without problems. Approximately one-third (31%) continued to gamble with moderate-risk (see Figure 3.21).

Figure 3.21: Moderate-Risk Gamblers 36 - Week Transitions



Finally, about one-quarter of the baseline moderate-risk gambling group were gambling at this level after 48 weeks. Almost three-quarters (72%) showed an improved level of gambling (10%, 35%, and 28% respectively for non-gambling, non-problem and low-risk gambling). Only 1 participant (3%) gambled with problems (see Figure 3.22)

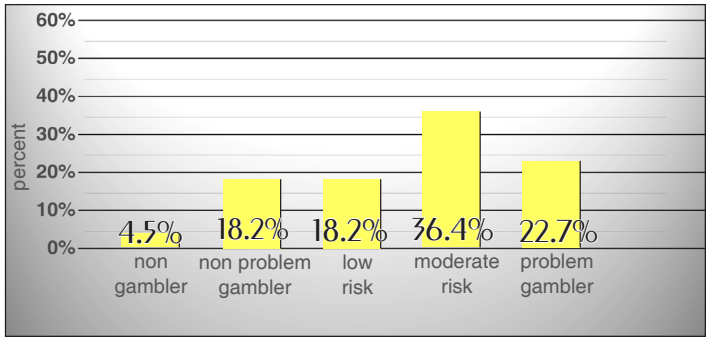
Figure 3.22: Moderate-Risk Gamblers 48 - Week Transitions



Baseline Problem Gambling Group

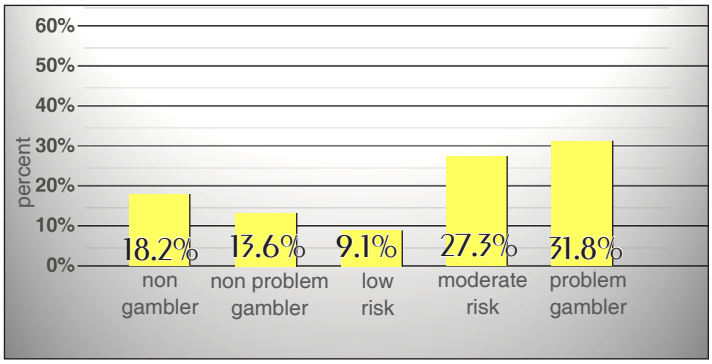
The baseline problem gambling group represents 6% of the total general population group (n=22). At the 12 week period, fewer than one-quarter (23%) continued to gamble with problems. Of the remaining participants in the problem gambling group, the majority gambled at risk; 18% gambled at low-risk and 36% at moderate-risk. Only 1 participant (5%) who gambled with problems at baseline stopped gambling (See Figure 3.24).

Figure 3.23: Problem Gamblers 12 - Week Transitions



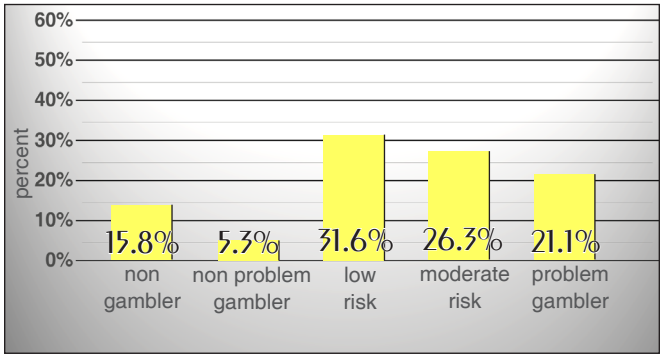
After 24 weeks, the percentage of those with problems at baseline who gambled with problems rose slightly from the rate at 12 weeks (23% to 32%). Of those who improved from their problem gambling level, just over one-third (36%) still gambled at low to moderate risk, while 14% gambled without any problems. Almost 1 in 5 (18%) did not gamble at all (see Figure 3.25).

Figure 3.24: Problem Gamblers 24 - Week Transitions



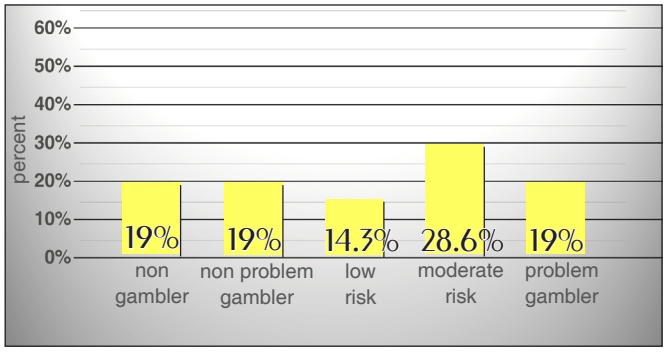
After 36 weeks, 79% of the baseline problem gambling group moved to less severe gambling levels. In particular, 32% gambled with low risk, an increase from the 9% found in the 36-week assessment period (see Figure 3.26).

Figure 3.25: Problem Gamblers 36 - Week Transitions



Finally, by the end of the 48 week study period, 19% of the baseline problem gambling group were gambling with problems. Among the 81% whose problem gambling level improved from the baseline, the small majority moved to the moderate-risk gambling group (29%). Of the remaining baseline group who gambled with problems, there was a relatively even spread in movement as 14%, 19%, and 19% gambled at low risk, gambled without problems, or stopped gambling, respectively (see Figure 3.27).

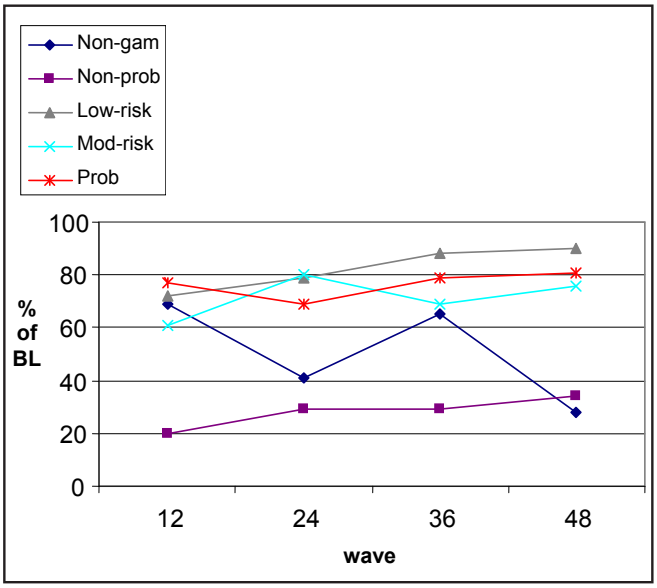
Figure 3.26: Problem Gamblers 48 - Week Transitions



Changes in Problem Gambling from Baseline to Follow-up

Participants from the general population group showed much variability in their problem gambling severity over the course of the study. Grouped according to PGSI problem gambling levels, participants showed substantial change in gambling levels from baseline to each of the follow-up assessment waves. Figure 3.27 shows the proportions of each baseline PGSI group who gambled at a different level than their baseline level. The figure shows this information for each assessment wave.

Figure 3.27: Percent of Baseline - PGSI Types Who Changed PGSI Level



Participants who gambled without problems at baseline were the most likely group to continue gambling in the same way throughout the study. Between 20% and 34% of these gamblers moved from baseline to a different PGSI level in at least one of the follow-up assessment waves. In contrast, the risky and problem gambling groups exhibited a consistently high rate of change in levels of problem gambling. Between 72% and 90% of the baseline low-risk gamblers changed gambling levels while the rate of baseline gamblers with problems who moved to a different (less severe) level was between 69% and 81%.

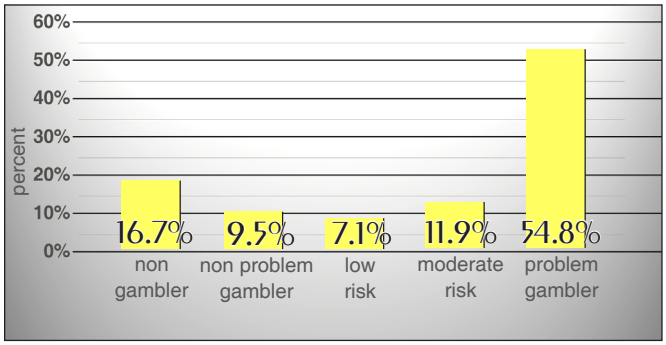
Last, a similarly high proportion of moderate-risk gamblers also consistently changed levels with more than 6 out of 10 of these gamblers moving to a different PGSI level in subsequent assessment waves.

The non-gambling participants showed the greatest variation in the proportion of their group who changed gambling levels. Although less than 4 in 10 participants changed levels in 2 assessment waves, almost 7 in 10 of them moved to a different level in 2 other waves. Moreover, there was no linear trend over time in the proportions (i.e., general downward or upward trend).

III) Help-Seeking Group

A total of 42 study participants sought help for concerns about gambling by attending the AFM orientation session. Over half of these individuals were classified as problem gamblers when they first sought assistance. Another 12% were moderate-risk gamblers, 7% were low-risk gamblers, 9.5% were non-problem gamblers and 17% were non-gamblers (see Figure 3.28).

Figure 3.28: PGSI Categories Beginning of Treatment



PGSI Categories Beginning of Treatment Seeking

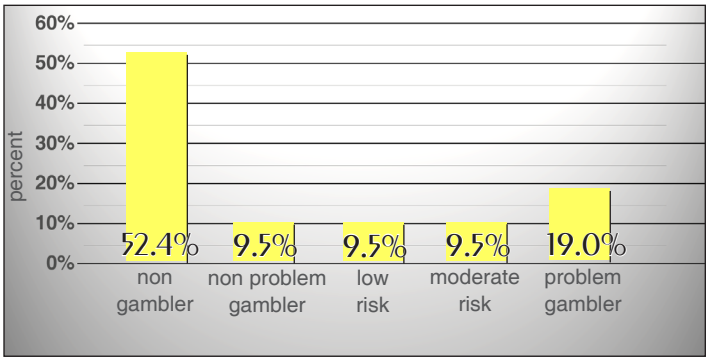
The help-seeking group was assessed again for their problem gambling levels 3 months later. Table 3.3 shows the PGSI level of help-seeking participants after 3 months by their PGSI level at the beginning of the study. Of the seven non-gamblers who sought help, six remained non-gamblers whereas one gambled with problems. Of the four non-problem gambling help-seekers, one became a non-gambler, one remained a non-problem gambler and two gambled with low-risk. Of the three low-risk gamblers, two became non-gamblers while one gambled with moderate risk. There were five moderate-risk gamblers at the beginning of the study, two of whom remained gambling at moderate risk; one gambled at low-risk; one gambled without problems; and one no longer gambled. Last, of the 23 help-seekers who had gambling problems at the beginning of the study, 7 gambled with problems, 1 each gambled at low and moderate risk, 2 gambled without problems, and 12 did not gamble by the end of the study.

Table 3.3: Change in PGSI Level 3 Months after Seeking Help for Gambling Concerns

PGSI Level 3 Months Later	PGSI Level at Beginning of Study				
	Non - gamble N=7	Non - problem N=4	Low-risk N=3	Mod-risk N=5	Problem N=23
Non-gamble	6	1	2	1	12
Non-problem	0	1	0	1	2
Low-risk	0	2	0	1	1
Mod-Risk	0	0	1	2	1
Problem	1	0	0	0	7

In total, after 3 months, only 19% of all help-seekers gambled with problems; 9.5% gambled with moderate risk; 9.5% gambled with low risk; 9.5% gambled without any problems; and over 52% did not gamble at all (see Figure 3.29).

Figure 3.29: PGSI Categories after Treatment for Help Seekers



PGSI Categories after Treatment for Help Seekers

Chapter 4

Predictors of Problem Gambling and Gambling Transitions

This chapter presents the results from our analysis of the predictors of problem gambling and changes in problem gambling severity over time for the general population group. The predictors examined included variables related to socio-demographics, alcohol and illicit drug use dependence, gambling activity and related cognitions, and psychological disorder. The first section of the chapter attempts to predict problem gambling both concurrently (from variables measured at the same time as problem gambling severity was measured) and prospectively (from variables measured in the 3 months before problem gambling severity was measured). The second section prospectively predicts movement in problem gambling severity (i.e., worse, improved, stable) from the variables measured in the 3 months before the movement occurred. Last, using latent growth modelling statistical techniques, the final section analyzes problem gambling and all predictors over the course of the study period to better identify and understand the longer term trends in problem gambling and the factors associated with these trends.

I) Predicting Problem Gambling

Logistic regression models were run to predict problem gambling as a dichotomous dependent variable. Due to the low number of participants in the problem gambling group, participants who scored at moderate risk (PGSI score = 3 to 7) were added to the "problem gambling" group. The remaining PGSI gambling levels (i.e., non-gambling, non-problem gambling, and low-risk gambling) were combined into the "non-problem gambling" group. Separate predictive models were analyzed for each of the baseline, 12-week, 24-week, 36-week, and 48-week assessment waves. These were the common data points for both the 6-week and 3-month interval survey samples and provided the largest possible sample for these analyses. The predictors examined included variables related to socio-demographics, alcohol and illicit drug use dependence, gambling activity and related cognitions, and psychological disorder.

Using stepwise analysis, concurrent predictions of problem gambling were conducted by analyzing the predictive variables that occurred in the same assessment wave as when the problem gambling was measured (e.g., predicted 12-week problem gambling level from 12-week predictors). In addition, prospective predictions were made by analyzing the predictive variables that occurred in the previous assessment wave from when problem gambling was measured (e.g., predicted 12-week problem gambling from baseline predictors, 48-week from 36-week predictors).

Last, for another indicator of problem gambling severity, we conducted stepwise OLS regression models using the PGSI score as a continuous dependent variable. As in the logistic regression analyses, these models included the same predictors described above, as well as both concurrent and prospective modelling.

Concurrent Problem Gambling Predictions

Problem Gambling Level (Categorical)

Analysis of the baseline data revealed a significant predictive model that identified a perceived inability to stop gambling as the only significant independent predictor of problem gambling. The model accounted for 35.2% of the overall variance in problem gambling (see Table 4.1). The model for the 12-week assessment wave accounted for 49% of the overall variance and indicated that problem gambling was predicted by a perceived inability to stop gambling, as well as a higher number of reported gambling activities. The perceived inability to stop gambling was again the most salient predictor of problem gambling status after 24 weeks but the amount of alcohol consumed was also a significant predictor. A regression model with these two predictors accounted for 35% of the total variance in problem gambling status. At the 36-week mark, a perceived inability to stop gambling and higher gambling-related expectancies were significant predictors in a model that accounted for 43% of the problem gambling variance. Finally, our 48-week model accounted for 58% of the problem gambling variance and revealed perceived inability to stop gambling, feelings of control over gambling outcomes, and gender (male) to be significant predictors of problem gambling status.

Table 4.1: Significant Concurrent Predictors of Problem Gambling Status

Predictors	B	SE^B	Wald	Exp (B)	R^2
Baseline (N=212)					
Inability to stop gambling	.24	.04	37.64***	1.27	35.2%
12-Week (N=219)					
Inability to stop gambling	.34	.06	29.66***	1.41	45.6%
Step 2:					
Inability to stop gambling	.34	.07	27.38***	1.41	49%
Number of gambling activities	.46	.21	4.69***	1.58	
24-Week (N=250)					
Inability to stop gambling	.31	.06	30.83***	1.36	32.1%
Step 2:					
Inability to stop gambling	.33	.06	31.75***	1.39	35.4%
Alcohol consumed	.16	.07	4.85*	1.17	
36-Week (N= 179)					
Inability to stop gambling	.37	.08	21.37***	1.45	39.2%
Step 2:					
Gambling-related expectancies	.14	.07	4.08*	1.15	43.4%
Inability to stop gambling	.29	.08	13.99*	1.37	
48-Week (N=162)					
Inability to stop gambling	.40	.08	25.76***	1.49	47.5%
Step 2:					
Inability to stop gambling	.39	.08	22.68***	1.48	51.8%
Predictive control	.12	.05	4.81*	1.13	
Step 3:					
Gender	2.13	1.00	4.51*	8.39	57.6%
Inability to stop gambling	.43	.09	20.78***	1.53	
Predictive control	.18	.06	7.94**	1.19	

***p < .001; **p < .01; *p < .05

Problem Gambling Score (Continuous)

Stepwise OLS regression models were conducted to examine the predictive variables in relation to PGSI score. As shown in Tables 4.2 through 4.6, a perceived inability to stop gambling emerged as a significant predictor of problem gambling scores at all assessment periods. The greater the perception of an inability to stop gambling, the higher the participant scored on the PGSI.

Other predictors of PGSI scores also emerged at different assessment periods. With respect to the baseline period, depression and gambling frequency were also significant predictors in a model that accounted for 46% of the variance in PGSI scores. Higher levels of depression and increased gambling frequency predicted higher PGSI scores (see Table 4.2).

Table 4.2: Significant Concurrent Predictors of Problem Gambling Status at Baseline

Predictors (N=212)	B	SE^B	ß	t	R^2
Inability to stop gambling	.42	.04	.62	11.54***	39%
Step 2:					
Inability to stop gambling	.35	.04	.53	9.67***	44.2%
Depression	.26	.05	.26	4.75***	
Step 3:					
Inability to stop gambling	.32	.04	.48	8.60***	46.2%
Depression	.27	.05	.28	5.08***	
Gambling frequency	.45	.15	.15	2.91**	

***p < .001; **p < .01; *p < .05

The 12-week data showed a slight change from the baseline results in that along with gambling frequency, illusions of control significantly predicted scores in a model that accounted for 47% of the variance in PGSI scores (see Table 4.3). More frequent gambling and less illusion of control predicted higher PGSI scores.

Table 4.3: Significant Concurrent Predictors of Problem Gambling Severity Index Score at 12 Weeks

Predictors (N=200)	B	SE^B	ß	t	R^2
Inability to stop gambling	.29	.02	.67	12.67***	44.5%
Step 2:					
Inability to stop gambling	.28	.02	.65	12.27***	46.3%
Depression	.27	.10	.15	2.77**	
Step 3:					
Inability to stop gambling	.29	..02	.67	12.54***	47.2%
Gambling frequency	.29	.10	.15	2.90**	
Illusions of control	-.09	.04	-.11	-2.09*	

***p < .001; **p < .01; *p < .05

After 24 weeks, a regression model that accounted for almost 37% of the PGSI variance found number of gambling activities, alcohol consumption and gender to be significant (see Table 4.4). That is, a higher number of reported gambling activities, higher alcohol consumption, and female gender predicted higher scores on the PGSI.

Table 4.4: Significant Concurrent Predictors of Problem Gambling Severity Index Score at 24 Weeks

Predictors (N=250)	B	SE^B	ß	t	R^2
Inability to stop gambling	.33	.03	.56	10.66***	31.2%
Step 2:					
Inability to stop gambling	.31	.03	.52	10.01***	35.1%
Number of gambling activities	.29	.07	.21	4.00***	
Step 3:					
Inability to stop gambling	.31	.03	.53	10.14***	35.8%
Number of gambling activities	.26	.07	.19	3.50***	
Alcohol consumption	.07	.04	.10	1.97*	
Step 4:					
Inability to stop gambling	.31	.03	.53	10.22***	36.6%
Number of gambling activities	26	.07	.19	3.54***	
Alcohol consumption	.09	.04	.13	2.44*	
Gender	-.43	.22	-.10	-1.96*	

***p < .001; **p < .01; *p < .05

At 36 weeks, increased gambling frequency and female gender were significant predictors of higher PGSI scores, accounting for 37% of the PGSI score variance (see Table 4.5).

Table 4.5: Significant Concurrent Predictors of Problem Gambling Severity Index score at 36 Weeks

Predictors (N=161)	B	SE^B	ß	t	R^2
Inability to stop gambling	.24	.03	.57	8.75***	32.1%
Step 2:					
Inability to stop gambling	.25	03	.58	9.06***	34.3%
Gender	-.47	.18	-.16	-2.54**	
Step 3:					
Inability to stop gambling	.23	.03	.54	8.22***	36.6%
Gender	-.52	.18	-.18	-2.86**	
Gambling frequency	.25	.10	.17	2.59**	

***p < .001; **p < .01; *p < .05

Finally, accounting for 65% of the variance in the PGSI scores, the 48-week model showed that anxiety levels, gambling frequency, gender, marital status, depression and somatisation were significant predictors of PGSI scores (see Table 4.6). In particular, higher levels of anxiety, and depression, lower levels of somatisation, greater gambling frequency, being female and single predicted higher PGSI scores.

Table 4.6: Significant Concurrent Predictors of Problem Gambling Severity Index score at 48 Weeks

Predictors (N=162)	B	SE^B	ß	t	R^2
Inability to stop gambling	.36	.02	.76	14.92***	57.9%
Step 2:					
Inability to stop gambling	.34	.04	.69	13.24***	60.5%
Anxiety	.15	.05	.17	3.37***	
Step 3:					
Inability to stop gambling	.33	.03	.69	13.24***	61.6%
Anxiety	.16	.05	.18	3.52***	
Gambling frequency	.20	.09	.12	2.36*	
Step 4:					
Inability to stop gambling	.33	.02	.69	13.36***	62.4%
Anxiety	.16	.05	.17	3.50***	
Gambling frequency	.21	.09	.13	2.47*	
Gender	-.36	.17	-.10	-2.13*	
Step 5:					
Inability to stop gambling	.33	.02	.70	13.65***	63.2%
Anxiety	.15	.04	.17	3.56***	
Gambling frequency	.21	.08	.12	2.45*	
Gender	-.39	.17	-.11	-2.31*	
Marital Status	-.20	.10	-.10	-2.09*	
Step 6:					
Inability to stop gambling	.32	.02	.69	13.33***	64%
Anxiety	.10	.05	.11	1.97*	
Gambling frequency	.23	.08	.14	2.71**	
Gender	-.37	.17	-.11	-2.23*	
Marital status	-.21	.10	-.11	-2.25*	
Depression	.10	.05	.12	2.05*	
Step 7:					
Inability to stop gambling	.32	.02	.67	12.95***	64.8%
Anxiety	.16	.06	.18	2.76**	
Gambling frequency	.22	.08	.13	2.70**	
Gender	-.42	.17	-.12	-2.51**	
Marital status	-.22	.09	-.11	-2.30*	
Depression	.13	.05	.16	2.67**	
Somatic	-.10	.05	-.14	-2.12*	

***p < .001; **p < .01; *p < .05

Prospective Problem Gambling Predictions

Problem Gambling Level (Categorical)

Logistic regression models were used to predict problem gambling at each assessment wave using predictors from the immediately preceding assessment wave (i.e., prior 12 weeks). Table 4.7 presents the results for 12, 24 and 36 week prospective predictions. A regression model revealed that the only significant baseline measure that predicted problem gambling at 12 weeks was a perceived inability to stop gambling, which accounted for 22% of the variance in problem gambling status. The perception that one is unable to stop gambling was also the only significant predictor of problem gambling at 24 weeks from the 12-week variables. This model accounted for 51% of variance in problem gambling. Using the 24-week variables to predict problem gambling at 36 weeks revealed a perceived inability to stop gambling, again, as the strongest independent predictor, along with a higher number of reported gambling activities. This model accounted for 43% of the variance in problem gambling.

Table 4.7: Significant Prospective Predictors of Problem Gambling Status for 12, 24 and 36 Week Variables

Predictors	B	SE^B	Wald	Exp (B)	R^2
12-week from baseline (N=199)					
Inability to stop gambling	.18	.04	21.57***	1.20	22.2%
24-Week from 12-week (N=208)					
Inability to stop gambling	.33	.06	27.64***	1.39	51.2%
36-Week from 24-week (N=239)					
Inability to stop gambling	.30	.06	25.06***	1.34	27.7%
Step 2:					
Inability to stop gambling	.31	.07	20.54***	1.36	43%
Number of gambling activities	.80	.21	15.30***	2.23	

***p < .001; **p < .01; *p < .05

Predicting problem gambling at the 48-week period from the 36-week measures provided a much more complex model. Lower levels of education, being male, higher frequency of gambling, higher levels of interpretive control/bias, more false beliefs about being able to control gambling outcomes, and a perceived inability to stop gambling were all significant variables in this model that accounted for almost 62% of the problem gambling variance (see Table 4.8) .

Table 4.8: Significant Prospective Predictors of Problem Gambling Status at 48 Weeks from 36 Week Variables

Predictors (N=172)	B	SE^B	ß	t	R^2
Inability to stop gambling	.27	.07	17.24***	1.32	25.4%
Step 2:					
Gambling frequency	.64	.25	6.46**	1.89	32.2%
Inability to stop gambling	.24	.07	13.60***	1.27	
Step 3:					
Gambling frequency	.85	.28	9.20**	2.34	41%
Illusion of control	.40	.14	8.36**	1.49	
Inability to stop gambling	.22	.07	11.97***	1.25	
Step 4:					
Gender	2.00	.86	5.39*	7.42	48%
Gambling frequency	1.01	.33	9.71**	2.76	
Illusion of control	.47	.16	9.29**	1.60	
Inability to stop gambling	.27	.08	11.07***	1.31	
Step 5:					
Education	-.48	.19	6.19**	.62	56.9%
Gender	2.69	.97	7.66**	14.70	
Gambling frequency	1.14	.37	9.41**	3.11	
Illusion of control	.62	.18	12.19*	1.85	
Inability to stop gambling	.38	.10	13.48***	1.46	
Step 6:					
Education	-.54	.21	6.82**	.58	61.8%
Gender	3.71	1.21	9.43**	40.94	
Gambling frequency	1.17	.40	8.54**	3.21	
Interpretive control/bias	.27	.12	4.85*	1.31	
Illusion of control	.45	.19	5.54*	1.57	
Inability to stop gambling	.35	.11	10.31***	1.42	

***p < .001; **p < .01; *p < .05

Problem Gambling Score (Continuous)

To predict PGSI scores, regression models using variables measured from the prior 12-week assessment wave were conducted. To predict 12-week PGSI scores from baseline data, we ran a model that explained 29% of the variance in scores (see Table 4.9). The model suggests that a stronger perception of an inability to stop gambling, higher levels of depression, more gambling-related expectancies, and higher gambling frequency were all significant predictors of higher PGSI scores. On the other hand, a low illusion of control over gambling outcomes and being male predicted lower scores.

Table 4.9: Significant Prospective Predictors of Problem Gambling Severity Index at 12 Weeks from Baseline Variables

Predictors (N=270)	B	SE^B	ß	t	R^2
Inability to stop gambling	.20	.03	.44	8.11***	19.4%
Step 2:					
Inability to stop gambling	.17	.03	.38	6.71***	23.7%
Depression	.14	.03	.22	4.00***	
Step 3:					
Inability to stop gambling	.15	.03	.32	5.40***	24.9%
Depression	.12	.03	.21	3.68***	
Gambling related expectancies	.06	.03	.14	2.34***	
Step 4:					
Inability to stop gambling	.16	.03	.36	5.91***	26.6%
Depression	.12	.03	.21	3.71***	
Gambling related expectancies	.09	.03	.20	3.165**	
Illusions of control	-.12	.05	-.16	-2.64**	
Step 5:					
Inability to stop gambling	.17	.03	.38	6.24***	28.2%
Depression	.11	.03	.19	3.43***	
Gambling related expectancies	.10	.03	.22	3.56***	
Illusion of control	-.13	.04	-.18	-2.96**	
Gender	-.59	.23	-.14	-2.62**	
Step 6:					
Inability to stop gambling	.16	.03	.36	5.88***	29.0%
Depression	.12	.03	.21	3.71***	
Gambling related expectancies	.10	.03	.21	3.44***	
Illusion of control	-.14	.04	-.19	-3.14**	
Gender	-.66	.23	-.15	-2.89**	
Gambling frequency	.21	.10	.11	2.03*	

***p < .001; **p < .01; *p < .05

When using 12-week variables to predict PGSI scores after 24 weeks, only perceived inability to stop gambling was a significant predictor of higher scores, accounting for almost 50% of the variance in PGSI scores (see Table 4.10).

Table 4.10: Significant Prospective Predictors of Problem Gambling Severity Index at 24 Weeks from 12 Week Variables

Predictors (N=165)	B	SE^B	ß	t	R^2
Inability to stop gambling	.29	.02	.71	12.76***	49.7%

***p < .001; **p < .01; *p < .05

In a significant model that accounted for 38.4% of the variance in PGSI scores at 36 weeks, the significant 24-week predictors of higher scores were a perceived inability to stop gambling, higher number of reported gambling activities, and greater interpretive control/bias and alcohol consumption. Being male, however, predicted a lower score (see Table 4.11).

Table 4.11: Significant Prospective Predictors of Problem Gambling Severity Index at 36 Weeks from 24 Week Variables

Predictors (N=190)	B	SE^B	ß	t	R^2
Inability to stop gambling	.26	.03	.53	8.46***	27.7%
Step 2:					
Inability to stop gambling	.24	.03	.47	7.87***	34.4%
Number of gambling activities	.33	.07	.28	4.64***	
Step 3:					
Inability to stop gambling	.22	.03	.44	7.03***	35.4%
Number of gambling activities	.32	.07	.27	4.52***	
Interpretive control bias	.06	.03	.12	2.01*	
Step 4:					
Inability to stop gambling	.21	.03	.42	6.82***	37.2%
Number of gambling activities	.32	.07	.28	4.67***	
Interpretive control bias	.07	.03	.17	2.62**	
Gender	-.51	.21	-.15	-2.48**	
Step 5:					
Inability to stop gambling	.22	.03	.43	7.03***	38.4%
Number of gambling activities	.29	.07	.25	4.09***	
Interpretive control bias	.07	.03	.15	2.47**	
Gender	-.62	.21	-.18	-2.96**	
Alcohol consumed	.07	.03	.13	2.16*	

***p < .001; **p < .01; *p < .05

Finally, when examining 48-week PGSI scores using 36-week predictors, perceived inability to stop gambling, higher levels of interpretative control bias, male gender, lower levels of education, and being single predicted higher PGSI scores. The overall model explained almost 45% of the variability in the PGSI scores (see Table 4.12).

Table 4.12: Significant Prospective Predictors of Problem Gambling Severity at 48 Weeks From 36 Week Predictors

Predictors (N=146)	B	SE^B	ß	t	R^2
Inability to stop gambling	.35	.04	.60	8.97***	35.9%
Step 2:					
Inability to stop gambling	.30	.04	.52	7.25***	38.8%
Interpretive control bias	.10	.04	.19	2.62	
Step 3:					
Inability to stop gambling	.29	.04	.51	7.12***	41.1%
Interpretive control bias	.12	.04	.23	3.12**	
Gender	-.58	.25	-.16	-2.35*	
Step 4:					
Inability to stop gambling	.30	.04	.52	7.37***	43.2%
Interpretive control bias	.12	.04	.22	3.12**	
Gender	-.63	.25	-.17	-2.58**	
Marital Status	-.10	.04	-.15	-2.29*	
Step 5:					
Inability to stop gambling	-.32	.04	.55	7.71***	44.8%
Interpretive control bias	.11	.04	.21	2.90**	
Gender	.72	.25	-.19	-2.92**	
Education	-.10	.04	-.15	-2.39*	
Marital status	-.25	.12	-.13	-2.03*	

***p < .001; **p < .01; *p < .05

II) Predicting Transitions Between Gambling Levels

This section presents the results for the multinomial logistic regression models that predict transitions between PGSI gambling levels. To identify a change in levels, PGSI gambling category levels were compared between consecutive assessment points. If participants' level became worse (e.g., moved from at-risk to moderate or from moderate to severe), they were coded as "worse". Participants whose level improved (i.e., moved from moderate to at-risk or from at-risk to non-problem) were coded as "improved". Those with no change in levels of gambling were coded as "stable" and were used as the reference group for comparison against those who worsened and improved. Transitions were predicted by variables measured in the assessment wave occurring immediately prior to the change (e.g., used 12-week measures to predict change between 12- and 24-week periods). The same sets of predictors used in previous models were employed here.

The model that predicted gambling level movement between baseline and 12 weeks accounted for almost 24% of the variance in status transition. During this period, 67% of participants remained stable in their gambling level, while11% worsened and 22% improved to a less problematic level. A shift to worse gambling levels was predicted by consumption of a greater amount of alcohol, higher gambling-related expectancies and higher interpretive control/bias at baseline. For participants whose level improved, they were more likely to be older and married, and have higher somaticizing scores, and a lower gambling frequency at baseline (see Table 4.13).

Table 4.13: Significant Predictors of Transitions between Baseline and 12 Week Gambling Levels

Predictors	B	SE^B	Wald	Exp (B)	R^2
12-week from baseline (N=207): Reference: Stable (n=139, 67.1%)					23.7%
Gambling Worsened (n=23, 11.1%)					
Alcohol Consumed	-.26	.13	4.32*	.77	
Gambling-Related Expectancies	.23	.07	9.50**	1.22	
Interpretive Control Bias	-.21	.11	3.42	.81	
Gambling Improved (n=45, 21.7%)					
Age	-.04	.02	5.44*	.96	
BSI-Somatic-00	.16	.08	4.62*	1.18	
Gambling Frequency	.51	.22	5.34*	1.66	
Marital status					
Single vs. Married	-1.74	.88	3.92*	.18	
Divorced vs. Married	-2.43	1.04	5.49*	.09	
Widowed vs. Married	-2.05	.99	4.32*	.13	

***p < .001; **p < .01; *p < .05

Table 4.14 shows the significant predictors of gambling level transitions between 12 and 24 weeks. The model accounted for 21% of the variance in status transition and shows that participants whose gambling level worsened were more likely to be depressed and drink more alcohol at the 12 week assessment. Improvement, on the other hand, was predicted only by age.

Table 4.14: Significant Predictors of Transitions between 12 Week and 24 Week Gambling Levels

Predictors	B	SE^B	Wald	Exp (B)	R^2
24-Week from 12-week (N=205) Reference: Stable (n=138, 67.3%)					21%
Gambling Worsened (n=24, 11.7%)					
BSI-Depression	-.32	.16	3.76*	.73	
Alcohol consumed	-.20	.11	3.62	.82	
Gambling Improved (n=43, 21.0%)					
Age	-.04	.02	4.39*	.96	

***p < .001; **p < .01; *p < .05

From 24 weeks to 36 weeks, no significant variables predicted a worse gambling level but those whose levels improved reported participating in fewer gambling activities (see Table 4.15).

Table 4.15: Significant Predictors of Transitions between 24 Week and 36 Week Gambling Levels

Predictors	B	SE^B	Wald	Exp (B)	R^2
36-Week from 24-week (N=183) Reference: Stable (n=137, 75.3%)					24.5%
Gambling Worsened (n=19, 10.4%)					
No significant predictors					
Gambling Improved (n=26, 14.3%)					
Number of gambling activities	-.47	.24	3.85*	.63	

***p < .001; **p < .01; *p < .05

Finally, a model that predicted transitions from the 36 week to the 48-week assessment period accounted for 33% of the variance in level movement during this period. According to the model, participants who moved to more problematic levels drank more alcohol whereas those who shifted to less problematic levels reported fewer gambling activities (see Table 4.16).

Table 4.16: Significant Predictors of Transitions between 36 Week and 48 Week Gambling Levels

Predictors	B	SE^B	Wald	Exp (B)	R^2
48-Week from 36-week (N=171) Reference: Stable (n=120, 70.2%)					32.8%
Gambling Worsened (n=25, 14.6%)					
Alcohol consumed	.31	.11	7.45**	1.36	
Gambling Improved (n=26, 15.2%)					
Number of gambling activities	-.86	.30	8.55**	.42	

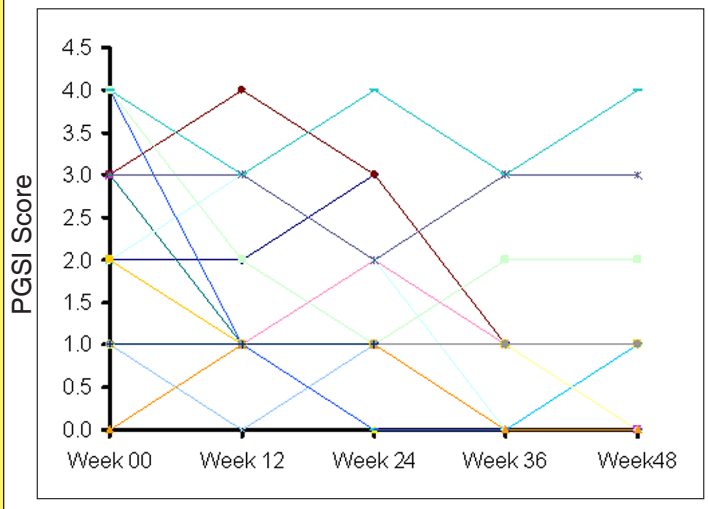
***p < .001; **p < .01; *p < .05

III) Longitudinal Modeling of Problem Gambling

One of the key aims of this study was to describe and predict changes in gambling over time. This objective necessitates the collection of multiple observations across large numbers of individuals in order to derive stable and generalizable estimates of population parameters. In the current study, participants provided information on five separate occasions (i.e., baseline, 12-, 24-, 36-, and 48-week periods) and latent growth curve models were developed to assess changes in problem gambling, as measured by PGSI scores, over this time. A variety of models were fitted to the data in order understand these longitudinal changes as well as of the characteristics of participants who changed more or less over time. These models also have the added advantage of correcting for unreliability of measurement.

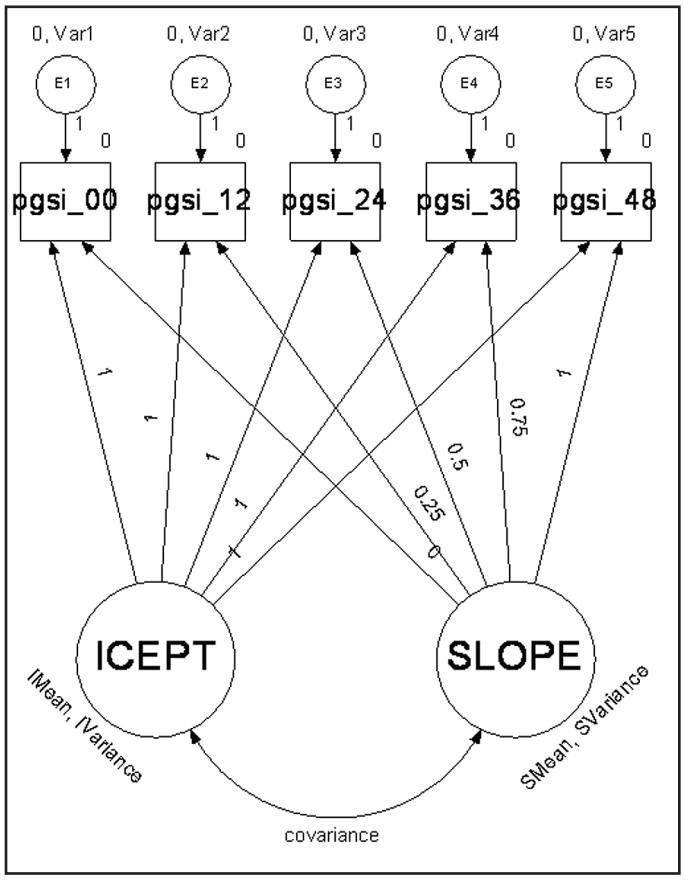
As is customary in this type of investigation, we first evaluated plots of individual and group trajectories of total PGSI scores. Figure 4.1 shows the observed total PGSI scores for a random selection of 25 cases from the data. These plots suggest that there was, on average, a decline in scores over the course of this study and that the decline was roughly linear in nature.

Figure 4.1: Example Trajectories for 25 Random Participants



Based on these findings, we next estimated a linear latent growth curve model (see Figure 4.2) assuming homoscedasticity of model residuals. This model (M00) provided a relatively poor fit to the data, so we then relaxed the assumption of homoscedastic residuals, and consequently found a) a significant improvement in model fit and b) an overall baseline model that fit the observed data very well (M01).

Figure 4.2: Latent Growth Curve Model for Gambling Behaviour over 48 Weeks



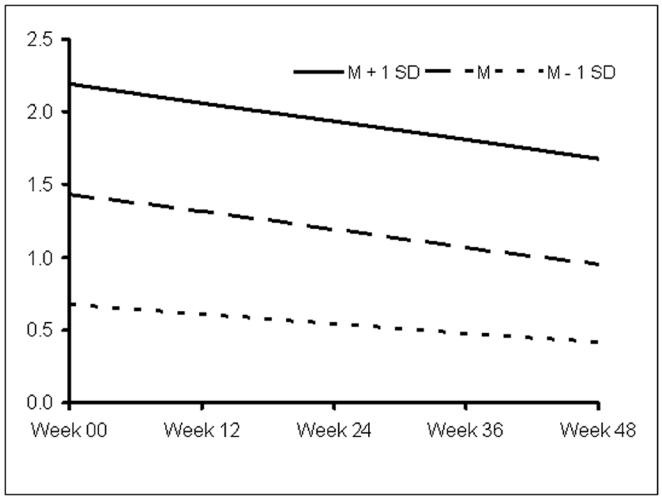
The baseline model indicates that, on average, participants entered the study with PGSI scores of 1.430 and that their scores declined an average of 0.943 by Week 48. There was also significant variability both in the initial baseline scores (SD = 0.76), as well as in how their scores changed over time (SD = 0.56). Further, participants with higher PGSI scores at the beginning of the study tended to have, on average, larger decreases in scores throughout the study period than those who entered the study with lower scores. Initial baseline scores and extent of change correlated approximately -0.41 over this time period. Parameters of the baseline model are summarized in Table 4.17.

Table 4.17: Baseline Growth Curve Model for Gambling Behaviour over 48 Weeks

Fixed Effects (Means)	Est	SE	t	p
Initial level	1.430	0.048	29.715	0.001
Change over time	-0.487	0.050	-9.789	0.001
Random Effects (Variance and Covariances)				
Initial level	0.577	0.062	9.234	0.001
Change over time	0.318	0.072	4.396	0.001
Cov(level, change)	-0.174	0.054	-3.196	0.001
e1	0.537	0.054	9.920	0.001
e2	0.233	0.027	8.756	0.001
e3	0.260	0.026	10.099	0.001
e4	0.195	0.022	8.900	0.001
e5	0.207	0.031	6.777	0.001

Figure 4.3 illustrates the typical PGSI score trajectories for participants at baseline with average (M), above average (M + 1 SD), or below average (M – 1 SD) scores. As can be seen, despite the fact that the rate of decline is roughly twice as large for the above average group as compared to the below average group, scores for the above average group were still higher than those of the average group at the baseline (i.e., the right-most point for the above average group is above the left-most point for the average group). The same is also true when comparing the average and below average groups with one another.

Figure 4.3: Average Change in Gambling Behaviour over 48 Weeks



These predicted values for the below average, average and above average groups are summarized in Table 4.18. The fact that there was significant variation between individuals in intercepts and slopes means that both of these latent variables can be predicted by other characteristics of participants in the study. The ability to identify these inter-individual differences in intra-individual rates of change is one of the key benefits of latent growth curve models.

Table 4.18: Estimates of Change and Variability in Gambling Behaviour over 48 Weeks

Trajectory	Baseline	Week 12	Week 24	Week 36	Week 48
M + 1 SD	2.19	2.06	1.93	1.81	1.68
M	1.43	1.31	1.19	1.06	0.94
M - 1 SD	0.67	0.61	0.54	0.48	0.41

Next, a series of models were estimated in which different groups of variables were used as potential predictors of both problem gambling, as indicated by the PGSI scores, and changes in severity over time. Four separate sets of variables were used to predict parameters of the latent growth curve model. These include socio-demographic characteristics, psychiatric disorders (BSI subscales - Anxiety, Depression, Somatic Symptoms), alcohol and illicit drug abuse co-morbidities (AUDIT and DAST), and gambling-related cognitions (GRCS subscales - Gambling Expectations, Illusion of Control, Predictive Control, Inability to Stop Gambling, and Interpretive control/bias).

Socio-demographic Characteristics

As can be seen in Table 4.19, none of the demographic characteristics were significantly associated with either initial problem gambling or with changes in severity over time.

One possible reason for this non-significant finding in the current study is social norms surrounding gambling behaviours may have changed in ways that render specific demographic characteristics less important than they have been in the past. Alternatively, differences on these variables may be limited to the likelihood of whether or not an individual engages in any form of gambling behaviour, and participation in our study was limited to those with at least some level of involvement.

Table 4.19: Demographic Predictors of Change in Gambling Behaviour over 48 Weeks

Demographic	Est	SE	t	p
Predictors of Initial Levels of Problem Gambling				
Age	0.003	0.003	0.998	0.318
Education	-0.006	0.017	-0.365	0.715
Gender	-0.006	0.098	-0.064	0.949
Personal income	-0.001	0.002	-0.340	0.734
Predictors of Longitudinal Change in Problem Gambling				
Age	0.001	0.003	0.386	0.699
Education	0.005	0.018	0.305	0.760
Gender	0.057	0.101	0.568	0.570
Personal income	0.002	0.002	0.908	0.364

Psychological Disorder

As can be seen in Table 4.20, higher levels of depressive symptomatology, as measured on the BSI, were associated with more problematic gambling, but also with a significantly higher rate of reduction in problem gambling over time. Individuals with higher initial levels of depressive symptoms were more likely to start the study with a greater severity of problem gambling, but less likely to persist at this higher level over the longer term. Individuals who scored one standard deviation above the mean on depressive symptoms began the study an average of 22% higher than average in predicted problem gambling scores, but also had a 34% greater than average decline in problem gambling severity over time.

Table 4.20: Psychological Predictors of Change in Gambling Behaviour over 48 Weeks

Brief Symptom Inventory	Est	SE	t	p
Predictors of Baseline Problem Gambling				
Anxiety	0.012	0.023	0.533	0.594
Depression	0.092	0.019	4.792	0.001
Somatic complaints	-0.013	0.019	-0.693	0.488
Predictors of Longitudinal Change in Problem Gambling				
Anxiety	0.001	0.025	0.053	0.958
Depression	-0.061	0.021	-2.905	0.004
Somatic complaints	0.036	0.021	1.735	0.083

Alcohol and Illicit Drug Abuse Co-morbidities

Use of alcohol and illicit drugs have also been found to be risk factors for problem gambling (e.g., Petry, Stinson, & Grant, 2005; Petry & Weinstock , 2007). The current results suggest that, when longitudinal change is considered, the picture is slightly more nuanced than when a snapshot of these behaviours is examined at a single moment in time. As seen in Table 4.21, individuals who engaged in problematic alcohol use were not associated with initial levels of problem gambling, but these individuals had only one-third of the rate of decrease in such gambling over time. Illicit drug abuse, on the other hand, was associated with higher levels of problem gambling at baseline. Somewhat surprisingly, however, illicit drug abuse was also associated with significantly (two-thirds) greater rates of decline in problem gambling over the course of the study. These findings suggest that gambling and alcohol dependency are associated behaviours, whereas gambling and illicit drug use are incompatible over longer periods of time; greater participation in one activity necessitates decreasing participation in the other.

Table 4.21: Alcohol and Drug Use as Predictors of Change in Gambling Behaviour over 48 Weeks

Co-morbidities	Est	SE	t	p
Predictors of Baseline Problem Gambling				
Alcohol Use (AUDIT)	-0.153	0.107	-1.436	0.151
Drug Use (DAST)	0.130	0.065	2.019	0.043
Predictors of Longitudinal Change in Problem Gambling				
Alcohol Use (AUDIT)	0.215	0.109	1.968	0.049
Drug Use (DAST)	-0.216	0.066	-3.265	0.001

Gambling-Related Cognitions

From a psychological perspective, gambling-related cognitions represent a particularly proximal set of predictor variables for problem gambling and any longitudinal changes in its severity. As shown in Table 4.22, participants who expressed higher gambling expectations, greater interpretive control/bias, and a perceived inability to stop gambling reported higher initial levels of problem gambling at baseline. Surprisingly, however, individuals reporting higher degrees of interpretive control/bias and a perceived inability to stop gambling also reported significantly greater declines in their problem gambling over time. This suggests that, while gambling-related cognitions may be an important risk factor for problematic gambling at any given point in time, they also seem to play an important role in self-regulating gambling behaviour over time.

Table 4.22: Gambling Related Cognitions as Predictors of Change in Gambling Behaviour over 48 Weeks Table

Demographic	Est	SE	t	p
Predictors of Baseline Problem Gambling				
Gambling expectations	0.049	0.011	4.34	.001
Illusion of control	-0.023	0.018	-1.27	.204
Predictive control	-0.015	0.010	-1.46	.143
Inability to stop gambling	0.073	0.010	7.00	.001
Interpretive bias	0.036	0.013	2.70	.007
Predictors of Longitudinal Change in Problem Gambling				
Gambling expectations	0.002	0.014	0.18	.859
Illusion of control	0.018	0.023	0.80	.426
Predictive control	0.019	0.012	4.54	.123
Inability to stop gambling	-0.046	0.013	-3.57	.001
Interpretive bias	-0.040	0.016	-2.45	.014

A summary of the key indicators of model fit for each of the models discussed in this section is provided below. By all most commonly applied metrics, each is indicative of models which fit the observed data well. Overall, then, latent growth models successfully identified and described trajectories of problem gambling over time. These models suggested some differences in measurement reliability over time as indicated by the need to model an independent but heteroscedastic error structure. These differences seemed to be limited to the first versus subsequent administrations of the PGSI; a modest but noteworthy testing effect. Predictor variables in distinct sets were added to this overall baseline model in order to determine which characteristics of individuals were associated with both their initial levels of problem gambling as well as how they changed over time.

Table 4.23: Model Fit Statistics for Predictors of Change in Gambling Behaviour over 48 Weeks

Model	df	Chi-Square	p-value	RMSEA	NFI	CFI
Baseline Models						
Linear, Homoscedastic Residuals	14	92.6	0.001	0.10	0.89	0.91
Linear, Heteroscedastic Residuals	10	36.2	0.001	0.07	0.96	0.97
Predictors of Change						
Demographic predictors	22	44.1	0.003	0.04	0.95	0.97
Brief symptom inventory	19	60.3	0.001	0.06	0.96	0.97
Comorbidities	16	39.9	0.001	0.05	0.95	0.97
Gambling-related cognitions	25	67.4	0.001	0.06	0.96	0.97

Chapter 5

Problem Gambling Assistance and Help Seeking-Behaviour

This chapter aims to understand why people seek help for problem gambling by examining participants' perceptions and experiences with problem gambling assistance and their help-seeking behaviour. The first section looks at problem gambling assistance among the general population and help-seeking groups. The next section compares the help-seeking group with the problem gamblers from the general population group to better understand why gamblers with problems seek help.

Attitudes and Use Among the General Population Group

Study participants from the general population group were asked questions about their awareness and use of problem gambling services. Table 5.1 shows the proportion of participants who said they would seek help if they were concerned either about someone else's or their own gambling. Whereas almost all the participants (92%) said they would seek help if they were concerned with their own gambling, only two-thirds (67%) indicated they would do so for someone else whose gambling gave them concerns.

Table 5.1: Willingness to Seek Help over Concerns about Gambling

Concerned About…	% Who Would Seek Help
Someone else's gambling	67.4
Own gambling	92.2

Participants were asked about their awareness and use of particular problem gambling services in Manitoba. Table 5.2 reports the percentages of participants who were aware and used the problem gambling helpline and community problem gambling counseling services. About 75% were aware of the toll-free gambling help-line in Manitoba while only 38% were aware of problem gambling counseling services. Use of these services was considerably lower with approximately 2% having ever used the gambling helpline, or the problem gambling counseling services.

Table 5.2: Awareness and Use of Problem Gambling Services Among General Population

Problem Gambling Service	Total General Population Group
Problem Gambling Helpline	
Aware	74.1
Used	1.7
Problem Gambling Counseling Services	
Aware	37.5
Used	2.3

Treatment Participation among Help-seeking Group

At follow-up, the help-seeking group was asked about their treatment participation since attending the initial AFM orientation session and almost 66% of the participants reported that they continued to pursue treatment at the AFM after the initial session (Figure 5.1).

Figure 5.1 Following the initial gambling orientation session at AFM, did you continue to seek assistance from AFM for your gambling concerns?

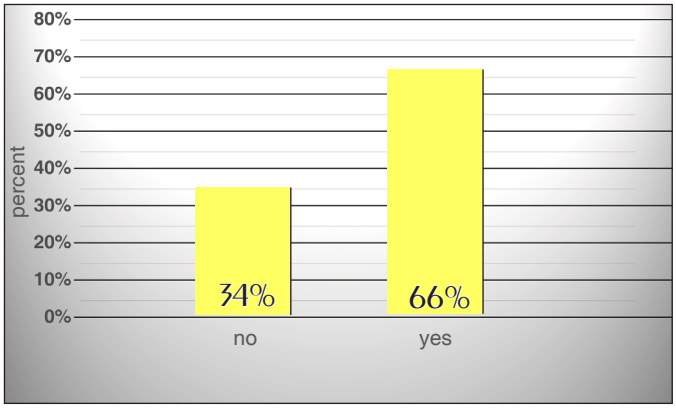
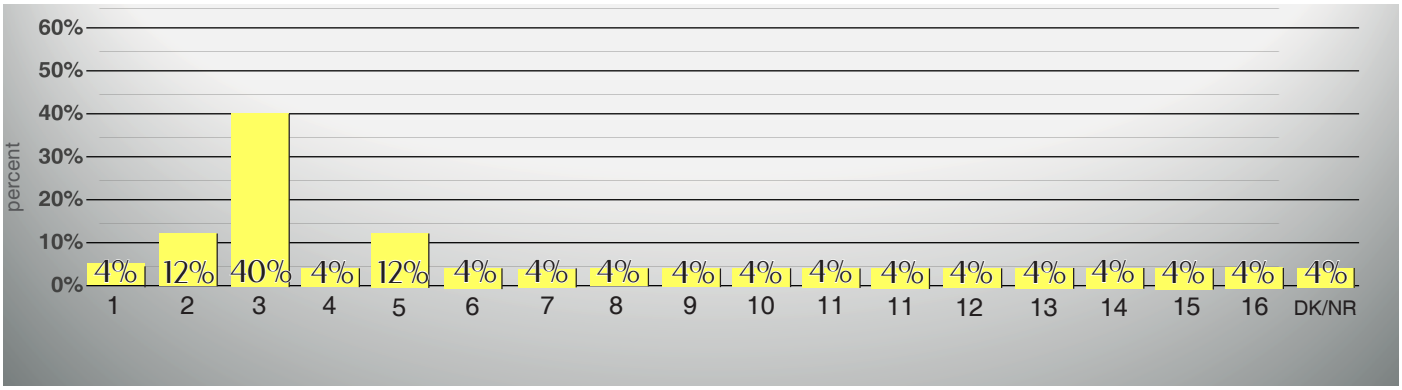


Figure 5.2 shows the number of AFM treatment sessions that study participants attended since the initial orientation session. Over 72% of all participants attended 5 or fewer sessions with the most common number of attended sessions being 3.

Figure 5.2: Approximately how many sessions have you attended?



We conducted some analysis to compare participants who, after the initial orientation session, attended further treatment sessions with those who did not. The analysis revealed no significant differences in the number of gambling activities reported by those who returned for further treatment sessions and those who did not, p>.05. Furthermore, the groups did not differ in their problem gambling severity as measured by their continuous PGSI scores, p>.05.

II) Factors Related to Help-seeking

The recruitment and enrollment of the general population and help-seeking groups at roughly the same time allowed us to compare the two groups on their baseline measurements. Since only 13% (n=4) of the problem gambling group from the general population sample reported ever using the problem gambling helpline or community problem gambling counselling services, we can assume that most individuals who had gambling problems in the general population were not seeking help. By comparing this group (i.e., non-help seekers) to those who actually sought problem gambling help through the AFM orientation session, we hope to uncover potential explanations for help-seeking.

To increase the sample size of the problem gambling group from the general population in this analysis, we included any participant who had gambling problems (i.e., PGSI score of 8 or more) at any point in the study period. Although, as we have seen, there was considerable movement between problem gambling levels over time: 83% of the problem gambling group were gambling with problems and 17% were gambling at moderate risk at baseline (see Table 5.3). This indicates that at the time at which we are making comparisons with the help-seeking group, the general population problem gambling group was generally gambling with problems.

Table 5.3: Baseline Help-Seeking PSGI Type Baseline General Population PGSI Type Among Problem Gamblers

PGSI Type	Help-seeking Group N=42	General Population Problem Gambling Group N=29
PGSI Type	**%**	**%**
Non-gambler	16.7	0.0
Non-problem gambler	9.5	0.0
Low-risk gambler	7.1	0.0
Moderate-risk gambler	11.9	17.2
Problem gambler	54.8	82.8
Mean PGSI Score (SD)	9.8 (8.0)	9.8 (4.1)

It needs to be noted that the low sample size for this analysis was limiting. The aim of this section is to highlight any statistically significant differences between the two groups that may go towards better understanding why people seek treatment but also any potentially significant findings had we had a larger sample. Regardless, the low sample size is clearly a limitation and further research will be absolutely necessary to substantiate any claims made in this section.

Demographic Profile

Table 5.4 presents the demographic characteristics of the help-seeking and general population problem gambling groups. The help-seeking group has a higher proportion of males compared to the problem gambling group (55% vs 32%), although this was not a statistically significant difference (p=.056).

Table 5.4: Demographic Characteristics of the Help - seeking and General Population Problem Gambling Groups

Demographic Characteristics	Help-seeking Group N=42	General Population Problem Gambling Group N=31
Gender		
Male	54.8	32.3
Female	45.2	67.7
Marital Status		
Single (never married)	28.6	32.3
Married	35.7	48.4
Common-law	11.9	3.2
Divorced or separated	16.7	16.1
Widowed	7.1	0.0
Employment		
Full-time	64.3	58.1
Part-time	4.8	19.4
Unemployed	9.5	6.5
Student	0.0	6.5
Retired	11.9	0.0
Homemaker	2.4	3.2
Disability leave	4.8	3.2
Other	2.4	3.2
Household income		
Less than $20,000	14.3	22.6
Between $20,000 and $39,999	28.6	19.4
Between $40,000 and $59,999	16.7	19.4
Between $60,000 and $79,999	16.7	9.7
Between $80,000 and $99,999	4.8	16.1
More than $100,000	11.9	9.7
Don't know/no response	7.1	3.2

* p<.05

As shown in Table 5.5, the general population group had a significantly higher past 6 week participation rate in playing instant-win/scratch tickets (48% vs 24%), raffle or fund-raising tickets (29% vs 10%), and bingo (23% vs 5%), p<.05. In general, it seems the general population problem gambling group gambled more than the help-seeking group over this period as they also reported gambling on significantly more activities than the help-seeking group (3 vs 2), p <.05. Further, while not statistically significant, in all activities except betting with a bookie and speculative stock trading, where both groups reported no past 6 week participation, the problem gambling general population group had higher participation rates.

The popularity of the activities, however, was relatively the same as indicated by the ranking of each activity's participation rate. The only notable differences were bingo and the internet, which ranked 6th and 7th, respectively, among the general population group, compared to 9th and 10th among the help-seeking group.

Table 5.5: Past 6 Week Gambling Participation

Gambling Activity	Help-seeking Group N=42	General Population Problem Gambling Group N=31
Lottery tickets	57.1	74.2
VLTs	52.4	67.7
Instant-win/scratch tickets*	23.8	48.4
Casino slots	16.7	29.0
Raffle or fund-raising tickets*	9.5	29.0
Sports Select	7.1	6.5
Casino dice or card games	7.1	6.5
Card games other than casino or internet	7.1	9.7
Bingo*	4.8	22.6
Internet	4.8	16.1
Sports pools	4.8	6.5
Outcome of professional sporting event, other than pools or Sports Select	0	3.2
Bookie to be on sporting events	0	0
Horse racing	0	6.5
Short-term speculative stocks or commodity purchases (e.g., day trading) but not including long-term investments	0	0
Mean total number of gambling activities (SD)*	**1.9 (1.6)**	**3.2 (2.0)**

* p<.05

When comparing the two groups on their endorsement of the individual PSGI items, we found the groups significantly differed on three items. As shown in Table 5.6, the help-seeking group was significantly more likely to report having felt that their gambling had caused financial problems for them or their household (46% vs 14%) and guilty about they way they gambled (57% vs 14%) most of the time or almost always, p<.05. On the other hand, the general population group was also more likely to have felt that their gambling had caused them some health problem, including stress and anxiety at some point during the past 6 months (97% vs 69%), p<.05.

These findings suggest that the type of consequences experienced from gambling may play a role in motivating people to seek help. In particular, it may be that when the consequences are financial or affect others (e.g., family), a person may be more likely to seek help. The lack of finances to gamble of course would be a strong impetus to stop gambling and seek help but so would the responsibility to their family or loved ones who would also feel the financial impact. This would be consistent with the finding that the help-seeking group felt more guilty about their gambling.

Individual health problems, on the other hand, may be less motivating because these effects are more mutable. Just as it is common to forgo seeing a doctor for every sickness one gets, people with gambling problems who suffer some kind of sickness may still feel they can get healthy on their own, or worse, use gambling to self-medicate. Furthermore, since these health problems are isolated and generally do not affect others, there is less added pressure to seek help.

Table 5.6: Past 6 week Problem Gambling Characteristics

PGSI Characteristics	Help-seeking Group N=35	General Population Problem Gambling Group N=29
Feel gambling has caused you any health problems, including stress or anxiety*		
Never	31.4	3.4
Sometimes	22.9	34.5
Most of the time/Almost always	45.7	62.1
Feel your gambling has caused you financial problems for you or your household*		
Never	25.7	41.4
Sometimes	28.6	44.8
Most of the time/Almost always	45.7	13.8
Feel guilty about the way you gamble or what happens when you gamble*		
Never	28.6	41.4
Sometimes	14.3	44.8
Most of the time/Almost always	57.1	13.8

Table 5.7 shows the proportion of individuals from each group who reported some family or friend assistance or support in the past 6 weeks to help the participant reduce their gambling or address their gambling problems.

It is notable that efforts by family members to encourage problem gamblers to address the issue are not infrequent events. Even among the general population, 45% reported that they received suggestions about ways of quitting or controlling gambling. A third indicated that a concerned significant other took actual steps to help them.

While it appears quite likely that participants from the help-seeking group were more likely to report that a family member or friend accompanied them to see someone about their gambling (26% vs 3%), the incidence of this occurring was too small to produce a statistically reliable result. A larger sample, however, may have shown a significant finding on this variable.

While we cannot say with statistical certainty, it would appear that overall, the help-seeking group had more of their family or friends help them in some way. Across all the behaviours, the help-seeking group generally had higher proportions of individuals who reported all the family/friend assistance situations at least once.

These results provide some, albeit very limited, evidence to suggest that assistance and support from family and friends may play a small role in helping or motivating people with gambling problems to seek assistance.

Table 5.7: Past 6 Week Family and Friend Assistance and Support

Behaviour	Help-seeking Group N=35	General Population Problem Gambling Group N=29
Family member/friend suggests ways you could quit or control your gambling	62.9	44.8
Family member/friend takes steps to get you to quit or cut down on your gambling	42.9	31.0
Family member/friend tell you how confident they are that you can quit or cut down on your gambling	50.0	27.6
Family member/friend accompanied you to see someone about your gambling	25.7	3.4
Family member/friend commented that gambling is a risky or bad habit	65.7	51.7
Family member/friend talk you out of gambling	28.6	34.5
Family member/friend participated in an activity to keep you from gambling	35.3	31.0
People tell you that you need to seek some sort of help for your gambling	42.9	37.9

A perceived inability to stop gambling was one of the consistent factors found to be related to gambling problems and transitions between gambling levels among our study sample. When comparing the help-seeking and general

population groups on this characteristic, we found no significant differences. Overall, the mean scores of their perceived inability to stop gambling were about the same (M=15) for each group (see Table 5.8). There was some evidence suggesting that the general population problem gambling group may be more likely to believe that they would never be able to stop gambling (28% vs 0%); however the cell counts were too low to make a statistically reliable conclusion.

Table 5.8: Past 6 Week Perceived Inability to Stop Gambling (Percent)

Behaviour	Help-seeking Group N=35	General Population Problem Gambling Group N=29
I can't function without gambling		
Disagree	80.0	89.7
Neither agree nor disagree	11.4	10.3
Agree	8.6	0.0
It is difficult to stop gambling as I am so out of control		
Disagree	45.7	65.5
Neither agree nor disagree	2.9	3.4
Agree	48.6	31.0
My desire to gamble is overpowering		
Disagree	34.3	55.2
Neither agree nor disagree	5.7	0.0
Agree	60.0	44.8
I am not strong enough to stop gambling		
Disagree	71.4	58.6
Neither agree nor disagree	8.6	6.9
Agree	20.0	34.5
I will never be able to stop gambling		
Disagree	91.4	72.4
Neither agree nor disagree	8.6	0.0
Agree	0.0	27.6
Mean inability to stop gambling score (SD)	**15.1 (6.9)**	**14.6 (6.9)**

We also compared the help-seeking and general population problem gambling groups on their rates of alcohol dependence and drug abuse. The results are shown in Tables 5.9 and 5.10. The help-seeking group had significantly higher proportions of individuals who drank at hazardous, harmful, or dependent levels (88% vs. 19%) (see Table 5.9). The results for the drug use suggests the opposite pattern in that it appears that a higher proportion of problem gambling group from the general population exhibited some level of drug abuse (19% vs 5%), although due to the low cell counts we cannot draw a statistically reliable conclusion (see Table 5.10).

Table 5.9: Past 6 Week Drinking

AUDIT Measures***	Help-seeking Group N=42	General Population Problem Gambling Group N=31
AUDIT Type		
No problem/moderate drinking (0-7)	11.9	80.6
Hazardous/harmful/alcohol dependent drinking (8-15)	88.1	19.4
Mean AUDIT Score (SD)	**9.7 (4.7)**	**3.7 (3.6)**

* p<.001

Table 5.10: Past 6 Week Drug Use

DAST Measures	Help-seeking Group N=42	General Population Problem Gambling Group N=31
DAST Type		
No problem	95.2	80.6
Low level – Very high level	4.8	19.4
Mean DAST Score (SD)	**.04 (.21)**	**.87(2.3)**

Lastly, we compared the rates of psychological distress among the two groups and found no differences in the BSI scores for somaticism, depression and anxiety or overall distress (see Table 5.11).

Together these results suggest that help-seeking in associated with greater likelihood of alcohol problems perhaps but not greater psychological distress. Help-seekers report more financial problems and more likelihood that family and friends are actively supporting reduction in gambling involvement.

Table 5.11: Psychological Disorder

Psychological Disorder	Help-seeking Group N=42	General Population Problem Gambling Group N=31
	mean (SD)	mean (SD)
Somaticism score	8.9 (4.6)	9.9 (4.7)
Depression score	12.2 (6.2)	12.4(5.9)
Anxiety score	10.5 (5.7)	11.2 (5.4)
Global Severity Index Score	31.6 (14.5)	33.5 (14.0)

Chapter 6

Discussion and Conclusion

Broadly speaking, the objectives of this study were to examine changes in problem gambling over time and to gain insight into why people seek help for their gambling problems. For these objectives, we recruited two populations of gamblers. The first sample was recruited from the Addictions Foundation of Manitoba (AFM) general population prevalence study and consisted of 347 adults with gambling problems or low or moderate risk for gambling problems. The second sample consisted of 42 adults who sought help for their gambling problems by attending a gambling orientation session held by the AFM.

Gambling Involvement and Changes in Problem Gambling

Perceptions of Changes in Gambling Involvement

About 6 in 10 study participants from the general population felt that their gambling frequency had not changed in the past year. Between 20% and 30% believed their gambling decreased while 5% to 11% thought it increased. With respect to the past 5 years, 38% felt their gambling increased "a lot". The most commonly cited reasons for this large increase was personal, work, and financial issues (36%) and newly available gambling opportunities such as slots and VLTs. Personal, work, and financial issues were cited by 80% of the gamblers with problems in the general population sample.

Not surprisingly, the perceptions of past gambling among the help-seeking participants revealed much greater increases in gambling participation. Almost 6 in 10 reported their gambling increased in the past year. While this increase corresponded to an increase in the amount of money spent gambling it was not associated with a higher number of gambling activities. This suggests that their concerns about their gambling, which presumably motivated them to seek help, probably stemmed from participation in one or a few preferred gambling activities. The problem gamblers among the general population group reported greater involvement in bingo and instant scratch tickets, which might suggest that the current treatment options may not attract individuals with these concerns. In terms of the past 5 years, almost the entire help-seeking group (93%) said there had been a time when their gambling increased "a lot". The most common reasons given for the large increase were similar to the ones given by the general population group; that is, personal, work, and financial issues as well as newly available gambling opportunities.

Changes in Problem Gambling from Baseline to Follow-up

Participants from the general population group showed much volatility in their problem gambling severity over the course of study. Grouped according to PGSI problem gambling severity levels, participants showed great movement between levels from baseline through to each of the follow-up assessment waves. Participants who gambled without problems at baseline were the most likely group to continue gambling in the same way throughout the study while the risky and problem gambling groups exhibited a consistently high rate of change in levels of problem gambling. The non-gambling participants showed the greatest volatility in problem gambling levels and unlike the other groups, did not show a general linear trend towards increasing or decreasing problem gambling. This finding is not surprising given that these individuals, while not gambling at the baseline assessment for this study, were gambling at some level during the initial AFM survey. This volatility may indicate some ambivalence towards gambling as participants moved from risky or problematic levels to non-gambling levels throughout the course of the study.

The analysis of our gamblers from the general population shows that risky or problematic gambling is not a constant condition and that a gambling level prognosis can change in as little as 3 months. Overall, the results indicate a general improvement over the course of one year for risky or problem gambling. These conclusions are consistent with an emerging body of literature that claims that problem gambling is not static or chronic but instead, seems to improve on its own over time (e.g., Slutske, Jackson, & Sher, 2003; Slutske, 2006; Wiebe, Cox, & Falkowski-Ham, 2003; Abbott et al., 2004).

It is notable that over 80% of both the treatment-seeking group and the most severe problem gamblers in the general population attributed the increase in gambling to personal issues. Availability of gambling opportunities were less likely to be cited, although the results did indicate that availability was important.

It is interesting, however, that more people in the general population improved than declined in the follow-up interval. This trend may suggest that the overall past year prevalence of gambling problems has shrunk. More likely, however, this improvement trend reflects a subtle recruitment bias. It has previously been found that community individuals suffering from gambling problems will use participation in research as a non-threatening way to begin to address the issue (versus fully acknowledging a problem and seeking treatment) (Hodgins & el-Guebaly, 2000). A recent study has also shown that the prevalence of gambling problems is higher in random digit dialing studies that acknowledge to potential participants that the study is on the topic of gambling versus

presenting the survey as focusing on leisure or health functioning (Williams & Volberg, 2009). It may be that participants in this sample who were struggling with gambling were more likely to participate and, therefore, the volatility was expressed as general improvement.

The volatility found in risky and problem gambling begs the question of how exactly these changes occur. That is, what does the change in these gambling levels look like in terms of what the individual experiences? This study measured problem gambling with the PGSI, which measures the extent to which respondents experienced specific attitudes or feelings (e.g., guilty), behaviours (e.g., chasing losses), or consequences (e.g., financial problems). When someone reaches a level of problem gambling, it has likely developed from earlier levels of risky gambling where the individual may, for instance, have felt they might have a problem with their gambling or chased losses once in a while. Their gambling usually becomes problematic when they experience the same characteristics but to a greater frequency or experience new, additional characteristics that compound their old problems (e.g., health or financial problems).

The study results also suggest that people with gambling problems can recover or improve in approximately a year. They do not, however, show longer term (1 year +) patterns. While there may have been improvement over the course of the one year study period, it is possible that this pattern may be part of a longer term trend where problem gambling is experienced as a type of roller coaster ride with interspersed periods of no gambling, no problem gambling, or problem gambling. The finding that the baseline non-gamblers showed the greatest volatility in problem gambling level movement suggests that non-gambling behaviour can be fleeting and tenuous.

It is certainly possible that participants with gambling problems who have improved in this study may exhibit problems one or more years after the study. If so, have they really improved or recovered from gambling or are they simply in a temporary respite that is a part of a larger cycle that oscillates between the various levels of problem gambling? This model of addictions as chronic relapsing disorders requiring long term monitoring has been applied to alcohol dependence (McLellan, 2006). If true, we may have to reconsider the notion of problem gambling transition and stability. Although problem gambling has certainly been shown to be a fluid condition, this fluidity may be a part of a longer-term consistent trend where non-problem gambling and problem gambling are never really completely sustained, yet always just around the corner. In this sense, it could be argued that problem gambling does display some consistency and stability. Longitudinal studies for longer periods of time than one year would be needed to investigate this possibility.

Predictors of Problem Gambling

The regression analyses indicate that of all the examined factors, only a perceived inability to stop gambling and illusion of control emerged as significant predictors of problem gambling at some point in all our analytical approaches; that is, whether prospective or concurrent predictions were done or whether problem gambling was measured continuously or a categorically. A perceived inability to stop gambling, however, was significant throughout all the conditions of the study including at each individual assessment wave prediction (e.g., 12 week concurrent prediction, 48-week from 36-week prospective condition). This finding argues for a conceptual model of problem gambling that places impairment of control as a central and organizing feature (Corless & Dickerson, 2006). The value of such a model may be that it would help focus our treatment development efforts, both psychosocial and pharmacological treatments, at reducing impairment of control as a therapeutic mechanism.

This predictive strength of perceived inability to stop gambling for problem gambling also suggests that notions such as self-efficacy and self-empowerment may play important, even crucial, roles in problem gambling recovery. Future research needs to examine the factors that are related to these perceptions and how to address and use them in prevention and treatment strategies. Knowledge in this area may even be useful for increasing problem gambling treatment uptake. Advertising for treatment could incorporate ideas and messaging around how treatment can combat feelings of hopelessness and despair as these emotions are likely to prevail in the minds of individuals who are having trouble alleviating their problem gambling on their own.

Number of gambling activities, alcohol dependence, and illusion of control appear to be both significant concurrent

and prospective predictors of problem gambling as a discrete category. When we looked at problem gambling as a continuous score, we found that gambling frequency, alcohol dependence, number of gambling activities, gender, and depression predicted problem gambling both concurrently and prospectively.

Interestingly, interpretive control/bias was found to be a significant prospective, but not concurrent, predictor, whether problem gambling was measured categorically or continuously. This cognition was also found to significantly predict a worsening in levels of problem gambling. This cognitive distortion is targeted for correction in some types of problem gambling treatment. (e.g., Ladouceur et al., 2001).

Our bivariate analyses did not take into account the interrelationships between the numerous factors. We therefore conducted latent growth curve modeling analysis, which provides a richer, more complex description of the relationship between problem gambling and the factors over the course of the study. The findings highlight the importance of looking beyond a single cross-section of gambling behaviour because to do so, can mask important longitudinal associations. While factors such as depression, illicit drug abuse, interpretive control/bias, and perceived inability to stop gambling predicted higher levels of problem gambling at baseline, they were also associated with a faster rate of decline in problem gambling over the longer term. Alcohol abuse, on the other hand, was only related to higher initial baseline levels of problem gambling. These findings suggest that while these variables can be important risk factors for problem gambling at any point in time, some can also turn into protective factors over the longer run.

The idea that depression or illicit drug use can protect one from problem gambling is misleading however. These characteristics are obviously not healthy alternatives and can be quite harmful. Given the high rate of gambling co-morbidity with depression and illicit drug use (Petry & Weinstock, 2007), the literature on gambling and self-recovery may suggest a more optimistic picture than what may actually be occurring. It is tempting to romanticize the individual who heals themselves from their gambling problems because it implies self-sufficiency, strength and empowerment; characteristics that are highly valued in our society. And according to some researchers (e.g., Slutske, Jackson, & Sher, 2003) this may be the rule rather than the exception. While individuals may recover from their gambling problems, they could still be far from healthy if they “hop” or “switch” to other ailments (LaPlante et al., 2008). These individuals then have not truly recovered; their problems persist but in a different guise. This finding supports the need for broad-based treatment outcome assessment including assessment of comorbidity, mental health and quality of life (Walker et al., 2006)

The replacement of gambling problems by another problem also has implications for understanding the low utilization of problem gambling treatment. On the one hand, people who “self-recover” from their gambling problems simply do not need treatment. On the other hand, if their problem gambling has been replaced by another problem, it is possible that some of these individuals are seeking treatment for the replacement. Thus, people with gambling problems may be seeking treatment, just not for their gambling problems. Furthermore, those in such treatment may not be getting assistance for their gambling problem which may be deeply intertwined with their other problems. Addressing gambling along with their other problems may be the only way towards true recovery. Non-problem gambling assistance services (e.g., depression) then need to be aware of this possibility and probe for current and previous gambling related problems

Our modeling analyses have highlighted the value of trying to identify inter-individual differences in individual rates of change. Such approaches are likely to point the way to key outcomes such as who is at greatest risk of becoming a problem gambler over time, as well as indications of what kinds of mechanisms (e.g., cognitions, or treatment of an associated co-morbidity) are most likely to lead to prevention or minimization of problem gambling.

Although these findings are highly suggestive of gambling behaviour lying along an underlying continuum rather than reflecting categories of risk behaviours, a fruitful avenue for future research will be to examine whether there are distinct latent classes of gambling trajectories over time.

Problem Gambling Assistance and Help-Seeking Behaviour

Participants from the general population group generally seemed receptive to problem gambling assistance as almost all revealed a willingness to seek help over concerns about their own gambling. Moreover, the current findings suggest a fairly high awareness of problem gambling assistance services; particularly the problem gambling helpline (74% for helpline; 38% for counselling services)

The actual use of problem gambling services told a different story though, with about 1 in 10 people with gambling problems in the general population indicating that they had ever used the problem gambling helpline or community counseling service. Similar results have been found in other general population surveys (Cunningham, 2005; Suurvali et al., 2008).

The low sample sizes limited our analysis and the results at best, are exploratory and preliminary but they may provide some direction for understanding why people seek help with their gambling problems. Firstly, it appears from the results that the consequences of gambling may have some effect on people's motivation to seek help. Specifically, financial problems may be more of a motivating factor than health problems. This may be due to financial problems having a much greater capacity to undermine the ability to gamble (i.e., cannot gamble without money) and affect other people in the gamblers' lives (e.g., family finances). Health problems, on the other hand, unless completely debilitating, have less effect on the ability to gamble and indeed, may even encourage gambling if the individual gambles to self-medicate or distract themselves from pain or boredom. Furthermore, unless severely mentally or physically disabling, health problems may be perceived as more permeable and self-repairable without the need of professional assistance. This interpretation is consistent with the "rock-bottom" theory in that people may have to experience very severe gambling problems or breakdown for them to seek help (see Hodgins & el-Guebaly, 2000; Suurvali et al., 2008).

The treatment-seeking individuals in this sample were assessed within the first month after they attended the Treatment Orientation session. At that point, while the majority scored in the problem gambling range, a but a significant group scored in the non p range scored in the non-problematic range. In fact, 17% were abstinent and a further 16.5% were either in the low risk or the non-problem gambling range. Rapid early improvement in gambling problems has not yet been studied although the "sudden gains" phenomena has garnered interest in substance abuse and mental health disorders (e.g., Hardy et al., 2005; Ilardi & Craighead, 1999; Stiles et al., 2003) Early change in drinking and eating disorder behaviours has been found to predict longer term positive outcome (Breslin et al., 1997; Fairburn et al., 2004). Our sample is too small to examine this phenomenon in detail although only one of the 14 individuals who were "early responders" had relapsed to problem gambling at three months, suggesting that early response is a positive prognastic indicator. Rapid early responding may have implications for how we structure out treatment services with quick and easy access prioritized and the use of poor initial response as an indicator of the need for more intensive intervention. Such stepped care models have been recommended for gambling treatment systems (Hodgins, 2004).

The treatment sample revealed two important findings. First, it confirmed a truism of mental health and addictions treatment – most clients attend very few sessions; in this case the mode was three sessions. However, the study also painted a positive picture of treatment effectiveness. By three months, over half of the sample was abstinent and only 19% were categorized as problem gamblers and 9.5% as moderate risk gamblers. Of course, a longer term follow-up with larger sample is required to understand fully the post-treatment course. The findings from the general population sample suggest that a substantial amount of volatility is expected after three months, even if the overall pattern is maintained improvement.

Demographic characteristics did not predict which individuals attended a lesser or greater number of treatment sessions. Similarly, a comparison of the treatment-seeking sample and the problem gamblers in the general population sample, mostly non-treatment-seeking individuals, did not find large demographic differences. These findings are consistent with the notion that it is not specific types of individuals who seek treatment but rather individuals seek treatment at different phases of their problem development. Willingness to seek treatment and perceived need to seek and continue treatment

are likely more fluid versus static individual characteristics. This is consistent with the finding that 57% of the help-seeking group reported that their gambling increased over the past year compared to 7% of the general population group. This is likely an important factor in why the treatment group chose to seek help.

Further research is required to understand how individuals approach treatment. Do they see themselves as helpless subjects for whom treatment is the cure for an unmanageable problem or are they powerful agents who use treatment as one of many tools they employ on a self-directed road to recovery? The answers to these questions are important for understanding the impressions that people with gambling problems have of treatment. Such knowledge will aid in converging their impressions with the realities of the treatment, as well as tailoring treatment outreach programs that will speak and appeal to the specific needs and situations of gamblers with problems.

Although a larger sample size would definitely be needed to confirm this conclusion, there was an indication that help-seekers tended to receive some kind of support from family and friends in addressing their gambling or gambling problems. In particular, 25% of the help-seeking group in this study reported that a family member or friend physically accompanied them for help compared to only 3% of the general population problem gambling group. It seems plausible that support, and encouragement from significant others would help to motivate some people with problems to seek help. If this is true, it would also alternatively suggest that those with problems who consequently become isolated may be even at greater risk of not seeking help.

Perceived inability to stop gambling was another factor found to be consistently related to people's gambling and changes in their levels of gambling. There was some evidence to suggest that people who felt that they could not stop gambling were also less likely to seek help. Although the desire to handle problems on their own was found to be among the strongest barriers to help-seeking (Hodgins & el-Guebaly, 2000), increasing self-efficacy, self-confidence or simply hope in some cases may be the first step towards getting people to seek help.

There was evidence to indicate that help-seeking behaviour among gamblers with problems may also be related to problematic alcohol consumption. This suggests that gamblers with problems may be more likely to seek help when they feel their problems have been compounded by alcohol use. This association may relate, in part, to the fact that gambling treatment is offered as part of the addictions (i.e., substance abuse) treatment system as opposed to the mental health treatment system. Perhaps, gambling treatment is seen as more accessible to individuals who may have used, or considered using, substance abuse treatment, by targeting their problematic alcohol consumption.

Problem gamblers in both the treatment and general population samples reported that family members and friends frequently provided support. Would targeted media campaigns with images of hope and effeciancy of change (eg. people do change!) be more effective than campaigns that advertise treatment availability?

In this general population sample, awareness of services was high - 74% were aware of the AFM helpline whereas self-confidence in ability to stop gambling was low. Clearly, awareness is not enough. Belief in the ability to change is more important.

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Comparisons of Participants and Non-Participants

Refused vs Agreed to be Contacted for Future Research at the time of AFM Prevalence Study

	At-risk In-study Sample (n=346)	At-risk Non-consenting Sample (n=322)	More information
Proportion of men/women	59% female 41% male	56.5% female 43.5% male	Chi-square analysis: Not sig p=.52
T-test on age in years	Mean: 43.4 St. dev: 14.4 St. error mean 0.8	Mean: 43.8 St. dev: 16.6 St. error mean 0.9	T-test for equality of means: Equal variances assumed : t:-3.18 Not sig p=.75
Chi-square for marital status	(some categorical proportion examples): Single: 44.4% Married: 58.2%	(some categorical proportion examples): Single: 55.6% Married: 41.8%	Chi-square analysis: Sig p=.03
Chi-square for highest level of education	(some categorical proportion examples): Some HS or less: 50.5% Completed Bachelor degree: 53.4%	(some categorical proportion examples): Some HS or less: 49.5% Completed Bachelor degree: 46.6%	Chi-square analysis: Not sig p=.49
Chi-square for personal income	(some categorical proportion examples): Less than $20,000: 54%	(some categorical proportion examples): Less than $20,000: 46%	Chi-square analysis: Not sig p=.19
t-test on continuous PGSI score	Mean: 2.9 St. dev: 3.1 St. error mean 0.2	Mean: 3.2 St. dev: 3.6 St. error mean 0.2	T-test for equality of means: Equal variances assumed : t:-1.2 Not sig p=0.22
Chi-square on PGSI categories	(some categorical proportion examples): Low risk: 52.7% Moderate risk: 50.5% Severe problem: 50%	(some categorical proportion examples): Low risk: 47.3% Moderate risk: 49.5% Severe problem: 50%	Chi-square analysis: Not sig p=.85
t-test on total AUDIT score	Mean: 5.1 St. dev: 5.3 St. error mean 0.3	Mean: 5.8 St. dev: 5.8 St. error mean 0.3	T-test for equality of means: Equal variances assumed : t:-1.5 Not sig p=0.14
t-test on total DAST score	N/A	N/A	Did not use DAST in survey.

Note: We could not locate one identifier, therefore our sample is 346 (not 347).

Refused vs Agreed to Participate in the Current study

	Non-participants (n=218)	Participants (n=347)	More information
Proportion of men/women	57% female 43% male	59% male 41% female	Chi-square analysis: Not sig p=.56
T-test on age in years	Mean: 42.6 St. dev: 16.5 St. error mean: 1.1	Mean: 43.6 years St. dev: 14.4 St. error mean:.8	T-test for equality of means: Equal variances assumed: t=-.73 Not sig p=.47
Chi-square for Marital status	(some categorical proportion examples) Single: 28% Married: 49%	(some categorical proportion examples) Single: 24% Married: 51%	Chi-square analysis: Not sig p=.53
Chi-square for highest level of education	(some categorical proportion examples) Completed high school: 34% Completed post-secondary: 28%	(some categorical proportion examples) Completed high school: 25% Completed post-secondary: 36%	Chi-square analysis: Not sig p=.13
Chi-square for personal income	(some categorical proportion examples) Less than $20,000: 28% $20,000 - $39,999: 40%	(some categorical proportion examples) Less than $20,000: 31% $20,000 - $39,999: 39%	Chi-square analysis: Not sig p=.26
t-test on continuous PGSI score	Mean: 3.2 St. dev: 3.6 St. error mean: .24	Mean: 2.9 St. dev: 3.1 St. error mean: .17	T-test for equality of means: Equal variances assumed: t=1.2 Not sig p=.23
Chi-square for PGSI categories	(some categorical proportion examples) Moderate risk: 32% Problem gambling: 8%	(some categorical proportion examples) Moderate risk: 28% Problem gambling: 9%	Chi-square analysis: Not sig p=.62
t-test on AUDIT score	Mean: 5.1 St. dev: 4.4 St. error: .30	Mean: 4.9 St. dev: 4.9 St. error:.26	T-test for equality of means: Equal variances assumed: t=.44 Not sig p=.66
t-test on DAST score	Mean: 0.0 St. dev: 0.0 St. error: 0.0	Mean: .25 St. dev: .75 St. error: .04	T-test for equality of means: Equal variances not assumed: t=-6.3, Sig p=.00

Examples of survey questions

Network Influences on Gambling Items

Thinking about the last (6 weeks), would you say you:
Response Options: Never, Once, 2 or 3 times, 4 or 5 times, 6 or more times

1. Have had people telling you that you need to seek some sort of help for your gambling?

2. Have gambled with a family member or a friend?

3. Have had a family member or friend suggest ways you could quit or control your gambling?

4. Have had a family member or friend take steps to get you to quit or cut down on your gambling?

5. Have had a family member or friend tell you how confident they are that you can quit or cut down on your gambling?

6. Have had a family member or friend accompany you to see someone about your gambling?

7. Have had a family member or friend comment that gambling is a risky/bad habit?

8. Have had a family member or friend talk you out of gambling?

9. Have had a family member or friend comment on your lack of willpower?

10. Have had a family member or friend participate in an activity with you to keep you from gambling?

Gambling Management

In the past (6 weeks), how often did you do the following to manage your gambling?

- Never
- Occasionally
- About half the time
- Most of the Time
- All of the time

1. Limit amount of time playing

2. Limit how often you play

3. Reduce the bet level per wager

4. Restrict access to additional cash

5. Play with friends and or family present

6. Have spouse or someone else control your finances

7. Get involved in other activities instead of gambling

8. Set a predetermined spending limit or budget where you decided in advance how much you would spend gambling (if yes)

8a. What percentage of the time that you set a budget did you exceed it?

- 0%
- 1%-25%
- 26%-50%
- 51%-75%
- 76%-100%

9. Can you think of anything else you did to manage your gambling? (Open-ended)

Changes in Gambling/Awareness of PG

Instructions:

Question 1 and 2 asked only at time 1
Questions 4, 5, 6 and 7 asked at time 1 and the last survey (time 9 for 75% of the sample, time 5 for 25% of the sample)

Question 3 asked at all times

1. In the past 5 years, has there ever been a time

when your participation in gambling increased substantially (this could be time spent gambling or money spent on gambling)

NO (go to question 3)
YES

i) when was this? _____ years ago or _____months ago

ii) what was the activity?

ii) (what do you think are the reasons it increased?) (DO NOT READ LIST)

a) New Slot Machines
b) New types of electronic games
c) New Casino
d) New Bill Acceptors
e) Faster Machines
f) Extended Hours
g) Personal Problems
h) Financial Problems
i) Change in social activities
j) Change in friends or family
k) Other (specify)

2. Please tell me if your participation in gambling increased as a result of the following:

l) New slots and/or VLTs - both slots and VLTs are electronic gambling machines… however, slots are in casinos whereas VLTs are in restaurants, bars, lounges, etc).
m) New types of slots and/or VLTs
n) New Casino
o) New Bill Acceptors on machines
p) Faster Machines
q) Extended Hours
r) Life circumstances not related to the availability of gambling opportunities.

3. In between the time of this survey and the last one that you participated in (approximately X months) have there been any changes in your gambling in terms of

a. How Often you Gamble
Decrease
Increase
NO change
(if increased or decreased:)

i) Was this a decision you made or did it just happen?
Decision____
Just Happened_____

ii) What do you think led to this change? (open ended)

b. How much you spend?
Decrease
Increase
NO change
(if increased or decreased)

i) Was this a decision you made or did it just happen?
Decision____
Just Happened_____

ii) What do you think led to this change? (open ended)

4. If you were concerned with someone else's gambling would you seek help?

YES (where)
NO (why not)

5. If you were concerned with your own gambling would you seek help?

YES (where)
NO (why not)

6. Are you aware of a toll free gambling help line in Manitoba?

Yes (have you ever used it)
No

7.Are you aware of any gambling counselling services available in your community?

Yes (have you ever used them)
No

Variable	Mean	Standard Deviation	Minimum	Maximum	Skewness	Kurtosis
Demographics						
Age at baseline	43.55	14.40	18	83	.264	-.517
Personal Income	3.12	2.58	1	15	2.22	6.30
Personality						
BSI Anxiety baseline	8.09	3.16	6	26	2.66	8.81
BSI Anxiety 12-week	7.95	2.46	6	20	1.77	3.81
BSI Anxiety 24-week	7.95	3.09	5	26	2.83	10.20
BSI Anxiety 36-week	7.46	2.31	6	20	2.62	8.58
BSI Anxiety 48-week	7.47	2.45	6	23	3.06	12.28
BSI Depression baseline	8.03	3.43	6	26	2.50	6.82
BSI Depression 12-week	7.71	2.56	6	19	2.11	4.87
BSI Depression 24-week	7.87	3.35	6	24	3.00	10.22
BSI Depression 36-week	7.31	2.57	6	21	2.85	8.72
BSI Depression 48-week	7.43	2.60	6	24	2.99	11.46
BSI Somatization baseline	8.08	3.12	6	27	2.27	6.22
BSI Somatization 12-week	7.55	2.36	6	17	2.07	4.27
BSI Somatization 24-week	7.69	2.92	6	25	2.93	10.64
BSI Somatization 36-week	7.31	2.14	6	18	2.10	4.93
BSI Somatization 48-week	7.52	2.42	6	19	2.30	5.57
Gambling Related Cognitions						
CRCS-Total Score_00	40.04	17.26	23	105	1.37	1.34
CRCS-Total Score_12	35.79	14.92	19	95	1.50	1.87
CRCS-Total Score_24	35.09	14.02	23	98	1.40	1.63
CRCS-Total Score_36	33.74	13.64	23	85	1.53	1.88
CRCS-Total Score_48	33.74	14.09	23	84	1.67	2.12
CRCS-Expectancies_00	8.71	4.57	4	25	.85	-.13
CRCS-Expectancies_12	7.92	4.54	3	25	1.26	1.14
CRCS-Expectancies_24	8.02	4.52	4	22	.98	.03
CRCS-Expectancies_36	7.78	4.57	4	22	1.28	.83
CRCS-Expectancies_48	7.78	4.35	4	21	1.07	.29
CRCS-Interpretive Control Bias_00	7.41	4.52	4	26	1.42	1.40
CRCS-Interpretive Control Bias_12	6.08	3.68	2	22	2.14	4.26
CRCS-Interpretive Control Bias_24	6.30	3.70	3	23	1.84	3.03
CRCS-Interpretive Control Bias_36	5.85	3.54	4	20	2.04	3.45
CRCS-Interpretive Control Bias_48	5.82	3.62	4	22	2.27	4.79
CRCS-Illusions of Control_00	5.47	2.86	4	18	2.24	4.62
CRCS-Illusions of Control_12	4.85	2.14	3	16	2.92	8.67
CRCS-Illusions of Control_24	4.68	1.91	3	22	4.45	29.05

Variable	Mean	Standard Deviation	Minimum	Maximum	Skewness	Kurtosis
CRCS-Illusions of Control_36	4.52	1.57	4	15	3.86	16.97
CRCS-Illusions of Control_48	4.74	2.03	4	14	3.06	9.01
CRCS-Inability to stop Gambling_00	7.42	4.69	5	27	2.24	4.28
CRCS-Inability to stop Gambling_12	7.10	4.34	3	28	2.79	8.11
CRCS-Inability to stop Gambling_24	6.63	3.45	4	25	2.70	7.97
CRCS-Inability to stop Gambling_36	6.69	3.36	5	25	2.81	9.06
CRCS-Inability to stop Gambling_48	6.41	3.56	5	31	3.52	14.89
CRCS-Predictive Control_00	11.02	5.66	6	29	1.16	.59
CRCS-Predictive Control_12	9.84	5.11	5	26	1.42	1.16
CRCS-Predictive Control_24	9.47	4.87	6	31	1.64	2.60
CRCS-Predictive Control_36	8.91	4.76	6	27	1.98	3.50
CRCS-Predictive Control_48	8.99	4.92	6	35	2.04	4.89
PGSI Scores						
PGSI_00	1.59	3.18	0	23	3.11	12.19
PGSI_12	.96	2.09	0	11	2.68	7.00
PGSI_24	.84	2.05	0	12	3.21	10.66
PGSI_36	.66	1.59	0	8	3.00	9.02
PGSI_48	.81	2.08	0	15	3.54	14.62
Gambling Behaviours						
Number of Gambling Activities_00	2.38	1.63	0	10	.78	.93
Number of Gambling Activities_12	2.29	1.61	0	11	.90	2.02
Number of Gambling Activities_24	2.00	1.62	0	7	.68	-.04
Number of Gambling Activities_36	1.98	1.69	0	7	.71	-.11
Number of Gambling Activities_48	1.77	1.62	0	7	.80	.28
Gambling Frequency_00	.75	1.07	0	9	2.35	10.74
Gambling Frequency_12	.70	.95	0	7	1.82	5.70
Gambling Frequency_24	.47	.83	0	5	1.99	4.23
Gambling Frequency_36	.45	.84	0	5	2.30	5.84
Gambling Frequency_48	.44	.85	0	5	2.29	5.73
Alcohol Use						
Drink_00	2.98	2.68	0	12	1.00	.47
Drink_12	2.94	2.56	0	12	.96	.33
Drink_24	2.82	2.52	0	12	1.03	.53
Drink_36	2.72	2.35	0	11	.97	.30
Drink_48	3.15	3.36	0	24	2.54	8.86
Drug Use						
Drugs_00	.46	1.38	0	10	3.60	14.74
Drugs_24	.22	.67	0	3	3.10	8.78
Drugs_48	.25	.93	0	7	4.32	20.80