

**A Multinomial Logistic Regression Analysis of Youth Gambling in Manitoba Using Cycle 2
of the Manitoba Longitudinal Study of Young Adults**

By

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Abstract

Problem gambling is still a relatively new form of addiction in terms of the amount of research that has been put into it. The data is even scarcer when it comes to the young adult population. This project takes a quantitative approach to analyze problem gambling of young adults in Manitoba, Canada. Utilizing the Manitoba Longitudinal Study of Young Adults, the project examines several biological, psychological, and social variables using logistic regression to assess which variables are more or less likely to be associated risk factors for young adults and the issue of problem gambling. The overall finding is that problem gambling is a multi-faceted problem that encompasses biological, psychological, and social factors, and that simply addressing one aspect is not enough to fully understand and treat the addiction syndrome.

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CHAPTER 1

INTRODUCTION

In recent years gambling has emerged from the margins to become a mainstream form of entertainment. Widespread legalization and technological advancements have facilitated unprecedented access to gambling, in both online and other forms. As part of this, gambling is increasingly marketed towards young adults as a rite of adulthood. Concomitant with greater access is increased risk of gambling addiction, which similar to other addictions, such as drugs and alcohol, can cause serious negative social and mental health consequences. Young adults, or “emerging adults,” are in a transitional developmental period of life marked by increased exploration and experimentation and so may be particularly prone to addiction issues (Sussman & Arnett, 2014).

The main research objective of this project is to identify whether or not certain factors are more or less likely to predict young adults’ likelihood of being categorized as an at-risk or problem gambler versus a no-risk/non-gambler. Given what is known and studied on the topic of problem gambling, this project seeks to further contribute to the knowledge of the subject by looking at a population that is understudied in gambling research, namely young adults in the 18-25 year age range.

A brief history of gambling in Canada

Gambling behaviours are learned socially at a young age. Research from the United States and Canada shows that even before reaching the legal gambling age (varies from 18 to 21 in North America), many teens have already engaged in some form of games of chance (Marshall and

Wynne, 2004). Gambling is a multi-culture phenomenon that has evolved throughout history, and Canada is no exception.

In Canada, gambling has followed a unique trajectory. It began as a simple activity among citizens, became completely outlawed at one point, before eventually becoming an accepted part of mainstream life. As early as 1497, John Cabot found Indigenous populations who participated in games of chance (problemgambling.ca, 2011). By the late 19th century, however, gambling was seen as an immoral and criminal activity. This was in large part due those who were deemed excessive gamblers (Campbell and Smith, 2003: 122). In 1892, the Canadian Criminal Code imposed a complete ban on all gambling activities (problemgambling.ca, 2011). But over the course of the last century, various games of chance came to be increasingly accepted as public attitudes changed across regional, socio-cultural, and ethnic lines.

Gambling in Canada became legal in 1969 due to landmark amendments to the Criminal Code. Under these amendments, the federal government could conduct and manage lottery 'schemes' and authorize charitable and religious groups to do likewise under license (Campbell and Smith, 1998: 23). Subsequent amendments throughout the latter half of the century, most notably in 1985, further allowed for different forms of gambling activities to take place. In 1985, the provinces consolidated control over gambling provision with an amendment giving them exclusive jurisdiction. This change in both public perception and government policies contributed to widespread acceptance of gambling as a legitimate recreational activity, and at the same time, a revenue-generating tool for the provincial governments. Gambling, in the eyes of the government regulators was, similar to alcohol and other potential vices, an issue of moderation. In other words, as long as individuals in society could police themselves in the frequency and amount per play, gambling would not be harmful to society or the individual.

Today, no longer illegal, gambling has transitioned from the margins to the mainstream. There is greater responsibility and authority over gambling matters exercised by provincial governments, who have generally continued to relax regulations (Campbell and Smith, 2003). However, as Reith (2007) points out, for the individual there exists a paradox. On one hand, they are encouraged by the government and subsequently others in society to consume and give into urges for self-fulfillment through gambling. On the other hand, they are to exercise self-control and restraint. Furthermore, with regard to this idea of recreational consumption, the message of individual responsibility and self-regulation became central; the individual was responsible for their own fate at the tables. What problem gambling seems to be then is a problem of inappropriate consumption, namely a lack of control (Reith 2007: 40). It suggests that the governments assumed that relaxation of the gambling rules would produce individual gamblers who would, given such increased freedom, be able to effectively manage their gambling through self-control.

Who are young adults and why study them?

First, it is necessary to define what demographic segment of the population I am referring to when the term “young adult” is used. A broad review of the literature reveals no apparent or definitive cut-offs regarding what age or age range constitutes ‘youth’ versus ‘young adulthood’ (Messerlian and Derevensky, 2005). But based on a majority of the literature, the term ‘youth’ typically denotes a person between the ages of 12 to 17 years old (Derevensky and Gupta, 2000; Derevensky and Gupta, 2004; Woods and Griffiths, 1998). The term ‘young adults’ and ‘emerging adults’ conversely, typically suggested persons who are above the age of majority (varies from 18-19 years of age in Canada), but still not necessarily independent. In most cases,

'young adults' refers to persons ranging in age from 18-24/25 years (Adams et al. 2007; Porter et al. 2004; Stinchfield and Winters, 1998; Williams et al. 2006; Wong, 2013). A second pressing matter is the apparent discrepancy when it comes to reporting prevalence rates of problem gambling amongst youth and young adults. Some studies have shown that problem gambling rates for youth are higher than adults, while more recent studies have shown less pronounced differences. This discrepancy, according to Tepperman and Wanner (2012: 136) is due to methodological issues such as differences in the sampling procedures and measurement tools.

Gambling has traditionally, even prior to its full legalization, been an adult pastime and so gambling research has until recently has focused mostly on adults. However, with legalization and the shift from marginal vice to mainstream entertainment, what was once deemed an adult activity has become increasingly popular among adolescents and young adults, albeit still illegal for those under the age of majority. In a study addressing youth participation in gambling, Volberg and her colleagues (2010) found that in the West (North America and Europe), youth gambling rates are on the rise and in many cases, are similar to the rates for adults. This rise in youth gambling is attributed to the ease of access to gambling venues and activities in contemporary western society. With gambling no longer confined to specific locations such as casinos and race tracks, gambling opportunities proliferate as venues such as local bars and lounges offer electronic gaming machines. Corner/convenience stores and gas stations allow for the purchase of instant and weekly lottery tickets, while ever-growing technological advances have also seen the introduction of online gambling. The main point to be stressed here is the ease of access, whether land-based or online, youth and young adults are presented with increasing opportunities to participate in games of chance. As with adults, some proportion of young people gamble beyond their monetary means, which can lead to a wide range of problems, most notably:

emotional, financial, psychological, familial, and legal. In addition, adolescents and young adults tend to be more susceptible than older adults, both socially and psychologically, to risk-taking and potentially harmful behaviours (Derevensky, 2012: 53). Youth learn from observing others in their social circle, and then act upon certain behavioural patterns for themselves, which contributes to the development of their behavioural tendencies in adulthood. This developmental aspect is of great importance when considering gambling behaviour among individuals transitioning from adolescence to adulthood. Many of our behaviours, both positive and negative, take root in adolescence and carry on later into life and can be difficult to change once entrenched. In the Canadian case, research by Huang and Boyer (2007) indicate that youth between 15-24 years old are almost 1.5 times more likely to develop gambling problems than older adults (Huang and Boyer, 2007).

Adolescent problem gamblers, as Derevensky (2012) argues, “have been shown to be prone to engage in multiple, comorbid addictive behaviours” (Derevensky, 2012: 61). This suggests that problem gambling behaviours are not relegated to one negative aspect of the youth’s life, but can branch out to other harmful behaviours such as alcohol or drug abuse, and mental health problems. Problem gambling has also been shown to result in an increase in criminal behaviours and to severely disrupt one’s familial and personal relationships (Derevensky, 2012: 62). Similarly, Stinchfield and Winters (1998) suggest that problem gambling is linked to other problem behaviours as part of a general syndrome of maladjustment and deviance that characterizes the transition from youth to adulthood for some. This is of particular importance since the prevalence of problem gambling rates is reportedly higher among youths and young adults than adults (Stinchfield and Winters 1998). Youth/adolescent rates of problem gambling typically vary from as low as 2% to a high of 9% (Winters and Anderson, 2000)

Furthermore, in a recent study by David Hodgins and colleagues (2012), which examines who is most likely to be at risk of becoming a problem gambler, several of their findings further echoed what has been shown in earlier research. Their study is a 5-year longitudinal study in the province of Alberta with 1372 subjects. Their findings are that those who are more at-risk also tended to be more impulsive, be young men, have a social support system that is either weak or also exposed to the gambling environment, and to smoke or to have alcohol and/or drug dependence (Hodgins et al., 2012).

In sum, understanding the influence of important risk and protective factors on problem gambling behaviour during this critical developmental transition period may also ultimately provide helpful insights into understanding the persistence, remission, and re-occurrence of problem gambling over the life course.

Young adults and gambling: Trends, factors, and reasons

Young adults participate in gambling for any number of reasons, including relaxation, relief from boredom, monetary gain, enjoyment, and escape (Ellenbogen et al. 2008; Jacobs 2005; Le et al. 2010). Furthermore, gambling is often promoted by family and friends, especially since it is now seen as a rite of passage, akin to being able to buy alcohol or getting one's driver's license (Lin and Yiyang 2009). But we must delve beyond these broad general motivations if we are to better understand which factors contribute toward an individual's gambling experience and what affect this may have on their everyday life. Gambling behaviour can be viewed along a spectrum, ranging from no gambling, to social gambling, to problem gambling (Derevensky 2012). It is important for researchers and policy-makers to understand the factors that contribute to the development of problem versus non-problem gambling in order to devise effective social policy

and treatment programs. Social factors include things such as the amount of family and community influences and support, and the availability of resources, whereas psychological factors include impulse control, substance abuse, as well as other mental health problems that have been identified as contributing influences (Hardoon and Derevensky 2002; Le et al. 2010; Messerlian et al. 2004; Stinchfield 2004; Stinchfield 2011).

An early attempt to classify problem gambling along a continuum was proposed by Shaffer and Hall (1996). In their proposed system, there would be five levels, ranging from 0 to 4. Those in Level 0 are ones without any gambling history. Level 1 are those classified as "Non-problem" and defined as those who gamble but exhibit no signs or symptoms of gambling-related problems. Level 2 are those classified as "In-transition", being characterizes as having signs of problem gambling, but are essentially teetering between problem and non-problem. The Level 3 group consists of those who are considered "Pathological/Compulsive" gamblers as set out by the DSM-IV or SOGS. Lastly, Level 4 are those who are classified as the "Pathological/Compulsive" gamblers who are either open to entering, or are already in treatment (Shaffer and Hall, 1996). Ken Winters and Nikki Anderson (2000) note that as identified by Shaffer and Hall (1996) themselves, while their proposed classification system can improve communication between researchers and policy makers, more work is still needed to verify the validity of the system. Winters and Anderson (2000) first note that while there is an expanding field of literature for the measurement of drug and alcohol (ab)use of youth and adolescents, there has only been a few instruments discussed in the literature regarding adolescent problem gambling. Furthermore, of those that do look at such concerns, none of them (at the time of Winters and Anderson's article) could be considered multi-dimensional or comprehensive tools (Winters and Anderson, 2000; 180). Many studies on youth gambling typically used the South Oaks Gambling Screen (SOGS),

or adaptations of it (SOGS-RA), or the DSM-IV, while others have developed their own instrumentation/scale such as the Massachusetts Gambling Screen (Shaffer et al. 1994). However, it should be noted that despite the validity data being of a preliminary nature, there still exists a general consistency in terms of discriminant validity. That is, when investigators have compared problem and non-problem gamblers as a function of test scores, the group differences are consistent with expectations (Winters and Anderson, 2000; 181).

This paper will begin with a review of the past literature on the various social and psychological factors that are commonly addressed in the research on problem gambling. This is then followed by an examination and explanation of the two theoretical framework models that will inform the direction of the project. Based on the literature review, research questions and associated hypotheses will be formulated. Then the methodology section will provide the overview of the specific dependent and independent variables that will be used in this project, including a brief description of each variable, its development and validity, an explanation of any modifications and/or recoding to the variables for this project (if applicable), and a description of the statistical analyses used for this project. Next, the results section will report the findings of the logistic regression analysis in light of the hypotheses posed for this project. Following this, the discussion section will consider the implications of the findings in relation to previous research. Also included is a section on treatment programs and policies for best practices, whether already in place or other potential ones that should be established based on these findings. Lastly, a section containing the limitations of this project, along with its strengths, implications, and potential future research is given.

CHAPTER 2

LITERATURE REVIEW

Social and Psychological Factors

Multiple social and psychological factors influence whether people gamble. Two sources of attraction for many are the feelings of excitement and the sense of escape generated by gambling activity. Reith (1999) writes that when individuals enter the gambling arena, they can temporarily step out of the 'real world'. The casino or gaming venue provides the gambler an opportunity to leave their concerns and routines behind and embark on an adventure and may even allow them to experience a state of dream-like dissociation from their surroundings. Opposite to thrill and excitement, boredom is another factor that is commonly identified as a reason people gamble. As Reith argues, stepping outside of the gambling arena, players tend to find the real world "utterly dull in comparison to the one they have just left" (Reith, 1999: 134).

Social and psychological factors are not the only behavioural correlates to problem gambling amongst young adults. In many cases, problem gamblers exhibit multiple, comorbid behaviours such as drinking, smoking, and substance abuse. In addition to the behaviours, mental health disorders such as depression and anxiety may also co-occur. According to Derevensky (2012), our understanding of problem gambling amongst young adults must shift towards a biopsychosocial model, which contends that biological, psychological, and social factors all play a significant role in explaining problem gambling. This model has also led to research in the field of adolescent gambling that suggests no single factor is adequate or likely to be able to entirely explain problem gambling, and that there are multiple subtypes of problem gamblers. Next, I examine the main factors to be examined in this project; social support, impulsivity, co-occurring

substance use (drug and alcohol) and mood disorders (anxiety and depression), as well as styles of coping. Each of these factors can be categorized as being both social and psychological.

Social Support

The family is where most individuals initially learn and become socialized into society. Korn and Tepperman's (2005) study report that individuals whose parents gambled were more likely to gamble themselves. Family support is a significant factor for those individuals who identified as having one or both parents as gamblers. In addition, associating with other family members (siblings, aunts and uncles) who gambled also increased the likelihood of the individual becoming a gambler. Gambling participation within the family, along with environmental factors such as poverty and one's cultural influences are more likely to influence whether or not the individual became a gambler themselves. The concepts of luck, glamour, and family fun become embedded in one's experiences, which in turn influence gambling behaviour in young adults (Korn and Tepperman, 2005). As several studies show, an important influence on gambling among youths is parenting practices (Barnes et al., 1987; McCormick and Taber, 1987). A lack of family support coupled with factors such as an overemphasis on money, competition, and poor financial knowledge also contribute to the development of problem gambling. For some young adults, seeing their parents place a high value on money or emphasis on competition acted as a stressor. The need for greater acceptance, along with insecurity and a lower sense of self-esteem creates an environment where the youth gives into the stressors and begins to mimic the actions of the family (Derevensky, 2012).

While there is a substantial body of literature addressing how having alcoholic parents can contribute to health and behavioural problems of their children, there is much scarcer literature

concerning the vulnerability and risks of youths and young adults with parents who are compulsive or problem gamblers. This area is critical to our understanding of how a young adult's social support system conditions their attitudes and behaviours around gambling. One of the earlier works which attempted to address this area of gambling research was by Durand Jacobs (1989) and several of his colleagues. Jacobs and his team administered an anonymous 37-item survey to over 800 high school students in four Californian high schools. The survey covered topics ranging from general health to involvement with addictive substances and behaviours. Their study sample showed that of the 844 students, 52 students (6%) described themselves as having parents who were compulsive gamblers (Jacobs et al., 1989: 262). The study found that in all cases, children with one or both parents being compulsive gamblers also exhibited, compared to those whose parents were not compulsive gamblers, higher rates of: alcohol use (40% compared to 37%), drug use (25% versus 11%), and 'family problems' (divorce, separation, broken homes) (25% compared to 14%) (Jacobs et al., 1989: 262-265). In addition to this, children of problem gamblers also reported poorer quality of life as youth compared to those whose parents had no problems of gambling (42% versus 27%), as well as stronger impulses to drink (31% versus 24%) and use drugs (37% versus 24%) (Jacobs et al., 1989: 265-266). Lastly, and unsurprisingly, children who indicated one or both parents to be problem gamblers also had higher rates of mental health issues such as anxiety, depression, and low self-esteem (Jacobs et al., 1989: 266). What Jacobs and his team conclude is that since the home is where children learn many of their future traits, having parents who are problem gamblers essentially diminishes one form of social support and at the same time, creates an environment where high-risk behaviours are promoted rather than prevented.

However, family is not the only place in our social circles where we can find support and pressure. Outside of our family we have friends; many of whom also provide support for us. Research shows that there is a relationship between probability of gambling as a youth and having friends who gamble (Zhai et al., 2017). The main finding is that those with friends who participated in gambling are also more likely (than those with non-gambling friends) to partake in gambling activities themselves. While this does not necessarily mean that they are more likely to become problem gamblers, it does show that our peer groups have a strong influence on us (Gupta and Derevensky, 1997; Jacobs, 1986).

Impulsivity

For years, one of the conceptualizations of problem gambling has been that problem gambling stems from a lack of control on the part of the individual. According to Derevensky, there appears to be a positive relationship between impulsivity and problem gambling. That is, higher impulsivity scores for individuals – i.e. lower impulse control – predicted greater probability of being a problem gambler (Derevensky, 2012). This claim is backed by several different studies, and despite the different measures of impulsivity used in the various studies (Barratt Impulsivity Scale, the Impulsivity-Venturesome-Empathy Scale, UPPS Impulsive Behaviour Scale, Eysenck Impulsivity Scale), the findings all show similar results.

For many researchers (Buss and Plomin, 1975; Eysenck and Eysenck, 1977; Barratt and Patton, 1983; Carlton and Manowitz, 1987; Gray et al., 1983; White et al., 1994; McCown and Chamberlain, 2007), the term 'impulsivity' at its base is reduced into four basic elements. First, impulsivity is defined as having an "excessive sensitivity to potential reward and the desire for immediate reinforcement". Second, having a "tendency to respond impetuously without

forethought about negative consequences". Third, having "excessive insensitivity to threatened punishment (or non-reward)", and lastly, having "deficits in inhibitory control that keep the person responding despite the risk of negative consequences" (Vitaro et al., 1999; 566). From these elements of impulsivity, we can see how pathological/problem gambling exhibits these definitions. Vitaro and colleagues (1999) explain that in cases of problem gambling perseverance, chasing, and preoccupation with gambling all demonstrate the aforementioned elements. In terms of perseverance, the gambler's unwillingness to quit regardless if they are winning or losing would suggest a deficit in inhibitory control. With respect to chasing, when the gambler loses and attempts to win back what has been lost shows an excessive sensitivity to a potential reward, along with a desire for immediate reinforcement. Lastly, in terms of preoccupation, the gambler's continual thoughts about gambling, again, regardless of wins or losses, can be related to a lack of forethought about potential negative consequences (Vitaro et al., 1999; 566). Verdejo-Garcia and colleagues (2007) also find that those with poor response inhibition, steeper rates of delay-discounting, and higher risky decision-making traits were more likely to be pathological gamblers. In addition, Antonio Verdejo-Garcia and his colleagues (2008) assess impulsivity as a vulnerability marker for various disorders like substance (ab)use and problem gambling. With regards to gambling, the investigators note that several of the core symptoms present in those with problem gambling also tend to overlap with characteristics of those with substance-use disorders. These characteristics, as noted by the investigators include craving, withdrawal symptoms, tolerance, and frequent relapses (Verdejo-Garcia 2008; 792).

With regard to young adults, Lacey and Evans (1986) and Vitaro et al. (1999) suggest that impulsivity is a strong predictor of problem gambling in adolescent males. Their findings are in line with previous longitudinal research (Carlton and Goldstein, 1987; Carlton and Manowitz,

1992; Rugle and Melamed, 1993), although those studies all used adult samples. In addition to these findings, Auger et al. (2010), Blanco et al. (2001), Chambers and Potenza (2003), Lynch et al. (2004) and Winters and Anderson (2000), have all linked higher rates of problem gambling in adolescents and young adults with an etiological relationship between substance abuse and impulsivity.

Vitaro and colleagues (1999) also note that at the time, much of the gambling literature on impulsivity suffered from a few methodological problems. For example, Allcock and Grace (1988), McCormick and colleagues (1987), and Carlton and Manowitz's (1992) studies all have small sample sizes or are clinical samples (the subjects were gamblers who were entering treatment or in the middle of treatment). Vitaro and his colleagues (1999) argue that the use of adult samples in treatment does little to help us understand the behaviours of young people. They believe that using an adolescent sample, one assessed prior to the onset of pathological gambling, might be better suited in studying the predisposing personality factors (Vitaro et al., 1999; 567). Their longitudinal study followed 333 boys aged 13-14 years old for four years. The reason Vitaro and colleagues chose only to study boys is because pathological gambling is more prevalent in men, especially during adolescence (Vitaro et al., 1999; 568). While rates vary across a number of countries, studies consistently show that the rate of problem gambling for men is typically double that of women (Welte et al., 2008; Williams et al., 2012; Hing et al., 2016). Of the 333 initial cases, by the end of the four year study, gambling data was collected for 168 of these boys. The researchers use logistic regression to test if the various impulsivity measures predicted problem gambling. Their findings show that children who were involved at gambling activities early in the study (at age 13 or 14 years) are 3.6 times more likely to be at risk of belonging to the problem gambler group than the non-problem gambler group by age 17. In

addition, albeit unsurprisingly, those with higher scores on the Eysenck Impulsivity Scale are almost six times more likely to belong to the problem gambling group (Vitaro et al., 1999; 571). The researchers, despite contending the methodological issues with earlier works, note that the results of their study were congruent with the earlier studies which show that young people who exhibit problem gambling characteristics early on in childhood manifested into adulthood. In addition, they note that their study also supports the view posited by Newman and Wallace (1993) which argues that problem gamblers have 'response modulation deficits'. These deficits, as Vitaro and his colleagues explain, are the observations that gamblers ignore the negative cues from their environment and then do not subsequently alter their ongoing negative behaviour (Vitaro et al., 1999; 573).

One study that draws attention early on in research towards the relationship between impulsivity and pathological gambling was done by Alex Blaszczynski and his colleagues (1997). They note that while earlier work recognized the role impulsivity had in problem gambling, the studies did not operationally define or emphasize the complexity in the construct of the multiple features of impulsive behaviours (Blaszczynski et al., 1997; 76). For example, Moran (1970) described five subtypes of gamblers: impulsive, sub-cultural, neurotic, psychopathic, and symptomatic gamblers. The problem, as Blaszczynski and his colleagues assert, is that the criteria for determining the specific subtypes are not delineated and subsequently suffer from validity issues (Blaszczynski et al., 1997; 76). A second issue is sample size. In a study by Carlton and his colleagues (1987), the sample size was only 14. In Allcock and Grace's (1988) study, only 10 cases of pathological gamblers were included (from an addictions treatment hospital), and in Carlton and Manowitz's (1992) study, the sample comprised of 12 members of a Gamblers Anonymous group.

For their study, Blaszczynski et al. (1997) test a subset of 115 pathological gamblers (who had completed the Eysenck Impulsivity Scale) from a database of 306 pathological gamblers. The mean age for this sample was 19.6 years (Blaszczynski et al., 1997; 79). Blaszczynski and colleagues' study, which utilized 115 cases as opposed to the 25 used by Allcock and Grace (1988), found (in contrast to the latter's findings) that higher levels of impulsivity were exhibited by a subset of problem gamblers; most notably those who show signs of having an antisocial personality disorder. In addition, the study also found that those with higher impulsivity were more likely to display higher alcohol consumption rates, along with a history of psychometric indices of distress and disturbances (Blaszczynski et al., 1997; 83). This, as the researchers explain, is supported by other impulsivity research. For example, in Lacey and Evans' (1986) study, they ascribe the term 'Multi-Impulsive Personality Disorder' to a subgroup of patients who are characterized by higher levels of impulsivity. In another study, McCown (1988), also utilizing the Eysenck Impulsivity Scale found that multiple substance users were more likely to have higher scores of impulsivity. Similarly, O'Boyle and Barratt (1993) and Stanford and Barratt (1992), utilizing the Barratt Impulsiveness Scale found that those with multiple substance dependence had higher scores of impulsivity on their scale. What Blaszczynski and the others conclude is that there is evidence to support the idea of a 'multi-impulsive' personality disorder among pathological gamblers, and note that this profile of the highly impulsive gambler may be different than other gamblers in that they have multiple psychological control difficulties (Blaszczynski et al., 1997; 85).

Following up the earlier article by Blaszczynski and colleagues (1997), Blaszczynski and Nower (2002) delve further into impulsivity and one of the subgroups in their pathways model; the antisocial impulsivist. In their conceptualization, these individuals possess both psychological

and biological vulnerabilities. While this is true for many problem gamblers, this group is distinguished by a diminished lack of control over their activities and general level of psychological functioning (Blaszczynski and Nower, 2002: 494). In addition, they note that those with a background history of low impulse control are likely to have engaged in a wider array of behavioural problems. Blaszczynski and Nower (2002) investigate this relationship between impulsivity, antisocialism, and gambling from a cohort of 115 gamblers. Their findings are similar to other studies that addressed impulsivity such as McCormick's (1994) observation that problem gamblers with concurrent problems such as drugs and alcohol are more impulsive than those without concurrent problems.

Nancy Petry (2000), in addressing the relationship between substance abuse, impulsivity, and problem gambling, note that all these variables taken together can provide a stronger understanding of problem gambling itself. She notes that the co-occurrence of these risk factors, especially in children, can help identify substance abuse problems later on in life (Petry, 2000; 29). Petry explains how past research on impulsivity and gambling has yielded two apparently contradictory findings. Some research (Blaszczynski et al., 1997; Carlton and Manowitz, 1994; McCormick et al., 1987) shows higher levels of impulsivity in problem gamblers, while other data shows that problem gamblers exhibit no difference than non-problem gamblers in terms of impulsivity (Allcock and Grace, 1988; Dickerson et al., 1987).

However, Petry notes that these discrepancies may be in part due to the high rates of substance (ab)use among gamblers. As shown in works by Lesieur et al., 1986 and Ramirez et al., 1983, up to 50% of problem gamblers have a history of substance abuse, and that increased levels of impulsivity may be related to substance ab(use) rather than gambling (Petry, 2000; 30). Furthermore, Allcock and Grace's (1988) study assessing impulsivity and gambling failed to

report drug use histories, and at the same time, as mentioned earlier, is limited due to a small sample size. Another discrepancy that Petry identifies is that impulsiveness is a multi-dimensional construct. The problem with that is some types of impulsive behaviour are characteristic of substance abuse only, while others are related to problem gambling, and others representative of both (Petry, 2000; 30). Petry's study compares substance abusers, both with and without problem gambling, on a variety of impulsivity measures. The hypothesis is that substance abusers would score higher than those without substance abuse on behavioural and self-report measures, and that subjects with both substance abuse and problem gambling would exhibit the greatest impulsivity (Petry, 2000; 30). Petry's study examined 111 men and report that in both cases, the hypotheses were supported— those with substance abuse disorders score higher than those without on most measures of impulsivity, and those with both substance abuse and problem gambling tended to score even higher on impulsivity (Petry, 2000; 35).

Clarke (2005) sought to understand impulsivity as a mediator in the relationship between gambling and mood disorders, specifically depression, from a non-clinical sample. Building on the works of Petry (2000) and Blaszczynski and colleagues (1997), Clarke addresses the 'third' group of problem gamblers; the emotionally vulnerable gamblers who display impulsivity, antisocial behaviour, and substance abuse. Clarke's study furthers the empirical findings of the two aforementioned studies and formulates three areas to test: first, problem gamblers have more symptoms of depression than non-problem gamblers. Second, similar to Petry (2000) and Vitaro, Arsenault, and Tremblay's (1999) research on impulsivity, they note that impulsivity is a predictor of problem gambling, and not vice-versa. Lastly, since much of the earlier research on impulsivity and gambling focused on clinical samples rather than groups in the community, Clarke set out to examine this relationship in gamblers who do not seek treatment. His study

surveyed 180 university students in an introductory psychology course at Massey University in New Zealand. With respect to the second hypothesis, Clarke's findings show that when impulsivity is controlled for as a mediator, the covariance between depression and problem gambling disappears. The implications of this is, according to Clarke, is that dealing with the issue of impulsivity may be sufficient in weakening the depression-problem gambling link for the third group of impulsive gamblers (Clarke, 2005; 13). In addition, his findings to the third area of study revealed that similar to what Blaszczynski and Nower (2002) deem as the 'third' type of problem gambler in their pathway model; the antisocial impulsivist'. Their clinical samples also show that this construct is operational for this group of non-clinical subjects (Clarke, 2005; 12).

Comorbidity: Alcohol and Drug Use

With respect to problem gambling, drug and alcohol abuse are two commonly addressed aspects of comorbidity. Studies show that problem gambling is commonly associated with cigarette smoking and alcohol consumption (Barnes et al., 1999; Black and Moyer, 1998; Chou and Afifi, 2011; Derevensky, 2008; Maccallum and Blaszczynski, 2002; Stewart and Kushner, 2003). According to Derevensky (2002), the prevalence of smoking among problem gamblers is as much as three times that of the general population. In addition to smoking, alcohol consumption is also higher for problem gamblers, with 30% - 50% of adults who seek treatment for problem gambling also seeking help for alcohol and/or substance abuse (Derevensky, 2002: 74; Maccallum and Blaszczynski 2002: 411). McCormick et al. (1987) report that pathological gambling, substance abuse and impulsivity are inter-correlated. Their study shows that individuals who were pathological gamblers and substance abusers also have higher impulsiveness scores. Black and Moyer (1998) note that in the United States, drug and alcohol

abuse are well-documented comorbid diagnoses, with lifetime prevalence rates of almost 48 percent among problem gamblers (Black and Moyer, 1998; 1434).

These findings were also shown to be true in Canadian studies. In Canada, data has shown that most gamblers (74%) drink alcohol while gambling (Potenza et al., 2003). Furthermore, Potenza and colleagues' (2003) study suggest that problem gamblers with comorbid problems are different than those without a comorbid problem. Those with comorbid problems have more severe gambling problems (Potenza et al., 2003). For Rush and colleagues (2008), they examine how the co-occurrence of mental and substance use disorders impact the prevalence of problem gambling in Canada. In their study, using the Canadian Community Health Survey Cycle 1.2, a national survey carried out in 2002, the researchers concluded that problem gamblers have higher percentages of substance use than non-problem gamblers, while there was only a slight rate difference for mental disorder (Rush et al., 2008: 1852). In a more recent study, Afifi and colleagues (2016) examine the relationship between substance use and mental health disorders. Using the same dataset that this project derives its result from, the researchers address the issue in both a longitudinal and cross-sectional study rather than only one or the other as is typically seen in much of the extant literature. Their findings also confirm that mental health disorders and substance abuse are associated with at-risk and problem gamblers (Afifi et al., 2016).

With the younger population, Barnes et al. (1999) note that the findings for youth gambling and the subsequent patterns of drug and alcohol use are parallel to those reported in adults and other large national studies. In their study, the researchers examine several relationships between various sociodemographic factors (age, gender, race, and socio-economic indicators), socialization factors (parents and peers), and individual/psychological factors (impulsivity, depression, intellectual ability). In the first study, a six-wave longitudinal study on

how much social support given by families influenced alcohol and gambling frequency in adolescents, took a representative household sample of 699 adolescents between the ages of 13-16 years old at wave 1 and followed them for six years. In the second study, a three-wave longitudinal study sought to understand the relationship between substance abuse and delinquency in young men aged 16-19 years at wave 1. Utilizing a multivariate analysis of variance (MANOVA) for both studies, the researchers examine the effects of the various independent variables on alcohol consumption and gambling frequency. Their study found that in Study 1, men were more likely to consume a greater amount of alcohol and gamble more frequently. Furthermore, in Study 2, the amount of those who drank and gambled increased among those who were delinquents. The conclusions they reports that comorbidity (alcohol and gambling) is linked to both psychological factors such as impulsivity and social factors such as family/parenting practices for both men and women. The major difference is that men had a significantly higher proportion of those who exhibited problems in both areas(Barnes et al., 1999; 751-759).

For young adults, Goudriaan and her colleagues (2009) also examine college students in a longitudinal study. Their study examines problem gambling among college students alongside alcohol and drug use, and how gender varies as an interaction in those cases. Using latent class analysis (LCA) and latent transition analysis (LTA) to follow over 3700 students enrolled at the University of Missouri-Columbia. By the end of the fourth year, 60% of the initial 3720 students were left. The researchers hypothesize that those who gambled more frequently would also score higher on alcohol and drug use, along with men being more likely to be engaged in both gambling and alcohol use. Both hypotheses were confirmed, as 5-7% of men engaged in most of

the gambling activities throughout the four year study and are more likely to score higher on alcohol use than women (Goudriaan et al., 2009: 1229).

Nower, Derevensky, and Gupta (2004), building on their previous work examine the relationship of impulsivity, sensation seeking, coping, and substance use in youth gamblers. They note that although several studies on youth and 'risky' behaviour had previously focused on reckless driving, alcohol and drug use, and antisocial behaviours, few had addressed gambling. Similarly, while there are studies on impulsivity and gambling, few have focused on youths (Vitaro et al., 1997). For their study, analyses of variance (ANOVA) were run on a representative sample of 1339 youths aged 17-21 years old from Quebec. Next, multiple logistic regression analyses were run to evaluate the predictor variables on the likelihood of membership in problem gambling categories. Nower and colleagues' study analyze impulsivity, sensation-seeking, substance use, and coping as predictor variables in order to identify risk and protective factors that would contribute to youths being in one group as opposed to the other. For men, their results show that impulsivity was the greatest predictor of membership in the problem gambling group as men who scored higher on impulsivity are 1.6 times more likely to have gambling problems (Nower et al., 2004: 53). In addition, men who are in the problem gambling category are also 1.1 times more likely to abuse substances or cope using negative avoidance strategies than men without gambling problems. For women, similar to men, impulsivity proves to be the greatest predictor, yet at a lower odds ratio than the men (1.2 compared to 1.6). What is apparent from Nower and her colleagues' study is that impulsivity is a highly predictive variable of problem gambling in both genders. At the same time, the role of stress and coping styles, although varied for the different types of gamblers and gender, were similar to previous research. Both men and women non-problem gamblers are more likely to exhibit task-oriented coping strategies than

those with gambling problems. Problem gamblers, on the other hand, are more likely to resort to escape/avoidance coping techniques, with men also having an increased likelihood of substance abuse.

Depression and Anxiety

Aside from the physical aspect of addictions, there is also the psychological. While studies show that alcohol and substance abuse are common comorbid factors in problem gamblers, depression and anxiety are two psychological factors that researchers address when dealing with addictions. Although not as researched as alcohol and drug use in studies addressing problem gambling, there still exists some literature that gives positive correlations between mood and anxiety disorders and problem gambling. According to several researchers, individuals who experience one psychiatric disorder are more likely to experience others (Shaffer et al., 2004; Kessler et al. 2008; Lorains et al. 2011).

In a study by Cunningham-Williams and colleagues (1998), the researchers report that problem/pathological gamblers are three times more likely to have depression and/or other antisocial personality disorders than non-problem gamblers (Cunningham-Williams et al., 1998). This is furthered in Kessler and colleagues' (2008) study which show in a nationally representative sample that individuals with gambling problems also were two to five times more likely to exhibit mental disorders such as, but not limited to, depression and anxiety (Kessler et al. 2008).

A study by el-Guebaly and colleagues (2006) examines these using a Canadian sample. Similar to other researchers who have used Canadian cases, the researchers of this study also use the Canadian Community Health Survey Cycle 1.2. For their study, they wanted to find whether

or not mood / anxiety disorders and substance abuse disorders can predict who would be a problem gambler. Their logistic regression model shows that the odds ratio for mood/anxiety disorder is 1.8, while for substance abuse it is 2.9 times. The researchers note that in the absence of interaction terms, the model predicts independent effects. When taken together, that is having both mood/anxiety disorders alongside a substance abuse disorder, the logistic regression model predicts an odds ratio for problem gambling at almost 5 times (el-Guebaly et al., 2006: 284).

The aforementioned CCHS 1.2 study takes all ranges of age. A more recent study done by Martin and his colleagues (2013) looks at the same variables that el-Guebaly and his colleagues did (alcohol, anxiety, and depression), but as the researchers contend, psychiatric disorders tend to be more common among younger adults, more specifically, the college-age population (Martin et al., 2014: 322). Citing the American College Health Association (2009), Martin and colleagues note that compared to other age groups, this population of individuals typically report higher rates of gambling-related issues along with alcohol/drug use, and depression and anxiety-related issues (American College Health Association, 2009). The issue with these results is that despite studies showing this group to be more susceptible to these disorders, there are fewer studies that concentrate on this age group as opposed to an adult population (Martin et al., 2014: 323). Furthermore, Martin and his colleagues note that of the studies which address the issue of comorbidity and problem gambling, fewer still examine the mental health aspect of the problem; specifically anxiety and depression (Martin et al., 2014: 323). The researchers note that at the time of the study, only one study had examined college students gambling and depression. The study by Stuhldreher and colleagues (2007) found that the prevalence of depression is almost doubled for students with gambling problems versus those without (Stuhldreher et al. 2007). In

addition, there were no studies which examined the relationship between anxiety and problem gambling specifically tailored to college-aged students.

The study by Martin and his colleagues sought to shed light on this issue, in their study over 1400 undergraduate participants from a southeastern university in the United States is used. The results indicate that both alcohol and depression have correlations to problem gambling, but that anxiety did not. The main finding of this study show that those students with gambling problems have a much higher level of alcohol and depression rate than the adult population (Martins et al., 2014: 330).

Furthering Blaszczynski and Nower's (2002) pathways model for problem/pathological gambling, Ledgerwood and Petry (2010) attempt to subtype pathological gamblers based on impulsivity, depression, and anxiety. The researchers hypothesize that individuals who score low on anxiety and depression would likely exhibit lower levels of problem gambling, while those scoring higher would likely exhibit problem gambling characteristics. In comparison to Blaszczynski and Nower's three types of gamblers, Ledgerwood and Petry formulate that those who scored lower on anxiety and depression would be akin to the 'Behaviourally Conditioned' (BC) gambler, while those who exhibit higher anxiety, depression, and impulsivity are similar to the anti-social impulsivist (AI) category and thus likely be problem gamblers (Ledgerwood and Petry 2010: 682). The study started with 231 participants at the onset, followed by interviews at the 6 and 12 month period. The findings show that the anti-social impulsivist is more likely to meet the criteria for pathological gambling, along with a myriad of other issues such as poor coping skills and addictions such as drug or alcohol abuse (Ledgerwood and Petry, 2010: 684).

Ways of Coping

The next factor to be examined is how young adults cope with stress. Several researchers have noted that most models of gambling are narrow in scope (Blaszczynski and Silove, 1995; Lesieur, 1997; Lightsey and Hulse, 2002). Psychodynamic models focus too much on the intrapsychic factors, but ignore the role played by the individual's environment. Behavioural models emphasize reinforcement, but neglect cognitive and environmental factors. The disease model stresses biological and psychological factors over socio-environmental factors. As noted earlier, we cannot simply look at any one factor alone, but rather must shift towards the biopsychosocial model and consideration of how various factors affect the individual. In terms of coping, Lightsey and Hulse (2002), borrowing heavily from Lazarus and Folkman, look at how coping behaviours can be used to understand problem gambling. Based on this theory, effective coping methods lead to healthy outcomes, while ineffective coping methods lead to negative outcomes (Lightsey and Hulse, 2002: 202-203). The present study follows the definition of coping as posited by Lazarus and Folkman (1984), who define it as "constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the person's resources" (Lazarus and Folkman, 1984: 14). Lazarus and Folkman identified two key coping strategies; task coping and emotion-based coping, while Endler and Parker (1990) identified a third; avoidance coping.

Task (also called problem-focused) coping reflects "an attempt to alter the circumstances of the stressful event or to seek more information about ways to resolve the stressful situation" (Lazarus and Folkman, 1984). Emotion-based coping consists of "attempting to regulate emotional distress by changing one's perception or interpretation of the stressor, using cognitive or behavioural efforts such as minimization, positive comparisons, and construing positive value

from negative events (Lazarus and Folkman, 1984). Escape-avoidance coping consists of avoiding a stressful situation by engaging in a task not related to the stressor, such as drinking alcohol (Endler and Parker, 1990).

The different coping methods an individual utilizes to deal with stressors can have a significant role in differentiating between problem and non-problem gamblers. Kimberley Matheson and her colleagues (2009) examine the interplay between the different coping styles exhibited by men and women gamblers. They argue that the ways in which one dealt with stressors, in other words, their coping strategies, would allow for researchers to better understand how positive and negative coping strategies would affect the outcomes for the individual. Building upon Lazarus and Folkman's task-based coping (also referred to as problem-focused) and emotion-based coping strategies, their study examines the relationship between gambling, coping styles, and gender. Examining over 1500 first-year university students from an Eastern Canadian university, the study reports that with regards to coping styles between men and women, there were significant differences. The findings show that the biggest difference is that women use emotion-based coping strategies to a greater extent than men (Matheson et al., 2009: 218). In particular, problematic gambling among men is highly correlated to the lack of using problem-focused coping strategies, and an increase in wishful thinking rather than emotion-focused coping strategies (Matheson et al., 2009: 218).

Bergevin and colleagues (2006) sought to examine how the role of stress and coping affected adolescents and gambling. Earlier studies note how stress or negative life events and the subsequent ways the individual copes with the situation can affect their developmental behaviours for future events (Taber et al., 1987; Nolen-Hocksema et al., 1992). Utilizing the three categories of coping as identified by Lazarus and Folkman (1984) and Endler and Parker (1990),

Bergevin and her colleagues sampled over 2000 students in high schools across Ontario. The study is divided into three parts. The first part uses factorial analyses of variance (ANOVA) to determine if men and women differed in reported frequencies of negative life events. The second part uses a multivariate analysis of variance (MANOVA) to assess the different coping styles used by men and women. The last part uses a path analysis to examine whether the use of certain coping styles mediated the relationship between negative life events and gambling severity (Bergevin et al., 2006: 200).

Their findings show that with respect to task-oriented coping, those with more severe gambling problems use less task-oriented coping than non-problem gamblers. For avoidance-coping, the findings were similar for gender, but show that problem gamblers scored higher in avoidance-coping methods than their non-problem and social gambler counterparts. Lastly, for emotion-based coping, gender is a significant factor for men in the gambling group. Among the social and problem gamblers, men are more likely to employ emotion-oriented coping strategies than their non-gambling counterparts (Bergevin et al., 2006: 202-203). The overall conclusion derived from the study is that similar to prior research on coping, the study reveals that more severe gamblers are more likely to use negative forms of coping strategies than those without problem gambling. More specifically, problem gamblers tend to use more avoidance-coping strategies and less task-oriented coping strategies.

Gender

There is growing evidence of important gender differences in problem gambling behaviour. Prior to the 1990s, few studies examined gender differences in gambling (Phillips, 2009). It was not until the mid-1990s that gender became an important focus for gambling research (Phillips,

2009:4). Mark and Lesieur (1992) criticized gambling research for the apparent lack of focus on women. They state that instead of generalizing results from the studies that only look at men, gambling research needed to “focus on women gamblers as the primary subject” and that “women should be searched out and included rather than ignored”(Mark and Lesieur, 1992: 559). They conclude that in order to better understand gambling experiences and behaviours as a societal issue, women must assume an “integral role in the research process from the conceptual stage through the analysis stage and all points in between” (Mark and Lesieur, 1992: 559). Since then, more research began to incorporate women into studies and to study gender differences in depth.

One of the major findings that all the subsequent research note is that men and women do in fact differ in certain aspects of gambling behaviour, along with various risk factors (Afifi et al., 2010; Bruce and Johnson, 1994; Clarke, 2008; Fisher 1993; Gray, 2004; Potenza et al., 2006; Martin et al., 2014). For example, a study by Afifi and colleagues (2010), using the Canadian Community Health Survey Cycle 1.2, found in a gender comparison of problem gamblers, that factors such as, but not limited to, age, income, positive coping style, and social support are differ in their contribution towards male versus female problem gambling (Afifi et al., 2010). Bruce and Johnson (1994) report that gender differences are evident in betting strategies, with men being more likely to be risk-takers than women. Fisher (1993) reports that men are more likely to be weekly gamblers than women, and Potenza et al. (2006) report that men tend to begin gambling at an earlier age than women. Martin and colleagues (2014) note that among college-aged individuals, men gamble more frequently and tend to experience higher rates of other disorders. Lastly, Gray’s study, which encompasses seven countries, finds that men in all cases are more likely to be problem and/or pathological gamblers than women (Gray, 2004).

Studies by Donati and colleagues (2013), Hraba and Lee (1996), and Huang and Boyer (2007) also focus on the specific types of gambling activities men and women participate in, frequency of participation, and their reasons for playing certain types of gambling activities over other types.

Huang and Boyer's (2007) study which uses the Canadian Community Health Survey Cycle 1.2, reports that youth (aged 15-24 years) are more likely to be at risk for gambling problems than those of 25 years or older. In addition, young men are at an even greater risk of developing a gambling problem (Huang and Boyer 2007: 657). Using a multivariate logistic regression approach, their findings report that the prevalence of low and moderate-risk gambling between young men and women is almost twice and three times as high respectively (Huang and Boyer 2007: 663). Similarly, Wong and colleagues (2013) study of American college students report that men are more than twice as likely to be problem gamblers than women (20.1% compared to 7.8%) (Wong et al., 2013). Donati and colleagues' report echoes that of previous studies mentioned above. Their findings from a sample of high school students in Tuscany show that gambling involvement amongst the two genders is roughly equal (78% to 81%), though there are some differences in the types of gaming activities, along with the frequency and intensity of play. But similar to other research boys are more likely to be at-risk or become problem gamblers than girls (22% to 8%) (Donati et al., 2013). Hraba and Lee (1996) also found gender differences in the type of gaming activity and frequency of play. This in turn leads to men being more at risk than women; however, the researchers also note that for those who are at-risk or problem gamblers, gender differences virtually disappear.

Theoretical Framework

The theoretical framework behind this project stems from two models, both of which focus on addiction as the key concept to understanding problem gambling. The first is Durand Jacobs' (1986) general theory of addiction and his 'Addictive Personality Syndrome' model, or APS. The second is Shaffer and colleagues' 'Syndrome model of addiction' (2004). Jacobs' paper at the time, was an attempt to bridge the etiological commonalities of gambling, which was still in its infancy in terms of research, to the more studied topic of drug use. His reasoning is an apparent central functionality between drug use and gambling in that both behaviours tend to have similar 'altered states of identity' for vulnerable subjects. Jacobs' theory for this model relies heavily on two interrelated sets of predisposing factors that must coexist: a unipolar physiological resting state and a psychological nature (Jacobs 1986: 17). The former is a state that is continuously depressed or excited, while the latter refers to reactions that arise from social and psychological experiences one develops during his/her childhood and early adulthood.

Furthermore, to elaborate on the second predisposing conditions of Jacobs' APS, an essential pre-condition that must be present prior to one developing an Addictive Personality Syndrome is a childhood or adolescence marked by feelings of inadequacy, inferiority, and a sense of rejection from parents or significant others (Jacobs 1986: 21). Instead of responding to these negative circumstances by building 'success-producing' behaviours, the youth generally retreat to wish-fulfilling fantasies to escape their painful reality. These combined physiological and social-psychological impacts begin to manifest and consequently inhibit the youth from interacting and learning positive stress-reduction and coping styles. As a result, these styles of coping and methods to deal with stress are intensified during the younger years of a child's life and carry into adulthood.

Jacobs operationalizes addiction as a broad term to address it in a measurable and socially relevant manner. Whereas the Standard Medical Dictionary defined addiction as a state of being given up to some habit, the 'habit' in question referred to drugs and alcohol (Jacobs 1986: 18), Jacobs notes that an addiction need not be drugs and/or alcohol, but that experiences and other objects also be included, adding that addictions need not be solely relegated to drugs and ingested substances, but may also refer to activities in our daily lives; gambling being one. Tied together, for Jacobs, addiction is something that encompasses a persistent, out-of-control, and often negative behavioural pattern involving either substances or activities (Jacobs 1986: 18).

Accordingly, Jacobs' model can be applied to several forms of addictions, as it holds that addictions are not relegated to drugs and other ingested substances, but can be activities in people's lives, that is, 'behavioural addictions.' Furthermore, his model shows that in many cases, addiction is at its most influential on younger people and the lasting effects carry on into adulthood with severe negative consequences for the individual and those around him/her.

However, while Jacobs' model is useful, it does leave out a few important factors. Shaffer and his colleagues propose a conceptualization of addiction that is broader still. They argue that addictions need to be understood as a syndrome with multiple expressions (Shaffer et al. 2004: 367).

First, we must define a syndrome. According to Shaffer et al. (2004: 367), a syndrome is a cluster of symptoms and signs related to an abnormal underlying condition. In addition, syndromes and the expressive signs and symptoms that serve as identifying characteristics have a distinctive temporal progression. The model of the addiction syndrome encompasses three stages. The first stage, referred to by Shaffer and colleagues as "antecedents of the addiction syndrome", includes neurobiological and psychosocial elements. Factors such as individual vulnerability,

object exposure, and object interaction can all influence one's behaviour. While some elements increase the likelihood of addiction, others can serve as protective factors to reduce the chance of addiction (Shaffer et al. 2004: 368). In addition, throughout one's lifetime, he/she can be exposed to various objects of addiction. This increased exposure and/or access to the object of addiction similarly increases the likelihood of the individual's interactions with the object. This interaction then essentially exposes the at-risk individuals to neurobiological consequences that are both common to all objects of addiction, and at the same time unique to specific objects of addiction (Shaffer et al. 2004: 368).

When the individual has engaged in repeated interactions, the second stage of this addiction syndrome model can manifest. Shaffer and colleagues refer this as the “premorbid stage”. This stage emerges after the individual has repeated interactions with a specific object or objects of addiction, coupled with either the neurobiological or psychosocial elements that produced a desirable outcome for the individual. Shaffer and his colleagues call this desired interaction a ‘subjective shift’. This subjective shift is a prerequisite and only after this sought-after (desirable) subjective shift has been met, can the development of the addiction syndrome manifest (Shaffer et al. 2004: 368). It is at this stage, according to Shaffer and colleagues, where people teeter between more or less healthy behaviour.

The last stage is essentially the outcome stage of those who have moved passed the premorbid stage. Shaffer and colleagues note that addiction syndrome can manifest itself in different ways, that is, the expressions, manifestations, and sequelae of the addiction syndrome are dependent upon the object or activity with which people interact. With respect to gambling, Shaffer presents the example that if one has repeated interactions with a slot machine, the addiction syndrome may emerge. This syndrome and its sequelae will have some characteristics

that uniquely reflect each of these objects and activities, but at the same time, share common manifestations with other forms of addictions such as depression, neurological adaptation to the activity/behaviour, and deception (Shaffer et al. 2004: 368).

For Shaffer and his colleagues, addictions can be categorized into three aspects: shared neurobiological antecedents, shared psychosocial antecedents, and shared experiences. With respect to the first antecedent, the researchers note that psychoactive drugs and behaviours (such as alcohol, cocaine, and gambling) each have the capacity to stimulate the brain's dopamine reward system (Shaffer et al., 2004:369). Another shared neurobiological antecedent is genetics. Shaffer et al. provide the example that pathological gambling shares a common genetic vulnerability with alcohol dependence (Shaffer et al., 2004: 369). In the second antecedent, there are common psychological and social risk factors pertaining to behavioural and substance addictions. In terms of psychological risk factors, as Shaffer and colleagues explain, the prevalence of psychopathology is increased among those who are dependent on multiple substances, which could potentially be another indicator of a common underlying vulnerability, and at the same time, many substance-abusers show comorbid mental health and behavioural disorders (Shaffer et al., 2004: 370). A risk factor, as Clayton (1992) explains, is best conceptualized as an individual attribute, situational condition, or environmental context that increases the probability of the individual engaging in the object/behaviour (Clayton, 1992). Social risk factors that are common amongst young addicts include things such as impulsivity, delinquency, and poor parental supervision. Similar to the psychological aspect, those who engage in one problem behaviour are likely to engage in others. Also included in social risk factors are sociodemographic factors such as family, peer groups, socioeconomic status and neighbourhood, all of which can influence and contribute to the likelihood of developing

addictions (Shaffer et al., 2004: 370). Lastly, 'shared experiences' refers to the notion that there are underlying commonalities to the experiences of different forms of addiction which 'diminishes personality differences and tends to make all compulsive users very much alike' (Shaffer et al., 2004: 370). Another aspect to the shared experiences category is common patterns of progression of addiction, which seem to be parallel amongst the different types of addictions. What Shaffer and colleagues mean by this is that once an addictive pattern emerges, its path is similar regardless of what the particular addiction is, whether it is drugs, alcohol, or gambling. Furthermore, the researchers conclude that both behavioural and chemical expressions of addictions are fundamentally similar (Shaffer et al., 2004: 370).

Given the absence of a specific and fully objective criterion for diagnosing addiction, Shaffer and his colleagues argue that the syndrome model of addiction encourages an improved understanding of both proximal distal (genetic risk, psychological and social risk factors such as vulnerability and object interaction) and proximal (biopsychosocial events such as repeated interaction) influences, and how they contribute to an addiction. They further suggest that rethinking addiction as a syndrome holds numerous implications for addictions recovery treatment programs. One of the biggest advantages of utilizing such a model is that it encourages clinicians and treatment programs to understand and recognize that addictions patients can develop new risk factors during the course of their treatment (Shaffer et al., 2004: 372). The syndrome model thus requires the development of multidimensional treatment plans that account for the various relationships amongst the multiple social and psychological influences, along with the outcomes and consequences of addictions.

Research Question and Hypotheses

As noted earlier, the main objective of this project is to identify whether or not certain factors are more or less likely to predict one's likelihood of being categorized as an at-risk or problem gambler versus a no-risk/non-gambler. To test for this, through the use of statistics, more specifically the logistic regression model and its associated classifications within this method, several individual research questions are posed, of which are tied into a complete model.

(1): Does poorer social support – having lower levels of social support resources available – increase the likelihood of at-risk or problem gambling?

H1: Lower scores on the Multidimensional Scale of Perceived Social Support (MSPSS) will be associated with an increased likelihood of being categorized by the Problem Gambling Severity Index (PGSI) as an at-risk or problem gambler.

(2): Do higher levels of impulsivity contribute to a greater likelihood of being classified as a problem gambler versus a non-problem gambler?

H2: Higher scores on the Barratt Impulsiveness Scale will be associated with a greater likelihood of being classified as an at-risk or problem gambler on the PGSI.

(3): Do different coping styles – planful problem solving, distancing, and escape-avoidance – increase or decrease the odds that an individual will be classified as an at-risk or problem gambler? Do task/problem-based coping styles decrease the probability of being classified as an at-risk or problem gambler? Do negative coping styles – distancing and escape-avoidance – increase the probability of problem gambling?

H3: (a) Higher scores on the planful problem solving coping style subscale of the Ways of Coping Questionnaire will be associated with a decrease in the likelihood of being classified as an at-risk or problem gambler by PGSI.

(b) Higher distancing coping style subscale scores on the Ways of Coping Questionnaire will be associated with increased likelihood of being classified as an at-risk or problem gambler on the PGSI.

(c) Higher escape-avoidance coping subscale scores on the Ways of Coping Questionnaire will be associated with increased likelihood of being classified an at-risk or problem gambler on the PGSI.

(4): Does alcohol use and drug use (both separately and together) increase the odds of an individual being classified a problem gambler?

H4: (a) Higher alcohol use scores will be associated with a greater likelihood of being classified at-risk or problem gamblers by the PGSI.

(b) Individuals who report using drugs will be associated with a greater likelihood of being classified as being an at-risk or problem gambler

(c) The positive association between alcohol use scores and the likelihood of being classified as an at-risk or a problem gambler will be, moderated by drug use, such that it will be even greater for those drinkers who also use drugs.

(5): Do those who exhibit any mental health disorders (depression and/or anxiety) have an increased likelihood of being classified as an at-risk or problem gambler?

H5: Having a mental health disorder will be associated with an increase in the likelihood of being classified an at-risk or problem gambler.

(6): Are there gender differences in the probability of being classified an at-risk or problem gambler, and is the effect of alcohol use on problem gambling moderated by gender? Accordingly, an alcohol use by gender interaction term will be tested.

H6: (a) Men will be more likely to be classified by the PGSI as at-risk or problem gamblers than women.

(b) The effect of alcohol use on the probability of being classified an at-risk or problem gambler on the PGSI will be moderated by gender, such that the effect of alcohol use on the likelihood of being classified an at-risk or problem gambler will be greater for men than women.

CHAPTER 3

METHODS

Data

The Manitoba Longitudinal Study of Young Adults (MLSYA) is used for this study. This survey encompasses a five year span beginning in December 2007. This survey was carried out by a joint commission between the Manitoba Gaming Control Commission, Manitoba Lotteries Corporation, and the Addictions Foundation of Manitoba. The main purpose of the MLYSA project was to track and understand the gambling attitudes and behaviours of young adults in Manitoba over a period of time. The initial call for participants was done through various recruitment strategies such as placing advertisements at various locations in Manitoba like post-secondary institutions, casinos, and lounges/bars where video lottery terminals are present. Further recruitment was also done by snowball sampling where respondents are asked to provide referrals to other potential participants. The data itself is divided into four cycles.

For this project, I analyze Cycle/Wave 2 data: December 2008 – July 2009. The reason for analysis of this cycle is because it contains measures of the variables I wish to analyze, some of which are not available in Cycle 1. While alcohol use, drug use and social support are available for Cycles 1 through 4, the Barratt Impulsiveness Scale and the Ways of Coping Questionnaire are only asked in Cycles 2 and 4. The rationale for choosing Cycle 2 data as opposed to Cycle 4 data is because of the number of respondents left after each Cycle due to attrition. Cycle 2 has an attrition rate of 10.6%, meaning 624 of the initial 679 respondents were available. Cycle 4 on the other hand retains 76.1% of the response rate, leaving 517 participants. Demographic information for Cycle 2 are as follows: there are 624 cases, of which men comprise 47.8% and women 52.2%. In terms of age, the majority of the respondents are between the ages

of 19-21 years old (97.8%). Two-thirds of the respondents in this cycle are in some form of post-secondary education (66.8%), while 22.4% of respondents completed high school but are not in a post-secondary institution. Lastly, almost four-fifths of the respondents resided in Winnipeg (78.8%)

Table 1: Wave/Cycle 2 Demographics

Gender	N	
Male	298	48%
Female	326	52%
Highest level of schooling?	N	
Less than high school	23	37%
Completed high school	140	22%
Some technical/vocational school or college	60	10%
Some university	357	57%
Completed degree, diploma, cert. from school or college	31	5%
Completed university degree	13	2%
Age at time of survey.	N	
18	4	1%
19	207	33%
20	237	38%
21	166	27%
22	10	2%
Region	N	
Winnipeg	492	79%
Non-Winnipeg	130	21%
Outside Manitoba	2	0%

* Percents may not add up to 100 due to rounding

Measures

Dependent Variable

Problem Gambling - whether respondents classify as a problem gambler category or not, is measured by the Canadian Problem Gambling Index. The CPGI is used to measure rates of problem gambling with specific focus on the Problem Gambling Severity Index (PGSI). This is a nine item scale that assesses risk of gambling problems. The possible scores for this scale range from 0-27. Of the nine questions asked, each response can range from 0-3. A score of 0 indicates a response of 'Never'. A score of 1 is a response of 'Sometimes'. A 2 is associated with the response of 'Most of the time', while a 3 is for a response of 'Almost always' (Ferris and Wynne 2001). The resulting scores are then added from the nine questions and a classification of gambler sub-types is generated. Ferris and Wynne made four classification categories. Those with a score of 0 are non-problem gamblers. Scores of 1 or 2 indicate a low-risk gambler. That is to say, he/she is at a low risk of becoming a problem gambler. Scores ranging from 3-7 indicates a moderate-risk gambler. Lastly, scores of 8 or higher are classified as problem gamblers (Ferris and Wynne 2001).

The present study uses a slightly recalibrated scale for analysis. The categories of moderate risk and high risk will be combined into a single category. The reason for categorizing the variable as opposed to running the model as a continuous variable is because I am interested in detecting differences in the effect of risk and protective factors between individuals who have, or are at risk for, problematic gambling behaviour and individuals not at risk. The main problem with the coding of the values into a dichotomous variable (0 and 1) is that those who would be classified as problem gamblers (PGSI scores of 8+) would be quite low (under 5%) if we are to take the prevalence rates found in Canadian studies (Ladoucer, 1996; Jacobs 2000; Azmier 2005;

Cox et al. 2005; Nower et al., 2004). Therefore, to ensure we have adequate variability in our dependent variable, it makes more sense to use the ‘non-problem’ (PGSI scores of 0), low risk problem gambler (PGSI scores of 1-2), and moderate/high risk (scores of 3 or higher) categories.

There is, however, a recent study by Currie and colleagues (2013) on the validity of the PGSI categories which argues that reviews of the PGSI using both qualitative and quantitative methods have revealed many notable weaknesses (Currie et al., 2013: 312). In addition, of the four categories (non-problem, low-risk, moderate-risk, and problem gambler), only the last one of the four underwent extensive validity testing. The names and cut-offs for the remaining categories were established arbitrarily. The biggest problem with this, as Currie and colleagues identify, is the creation of false positives (Currie et al., 2013). To elaborate this point further, since the PGSI is intended to be a continuous measure, the categories themselves should represent a meaningful progression in the level of risk. In addition, most studies, even ones with a large sample size, tend to show that only 2-3% of the sampled individuals have a score higher than eight on the PGSI. The solution to this for researchers has been to combine those in the moderate-risk category with those in the problem gambler category. This combining of the two categories was meant to increase statistical power (Afifi et al. 2010; Crockford et al. 2008).

Currie et al. (2013) propose revised cut-off points for the PGSI categories. They note that the most problematic PGSI categories are the low-risk and moderate-risk categories. They argue that these are distinct types of gamblers and that the merging of these categories creates a heterogeneous group with a wide range of risk. It would be inaccurate to label moderate-risk gamblers and low-risk gamblers with the original PGSI scaling since the differences between 1-2 and 3-7 are less than distinctive. Their proposal is to recalibrate the scale in order to capture the meaningful differences between the low-risk and moderate-risk gamblers (Currie et al., 2013).

Instead of the 0, 1-2, 3-7, 8+ scale, the re-calibrated scale categorizes low-risk as 1-4, while scores of 5-7 would become the moderate-risk group.

Their method is to test several data sources to find the validity and reliability in an effort to create a more statistically sound scale. The three datasets they test are the CPGI Integrated Dataset, which includes prevalence surveys conducted in various Canadian provinces (Alberta, British Columbia, Ontario, Manitoba, and Newfoundland), along with the national CPGI validation study. The second dataset is the Canadian Community Health Survey Cycle 1.2 (CCHS 1.2), which is a 2002 cross-sectional survey administered by Statistics Canada for various mental health and well-being related questions, including problem gambling, and is currently the largest national survey in regards to sample size for persons who were administered the CGPI (18,913 cases). The third study they examine is the Leisure, Lifestyle, and Lifecycle Project (LLLP), which is a five-year longitudinal study from Alberta with participants ranging from 13-65 years old and consists of 1808 participants.

Currie and his colleagues then test the validity and reliability of the four PGSI gambler types (non-problem, low-risk, moderate-risk, and problem gambler) for both the original scale and the revised scale. Of the four types, the non-problem and problem gambler categories have the greatest validity in the population. Most notably, the differences between non-problem gamblers and the other three categories were statistically different for gambling intensity and preference (Currie et al., 2013: 324).

In their study, the new cut-offs did improve the distinctiveness of these categories. What Currie et al.'s (2013) study show is that these revised categories are more distinct on measures of gambling intensity and gaming preference. This cut-off point is also recommended by Williams and Volberg (2013). In their study, they test different cut-off points for problem gambling. The

goal is to find whether or not there could be an improved classification to identifying a problem gambler. Their results show that for the PGSI when the 5+ cut-off threshold is used the prevalence ratio is closest to one – the desired value – and therefore has significantly higher specificity, positive predictive power, and diagnostic efficiency than the 3+ cut-off point that had been used previously. While it is worthwhile to examine these groups as separate entities under their classifications, the current project has a limitation in sample size which requires a slight modification.

Due to the low sample size of the MLYSA dataset, along with the statistical method chosen, the proposed study uses the original problem gambling scale, with PGSI scores of 0 being coded as "no risk", scores of 1-2 coded as "low risk", and scores of 3 or greater as "moderate/high risk". This decision stems from the issue that if the 5+ category is used as the cut-off proposed by Currie and colleagues, the sample would consist of only 21 cases. While this still falls into the typical 2-7% prevalence rate of problem gamblers as seen in the literature review section, many of the aforementioned studies encompassed thousands of cases. Here, we are limited to just over 500. Therefore, in an effort to preserve power, by looking at those with 'no risk', 'low risk', and 'moderate/high risk', we can attempt to see which variables are more likely to increase or decrease an individual's likelihood of belonging to one group versus the other.

Independent Variables

Social Support is measured using Zimet and colleagues' (1988) Multidimensional Scale of Perceived Social Support. Inclusion of this variable will allow this project to analyze how family, friends, and significant others contribute toward the development or non-development of problem gambling behaviour. The MSPSS is a 12-item self-report measure of subjectively assessed social

support. For this dataset, the 12 questions, and three categories (family, friends, and significant others) are on a 7-point Likert scale which ranges from 1 'Very strongly disagree' to 7 'Very strongly agree'. Participants who gave no answer to one or two questions had their missing responses replaced by the mean of the remaining valid responses, while those who failed to answer three or more questions are excluded from the analysis (MGCC, 2006).¹ In addition, the alpha coefficients for this variable ranged from 0.90 to 0.94, which indicated good internal reliability (MGCC, 2006). The three categories of perceived social support (family, friends, and significant others) are each scored separately. A fourth category is then given which added the scores of the three categories, then divided to obtain to mean score of the three categories. For this project, the fourth category is used in its scale form as it provides a broader coverage of the variables rather than simply looking only one of the three categories of social support.

As noted in the literature review, the role of social support plays an integral part to one's mental and physiological health. Research has demonstrated that the adequacy, or inadequacy, of social support is linked to the severity of reported physical and mental health (Petry and Weiss, 2009). But one issue that persists is how best to define and measure this idea of social support. While there is a general agreement among researchers that social support entails some kind of relationship between individuals, it is the nature of the transaction that is understood in different ways. Another issue concerns the question of social support operates. In other words, does social support act as a buffer or have a direct effect? The development of the MSPSS by Zimet and his colleagues then is to not only address, but improve on four aspects pertaining to existing social support scales at the time. First, the MSPSS is designed to specifically address the subjective assessment of social support adequacy (Zimet et al., 1988: 32). Second, the MSPSS is designed

¹ While replacing missing responses with the mean value may lead to some error in data analysis, the replacement of the missing data by substituting the mean was done by the Gaming Control Commission at the time the dataset was constructed, and therefore beyond the author's discretion.

to assess the perceptions of social support from three specific sources: family, friends, and significant other (Zimet et al., 1988: 32). The third point of the MSPSS is that it is shown to be psychometrically sound. In other words, there is good reliability and validity. Lastly, the MSPSS is self-explanatory, simple to administer, and time conserving (Zimet et al., 1988: 33).

Impulsivity is measured using the Barratt Impulsiveness Scale (BIS). The Barratt Impulsiveness Scale was devised in 1959 and is currently in its 11th revision (Stanford et al, 2009). The scale itself is a 30 item self-report instrument that is designed to assess the personality/behavioural construct of impulsiveness. As Stanford et al. notes, it is arguably “the most commonly administered self-report measure specifically designed for the assessment of impulsiveness in both research and clinical settings” (Stanford et al., 385).

The original BIS was developed by Ernest Barratt in 1959 in an attempt to relate impulsiveness to psychomotor efficiency. The issue that Barratt had noticed was that other scales and subscales which measured impulsivity and anxiety (such as the Thurstone Temperament Survey and Guilford-Zimmerman Temperament Survey) usually had non-significant correlations with each other. Barratt had originally hypothesized that these two constructs were independent (Stanford et al., 2009; 386). While early studies supported his hypothesis, Barratt found that they were not statistically correlated to his BIS. A review of several factor analytic studies (most notably Eysenck and Eysenck (1977) convinced Barratt that impulsiveness was not uni-dimensional as he had originally thought. The goal was then to revise the BIS to measure impulsiveness in the three sub-traits Barratt had proposed: Cognitive Impulsiveness, Motor Impulsiveness, and Non-Planning Impulsiveness (Barratt, 1985). The current version of the BIS (11th version), came about as Barratt's final attempt to more specifically define the subtraits of

impulsiveness. A principal component analysis (PCA) was run on BIS-10 data and the resulting finding was that six first-order factors were established.

As for the MLSYA dataset itself, the BIS-11 is used to measure the six primary dimensions of impulsiveness that Barratt had produced after his PCA analysis: attention, motor impulsiveness, self-control, cognitive complexity, perseverance, and cognitive instability. As noted by the researchers who collected the data, this multiple factor structure was not viable with the MLSYA data set (MGCC, 2006). Consequently, an overall impulsiveness score is calculated by adding up the response scores to the 30 questions in the BIS-11. The scores are designed as a 4-point Likert scale with 1 being 'rarely/never', 2 'occasionally', 3 'often', and 4 'almost always/always'. In doing so, the possible scores range from a minimum of 30 to a maximum of 120, with higher scores indicating a tendency towards more impulsive behaviour. Reliability statistics for this variable produced an alpha coefficient of 0.84, which is noted as having comparable results achieved in previous studies by Patton and Stanford (MGCC, 2006).

Alcohol Use is measured by a scale taken from the CCHS Cycle 2.1 (Statistics Canada, 2004). The alcohol use scale is slightly modified, using a shortened version from the Composite International Diagnostic Interview Short-Form (MGCC, 2006). The respondents are asked the question "How often in the past 12 months have you had five or more drinks on one occasion?" (MGCC, 2006). Those who answer 'at least once a month' are then asked a series of nine questions. The possible scores range from 0 to 9, with higher scores indicating a greater chance of alcohol dependence. The alpha coefficient is 0.72, which indicates a moderately good internal consistency (MGCC, 2006). For this project, alcohol dependence is left in its original scale form.

Drug Use is measured by a scale taken from the CCHS Cycle 2.1. The drug use variable contains several sub-questions regarding certain types of drugs such as hard (cocaine, ecstasy)

and soft (marijuana) drugs. Each are a dichotomous measure, with use of each type of drug coded 1, and non-use coded as 0. For this project, due to the low number of cases in each of the types of drugs used, the scale I use looks at any drug use over the past 12 months of Wave 2. In other words, if the respondent indicates using any hard or soft drugs, they are coded as '1' having used drugs, while a '0' indicates no use in the 12 month period.

Coping Style is measured by Lazarus and Folkman's (1980) Ways of Coping Questionnaire. This 66 item instrument assesses 8 purported coping styles. In accordance with the literature reviewed earlier, only three of these coping styles are of interest in the current study: planful problem solving, escape-avoidance techniques, and distancing. The questions use a 4-point Likert scale ranging from 0 to 4, with increased use as the value increases. The variable is thus a continuous variable with a score of '0' indicating not used, and '4' indicating a great deal of use, and when added up for a raw score within each style of coping, higher scores indicate greater use. If it is shown that problem gamblers are more likely to use one strategy of coping over another, then it would make sense to further examine those strategies as potential tools to develop health and wellbeing policies around.

Anxiety is measured using the Generalized Anxiety Disorder scale from the World Health Organization's Composite International Diagnostic Interview - Short Form (CIDI-SF). The CIDI-SF was taken from the larger, fully structured CIDI. The goal of the CIDI-SF is to provide a much quicker screen for the more commonly occurring psychiatric disorders that were found in the CIDI (Kessler et al., 1998: 171). The CIDI-SF contains several 'stem questions' for eight syndromes that are assessed in the CIDI. One of them is the generalized anxiety disorder (GAD), which first asks the question of whether or not the respondent has ever had a period of a month or more when he/she was worried, tense, or anxious. If the respondent answers 'Yes', a subsequent

list of other questions may be asked. For this project, due to a lower number of cases in the MLSYA dataset, only the responses from this initial stem question is used. For those answering 'No', they are coded as '0', while those answering 'Yes', are coded as '1'.

Depression is also measured in the MLSYA dataset by the CIDI-SF. Similar to anxiety (GAD), major depression is another one of the eight syndromes in the CIDI-SF (Kessler et al., 1998: 175). The main stem question asks the respondent whether or not he/she has felt sad, blue, or depressed for two weeks or more in a row. For this project, those who respond 'No' are coded as '0', and those who respond 'Yes' are coded as '1'.

For this project however, given the number of cases available, along with the case-wise deletion issue in SPSS, the variables of anxiety and depression are further collapsed into a single variable called "Depression and Anxiety". The new variable was computed with possible scores ranging from 0-2. A score of '0' indicates that the individual has responded 'no' to both of the anxiety and depression variables, while a score of '1' indicates a response of 'yes' to one of the two items. Lastly, a score of '2' indicates that the respondent answered 'yes' to both of the items. For this 'Depression and Anxiety' variable, a dichotomous variable is then created, with scores of '0' remaining '0', indicating an absence of both, while scores of '1' and '2' are recoded as '1', indicating a presence of either and/or both.

Gender is coded with women being '0' and men being '1'.

Analytical Procedures

As described previously, the dependent variable has multiple outcomes –no risk, low risk, and moderate/high risk gambler –using ordinary least squares (OLS) regression is not appropriate. Instead, logistic regression – which is intended for use with either dichotomous or multiple

outcome categories is used. Logistic regression models are run in SPSS. Logistic regression is a type of regression analysis that determines the impact of multiple independent variables on the likelihood of occurrence of a target condition or event. In addition, logistic regression can be used to assess the relative importance of the independent variables through odds ratios. The impact of the predictor variables are expressed in terms of odds ratios, with values over 1 indicating an increase in the likelihood being classified in the target outcome category and values less than 1 indicating a decrease in likelihood. For this thesis, given the scale, a multinomial logistic regression analysis is used. This type of logistic regression is used when the dependent variable contains more than two possible outcomes, while independent variables can be discrete or continuous. The dependent variable in this project consists of three categories: the first category is the non-problem or no risk gamblers, which will also be the reference category. The second is the low risk category, and the third is the moderate/high risk group. In this case, the analysis will examine the effect of the independent variables on the individuals and their probability of being classified in the low risk, or moderate/high risk for problem gambling categories relative to the no-risk category. Logistic regression applies maximum likelihood estimation after transforming the dependent variable into a logit variable. In other words, logistic regression estimates the odds of a certain event occurring and the strength of the influence of the predictor variables on this outcome. For this project, in order to assess the relative importance of the independent variables, the logistic regression is run with all independent variables entered into the model at once.

There are a few key reasons for using a logistic regression as opposed to other linear regression methods such as an ordinary least squares (OLS) model. First, logistic regression does not assume linearity of relationship between the independent variables and the dependent variables. Another aspect of logistic regression is that it does not require normally distributed

variables, nor assume homoscedasticity, and in general has less stringent requirements (Garson, 2009). Logistic regression does however require that the observations be independent and that the independent variables be linearly related to the logit of the dependent variable. Finally, one can address the predictive success of logistic regressions by looking at the classification tables and goodness-of-fit tests such as the likelihood ratio, Hosmer-Lemeshow test, and the Wald statistic to test the significance of the independent variables (Garson, 2009). There are a few assumptions underlying logistic regression, they are: linearity in the logit, the absence of multicollinearity, independence of errors, and the absence of outliers in the solution (Field, 2009; Tabachnick and Fidell, 2012). To test for the first assumption, Tabachnick and Fidell note that while there are several graphical methods for testing this assumption, the Box-Tidwell approach is among the simplest. In this approach, the terms, which are composed of interactions between each predictor and its natural logarithm, are added to the logistic regression model. If the terms are not statistically significant, this assumption is proven to be confirmed (Tabachnick and Fidell, 2012: 445). However testing for the linearity of the logit in this project will be done using Field's (2009) method in SPSS. This is done by creating new variables that are natural logs of the original continuous variables. Next, all variables are placed into a single block in addition to the newly created interaction terms and their logs. The resulting output generated allows us to see whether or not the assumption has been met or violated. If the significance value is greater than 0.05, in other words not significant, this indicates that the assumption of linearity of the logit has been met (Field, 2009: 296).

To test for multicollinearity, Tabachnick and Fidell recommend using multiway frequency analysis for discrete predictors to find very strong relationships among them. For continuous predictors, they note that the discrete predictors should be replaced with dichotomous

dummy variables (Tabachnick and Fidell, 2012: 445). Field (2009) notes that while there is no way for SPSS to produce collinearity diagnostics in the logistic regression itself, statistics such as tolerance and VIF (variance inflation factor) are obtained by running linear regression analysis using the same outcome and predictor variables (Field, 2009: 297). Field, citing Menard (1995) and Myers (1990), notes that for the resulting collinearity output, a tolerance value of less than 0.1 indicates a collinearity problem, while a VIF value greater than 10 is a cause for concern (Fields, 297).

The independence of errors assumption is assessed by utilizing the Durbin-Watson test, which tests for serial correlations between errors. The test statistic can range between the values of 0 and 4, with a value greater than 2 indicating that the residuals are uncorrelated. A value greater than 2 indicates a negative correlation between adjacent residuals, while values lower than 2 indicate a positive correlation. As a very conservative rule, Field notes that values less than 1, or greater than 3, are causes for concern (Field, 2009: 221). Additionally, to test for outliers Tabachnick and Fidell suggest an analysis of the standardized residuals. We can test for this assumption by running a scatterplot in SPSS and examine for any cases that appear to be outliers on the plot.

By running a multinomial logistic regression analysis, it can help us better understand which factors are likely to determine whether to a young adult is categorized as a no-risk, low-risk, or moderate-to-high risk for problem gambling. The literature and case studies examined so far usually look at single factors, or when multiple factors are addressed, the focus has rarely been on young adults, but instead attention has been focused on adolescents (Chambers and Potenza 2003; Nower et al. 2004; Derevensky 2008) and older adults (Black and Moyer 1998; Clarke 2008). For example, studies that attempt to address impulsivity have only analyzed

impulsive behaviours, while the studies arguing that social support is a significant factor in one's gambling behaviours have rarely looked at other factors such as drug and/or alcohol use or impulsivity(Lacey et al., 1986; Blaszczynski and Nower, 2002; Potenza et. al., 2003). Since the literature has shown that all these factors are indeed significant in furthering our knowledge about problem gambling, it is beneficial to analyze which of these factors is/are more likely to predict problem gambling in young adults.

For this project, the multinomial logistic regression model is computed in two steps. In the first model, all the independent variables are entered and run as main effects. The second model then adds the two additional interaction terms into the model to test for the interaction effects. The independent variables of impulsivity, social support, the three ways of coping measures, and alcohol use are entered as scale variables, while depression and anxiety, drug use, and gender are entered as dichotomous variables. In addition, the interaction effects are also entered into the model after the individual variables and plotted into a graph.

CHAPTER 4

RESULTS

Table 1 gives the basic univariate statistics for the variables, while Table 2 provides the bivariate correlation of the variables to be analyzed. For the variables used in this project, the dependent variable of problem gambling initially consisting a total of 624 cases in Wave 2 of the MLSYA dataset, broken down into three categories: No risk/ non-gambler (78.4%), Low risk gamblers (13.8%), and a combined category of Moderate/High risk gambler (7.8%). For the dichotomous independent variables, first for gender, Wave 2 of the dataset contained a slightly higher amount of women than men at 52.2%. With regards to mental health disorders, just over a quarter of the cases (26.3%) had at least one form of mental health disorder present (anxiety and/or depression). Lastly, for drug use, 41.9% of Wave 2 respondents indicated having used any type of drugs in the past 12 months. All continuous variables were normally distributed.

Table 2 provides a basic bivariate Pearson's r correlation analysis of the continuous variables. The last three independent variables in Table 2 are nominal variables, and therefore when compared to the other continuous variables, are calculated with Spearman's rho as opposed to Pearson's r . First, for the dependent variable of problem gambling, the correlations between the DV and various IVs are in line with hypothesized relationships. We can see that social support is the only negative relationship, with scores on the MSPSS inversely correlated with problem gambling risk. In other words, as social support increases, risk of problem gambling decreases. Impulsivity, alcohol use, drug use, escape avoidance, and distancing were all positively related to problem gambling, which indicates that increases in each are associated with increases in the risk of problem gambling. Gender, with men being the target group is also positively correlated, meaning that men are associated with increased risk of problem gambling compared to women.

Lastly, planful problem solving was the only IV that is not significantly correlated to problem gambling risk.

TABLE 2a: Univariate Statistics

	<i>N</i>	<i>Mean</i>	<i>Std Dev.</i>
Impulsivity	604	33.6	10.35
Social Support	605	5.47	1.16
WOC – Planful Prob. Solving	599	6.95	3.8
WOC - Distancing	599	5.61	3.47
WOC - Esc. Avoidance	599	6.13	4.85
Alcohol Use	624	0.97	1.64
PGSI (Wave 2)			
No Risk/ Non-gamble	489	(78.4%)	
Low Risk	86	(13.8%)	
Mod/High Risk	49	(7.8%)	
Mental Health Disorders			
Present	164	(26.3%)	
Absent	460	(73.7%)	
Drug Use			
Yes	257	(41.9%)	
No	357	(58.1%)	
Gender			
Men	298	(47.8%)	
Women	326	(52.2%)	

Prior to entering all the variables into the logistic regression model, tests are conducted to verify that the various assumptions underlying logistic regression were satisfied. With regards to testing for the linearity of the logit, the continuous/scale variables are all tested. First, each continuous variable is logged. Next, to test the assumption, each newly created log variables are run as an interaction with the original variables. As noted by Field (2009), the assumption is met if the interactions have p values greater than 0.05. In this case, all variables have p values greater than 0.05 (ranging from 0.09 to 0.86). In testing for multicollinearity, using Field's test of collinearity diagnostics in SPSS of obtaining tolerance and VIF values, a check of the covariates in this project indicate the absence of multicollinearity as all the tolerance values are greater than 0.1, while the VIF values are all less than 10. Lastly, a check of the Durbin-Watson test yields a value of 1.5. This falls into the acceptable range of 1 to 3. It also indicates that there is a positive correlation, since a value of greater than 2 would indicate that they are uncorrelated. One of the issues noted by Field is that the Durbin-Watson statistic depends on the number of predictors and the number of observations. Given the low N value, it is likely that the values are more likely to be autocorrelated.

TABLE 2b: Correlation Matrix

Variables	PGSI	Soc. Support	Impulsivity	Prob. Solving	Distancing	Esc. Avoidance	Alc. Use	Mental Health	Drug Use	Gender
PGSI	1	-.171**	.226**	.04	.147**	.256**	.191**	.088*	.174**	.171**
Social Support		1	-.18**	.185*	.009	-.094*	.006	-.131**	-.042	-.225**
Impulsivity			1	-.062	.135**	.272**	.254**	.044	.241**	.065
Problem Solving				1	.448**	.407**	.126**	.108**	.018	-.038
Distancing					1	.54**	.138**	.07	.041	-.014
Esc. Avoidance						1	.19**	.231**	.125**	-.106**
Alcohol Use							1	.054	.365**	.066
Mental Health ^a								1	.109**	-.083*
Drug Use ^a									1	.07
Gender ^a										1

** Correlation is sig. at the 0.01 level (2-tailed)

* Correlation is sig. at the 0.05 level (2-tailed)

^a spearman's rho

Once the assumptions are tested and confirmed, the multinomial logistic regression is run in SPSS. Several factors contribute to the decision to use a multinomial logistic regression with three categories for the dependent variable, no risk/ non-problem gambler, low risk gambler, and moderate/high risk gambler, instead of a simple binary logistic regression with a dichotomous dependent variable. First, due to the number of cases, if a two category DV between non-problem, low risk, and moderate risk compared to a high risk problem gambler were used, the N size for those in the high risk problem gambler category would be very small. Another idea, which was tested, is to have the two categories be differentiated between a 'no-risk' group, that is, anyone who scored 0 on the PGSI scale, compared to all individuals who had a score of 1 or greater. The issue with this second approach is that in doing so, much of the potential differences between the

low risk and moderate/high risk individuals may be lost and/or underestimated. Furthermore, another multinomial logistic regression was run first, only using the moderate/high risk category as the reference category instead of the "no risk" category as used in the final model. The idea is to see if there are significant differences between the low risk and moderate/high risk categories. If there are no significant differences between any of the variables in these two groups, then a simple binary logistic regression of "no risk" compared to "any" risk would be appropriate. However, if there are significant differences between the two, as was found in the present study (see Table 4), then it made sense to separate the two groups as there are differences in the two categories.

For the multinomial logistic regression, the dependent variable is first placed into the model. The dependent variable originally contains 624 cases. 17 cases with invalid/incomplete responses for PGSI are removed, leaving a sample 607 valid responses. Next, a further 20 cases are removed from the multinomial logistic regression analysis since SPSS uses case-wise deletion whereby any cases that are missing values in any of the selected independent variables are removed from the model. Multiple imputation was considered a possible solution to address the missing cases, however as noted by a few researchers, missing cases of less than 5% is ignorable, and any result between imputing and not imputing yields minimal differences at best (Schafer, 1999; Bennet, 2001; Tabachnick and Fidell 2012). The model thus contains a valid total of 587. Of the 587 valid cases in this model, 461 cases (78.5%) are grouped into the 'non-problem/no-risk gambler' category. These are cases of respondents who scored 0 on the PGSI or did not participate in gambling activities. Next, 84 cases (14.3%) are classified as the 'low risk problem gamblers'. This category consists of respondents who scored 1-2 on the PGSI. Finally 42 cases (7.2%) are classified as the 'moderate/high risk problem gamblers' (scores of 3 or greater on the

PGSI). While this percentage is slightly above the average in the literature reviewed earlier, it is deemed more optimal for this analysis to combine the moderate and high risk groups into one category due to the number of cases in this dataset.

For the first models (Tables 3a, 4a, and 5a), only the independent variables (covariates) are entered and run as main effects. Two variables, as noted earlier, general anxiety disorder and depression, are combined into a single category renamed 'depression and anxiety' due to the low number of positive cases for each variable. Again, this was meant to increase statistical power and mitigate the list-wise deletion issue. Then for Tables 3b, 4b, and 5b, the two interaction terms are entered into the model. A gender x alcohol use interaction term was created to see if the effects of alcohol use differed by gender, and an alcohol use x drugs interaction term was created to examine whether use of both substances in combination (alcohol and drugs) potentially increased the likelihood of being categorized as a problem gambler compared to use of one or the other (either drug or alcohol use) only. All other covariates are entered as a main effect. The independent variables of impulsivity, social support, escape avoidance, planful problem solving, and distancing are all entered into the model in their original scale forms.

First, from the resulting output we get the Model Fitting Information. This output gives the log likelihood (a measure of how much unexplained variability is in the data). In other words, the change in the log-likelihood indicates how much new variance has been explained with this new model. The chi-square for this model shows an initial (intercept only) value of 770.945 to the final value of 662.044, which is a difference of 108.901. This change is also significant $p < .001$, which means that the final model explains a significant amount of the original variability. The next output is the Goodness-of-Fit output. This output tells us whether or not the data is a good fit. Both the Pearson and deviance statistic test the same thing; whether or not the predicted

values differ significantly from the observed values. As Field (2009) notes, if these statistics are not significant, then the predicted values are not significantly different from the observed values, and thus the model is a good fit. For this model, both the Pearson and deviance values meet the criteria with the former being 0.510 and latter being 1.00 indicating that this model is a good fit to the data. The third output gives us two pseudo R-square estimates: Cox and Snell, and Nagelkerke. Cox and Snell's R^2 shows a value of 0.169, while Nagelkerke's R^2 shows a value of 0.232.

Logistic regression model estimates are presented in Tables 3-5. The b (logistic coefficient), the standard error, the Wald statistic, and the odds ratio (OR) are presented for each predictor. In logistic regression, the Wald statistic is an indicator of whether the logistic coefficient for that covariate is significantly different from zero. If it is, then we can assume that the covariate is making a contribution to the prediction of the outcome.

**Table 3a: Multinomial Logistic Regression Estimates (Low Risk vs. No Risk)
Main Effect Model**

	B	Std. Error	Wald	Odds Ratio	Lower Bound (95% C.I)	Upper Bound (95% C.I)
Intercept*	-1.975	.852	5.376			
Social Support	-.064	.115	.309	.94	.750	1.170
Impulsivity	.011	.013	.685	1.01	.985	1.038
WOC- Planful Problem Solving	-.070	.040	3.078	.94	.862	1.008
WOC - Distancing	.048	.044	1.178	1.05	.962	1.143
WOC - Escape Avoidance	.087	.032	7.229	1.09*	1.024	1.163
Alcohol Use	.165	.073	5.088	1.18*	1.022	1.361
Drug Use	.491	.271	3.284	1.74	.961	2.780
Depression and/or Anxiety	.336	.309	1.176	1.40	.763	2.566
Gender - Men	.641	.264	5.887	1.90*	1.131	3.189

Notes: The reference category is the Non-gambler/no-risk category

R²= .15 (Cox & Snell), .21 (Nagelkerke)

* p< .05

Table 3b: Multinomial Logistic Regression Estimates (Low Risk vs. No Risk) Interaction Model						
	B	Std. Error	Wald	Odds Ratio	Lower Bound (95% C.I)	Upper Bound (95% C.I)
Intercept	-2.452	.907	7.301			
Social Support	-.054	.116	.219	0.95	.755	1.188
Impulsivity	.010	.013	.583	1.01	.989	1.040
WOC- Planful Problem Solving	-.078	.041	3.643	1.08	.855	1.002
WOC - Distancing	.049	.044	1.216	1.05	.963	1.145
WOC - Escape Avoidance	.094	.033	8.256	1.10*	1.03	1.171
Alcohol Use	.089	.116	0.169	1.05	.836	1.317
Drug Use	.802	.315	6.491	2.23*	.353	4.132
Depression and/or Anxiety	.322	.311	1.074	1.38	.750	2.540
Gender - Men	.622	.322	3.349	1.77	.992	3.498
Gender (M) x Alcohol Use	.042	.136	.098	1.09	.802	1.364
Drug Use x Alcohol Use	.388	.152	4.199	1.47*	1.017	2.135

Notes: The reference category is the Non-gambler/no-risk category
 $R^2 = .17$ (Cox & Snell), $.23$ (Nagelkerke)

* $p < .05$

Table 4a: Multinomial Logistic Regression Estimates (Moderate/High Risk vs. No Risk)						
Main Effect Model						
Mod/High Risk	B	Std. Error	Wald	Odds Ratio	Lower Bound (95% C.I)	Upper Bound (95% C.I)
Intercept	-2.53	1.122	5.080			
Social Support	-.215	.150	2.071	.81	.601	1.081
Impulsivity	.043	.019	5.082	1.04*	1.006	1.083
WOC- Planful Problem Solving	-.014	.055	.067	.99	.886	1.097
WOC - Distancing	.026	.060	.185	1.03	.912	1.115
WOC - Escape Avoidance	.100	.045	4.893	1.16*	1.012	1.209
Alcohol Use	.150	.092	2.674	1.15	.971	1.391
Drug Use	.458	.392	1.365	1.58	.733	3.412
Depression and/or Anxiety	.821	.368	4.961	2.27*	1.103	4.678
Gender - Men	1.177	.394	9.063	3.28*	1.513	7.098

Notes: The reference category is the Non-gambler/no-risk category

R²= .15 (Cox & Snell), .21 (Nagelkerke)

* p< .05

Table 4b: Multinomial Logistic Regression Estimates (Moderate/High Risk vs. No Risk) Interaction Model						
Mod/High Risk	B	Std. Error	Wald	Odds Ratio	Lower Bound (95% C.I)	Upper Bound (95% C.I)
Intercept	-3.245	1.234	6.912			
Social Support	-.175	.155	1.281	0.84	.619	1.137
Impulsivity	.041	.019	4.456	1.04*	1.003	1.082
WOC- Planful Problem Solving	-.021	.055	.149	0.98	.878	1.092
WOC - Distancing	.034	.062	.291	1.04	.916	1.168
WOC - Escape Avoidance	.107	.046	5.307	1.13*	1.016	1.218
Alcohol Use	.140	.325	1.757	1.15	.909	1.450
Drug Use	.948	.455	4.226	2.58*	1.043	1.630
Depression and/or Anxiety	.982	.375	6.654	2.67 *	1.267	5.627
Gender - Men	.644	.470	1.877	1.80	.758	4.778
Gender (M) x Alcohol Use	.434	.232	3.491	1.96*	1.071	3.782
Drug Use x Alcohol Use	.588	.203	5.091	1.80*	1.080	3.003

Notes: The reference category is the Non-gambler/no-risk category

R²= .17 (Cox & Snell), .23 (Nagelkerke)

* p< .05

**Table 5a: Multinomial Logistic Regression Estimates (Moderate/High Risk vs. Low Risk)
Main Effect Model**

Mod/High Risk	B	Std. Error	Wald	Odds Ratio	Lower Bound (95% C.I)	Upper Bound (95% C.I)
Intercept*	-2.224	1.353	2.701			
Social Support	-.152	.170	.796	.86	.616	1.199
Impulsivity	.032	.021	2.209	1.03	.990	1.076
WOC- Planful Problem Solving	.056	.062	.822	1.06	.937	1.194
WOC - Distancing	-.022	.068	.104	.98	.856	1.118
WOC - Escape Avoidance	.013	.050	.069	1.02	.918	1.117
Alcohol Use	-.015	.099	.021	.89	.811	1.197
Drug Use	-.033	.444	.005	.94	.405	2.311
Depression and/or Anxiety	1.156	.428	7.301	3.18*	1.374	7.353
Gender - Men	.546	.440	1.539	1.73	.729	4.087

Note: The reference category is the low risk category

R²= .15 (Cox & Snell), .21 (Nagelkerke)

* p< .05

Table 5b: Multinomial Logistic Regression Estimates (Moderate/High Risk vs. Low Risk) Interaction Model						
Mod/High Risk	B	Std. Error	Wald	Odds Ratio	Lower Bound (95% C.I)	Upper Bound (95% C.I)
Intercept*	-.831	1.407				
Social Support	-.115	.175	.349	0.89	.632	1.256
Impulsivity	.033	.022	.433	1.03	.991	1.079
WOC- Planful Problem Solving	.056	.062	2.383	1.06	.936	1.196
WOC - Distancing	-.016	.069	.817	0.98	.860	1.127
WOC - Escape Avoidance	.011	.051	.052	1.01	.916	1.117
Alcohol Use	-.582	.342	2.902	0.56	.286	1.092
Drug Use	-.210	.517	.165	0.81	.294	2.234
Depression and/or Anxiety	1.234	.434	8.087	3.44*	1.468	8.043
Gender - Men	.009	.527	.000	1.01	.359	2.836
Gender (M) x Alcohol Use	.590	.352	2.808	1.80	.905	3.598
Drug Use x Alcohol Use	.199	.271	.538	1.22	.717	2.076

Note: The reference category is the low risk category
 $R^2 = .17$ (Cox & Snell), $.23$ (Nagelkerke)
 * $p < .05$

First, the low risk category when compared to the no risk category will be addressed (Table 3a and 3b). Since this is a multinomial logistic regression rather than a simple binary logistic regression, the outcome variable has, in this case, 3 categories. First, looking at the initial multinomial logistic regression model (Table 3a), three independent variables are significant: escape-avoidance, alcohol use, and gender. Their odds ratios are 1.09, 1.18, and 1.90 respectively. This indicates that for those with higher escape-avoidance coping style scores, each 1 unit increase is associated with a 1.09 times greater likelihood of being in the low risk category. Similarly, those with higher alcohol use scores are also associated with an increase of 1.18 times

more likely to be in the low risk category. Lastly, for gender, men are 1.90 times more likely than women to be in the low risk category.

Next, the two interaction terms are entered into the model. Looking at this category in reference to the no risk/non-problem gambler category, there are three covariates that are significant: escape avoidance, drug use, and the interaction between drug and alcohol use. Their odds ratios are 1.10, 2.23, and 1.47 respectively. This means that when comparing between low risk problem gamblers to non-gamblers/no-risk gamblers, those individuals who tend to use escape-avoidance as a coping style are more likely to be in the low-risk category than the non-gambler/no-risk category, with each 1 unit increase in escape-avoidance coping score associated with 1.10 times greater likelihood of being in the low-risk category. In terms of drug use, those who have used illicit drugs at any point over the past 12 months of Wave 2 are also 2.23 times more likely to be categorized as a low risk problem gambler than a non-gambler/no-risk gambler. The interaction term of alcohol x gender was not a significant predictor, meaning that there is no interaction between these variables for the low risk category. The drug by alcohol use interaction term is significant, indicating that the association between alcohol and gambling risk is moderated by drug use, such that those the effect of alcohol on probability of being in the low risk groups (versus no risk group) is greater for those who also do drugs.

Next, when the moderate/high risk category is compared to the non-gambler/no-risk category, the differences become even more pronounced (Table 4a and 4b). For the initial model, the variables of impulsivity, escape-avoidance coping, depression and anxiety, and gender are significant predictors. Higher impulsivity scores are associated with being 1.04 times more likely to belong in the moderate/high risk category, while greater use of the escape-avoidance style of coping is associated with an 1.16 times increase in likelihood of being in this category. Those

who have either depression or anxiety are also associated with having a greater chance of being in the moderate/high risk category at 2.27 times. Lastly, men are 3.28 times more likely than women to be in the moderate/high risk category.

Next, the two interaction terms are placed into the model. All three covariates that are significant in the low risk category (Table 3b) remain significant for this moderate/high risk category. The escape-avoidance style of coping is associated with greater chance of being at moderate/high risk compared to no-risk for problem gambling with each 1 unit increase in escape-avoidance score being associated with 1.13 times greater odds of being in the higher risk group. Drug use increases the probability of being moderate/high risk by 2.58 times. Furthermore, the model also shows that those who scored higher on the impulsivity scale (lower control) are more likely to be categorized in the moderate/high risk problem gambler category, with each 1 unit increase in impulsivity score associated with 1.04 times greater likelihood of being in the higher risk category. For depression and anxiety, those who do exhibit depression and/or anxiety are 2.67 times more likely to belong in the moderate/high risk category than the non-gambling/no-risk category.

With regards to the interaction terms, gender x alcohol use, it was significant in relation to membership in the moderate/high risk category. This means that the association between alcohol use and probability of membership in the moderate/high risk category is greater for men than for women. Additionally, the alcohol x drug use interaction was also significant in relation to membership in the moderate/high risk group. That is, the association between alcohol use and membership in the moderate/high risk category is greater for those who also use drugs (compared to those who don't).

Finally, when the low risk problem gambler category is entered as the reference category and compared to the moderate/high risk category, only one of the covariates is significant. As reported in Table 5a and 5b, having anxiety and/or depression is associated with 3.4 times greater probability of belonging to the moderate/high risk category than the low risk category.

In this section, the moderator effects are explored further. For the two interaction terms that are used, multiple graphs are constructed. The graphs provide a visual indicator of the interactions. The Y axis represents the probability of membership in the higher risk problem gambling category (Low Risk in Figures 6a and 6c; Moderate/High Risk in Figures 6b and 6d) compared to the no risk group.

Figure 6a: Interaction between Alcohol Use and Low Risk Problem Gambling as Moderated by Gender

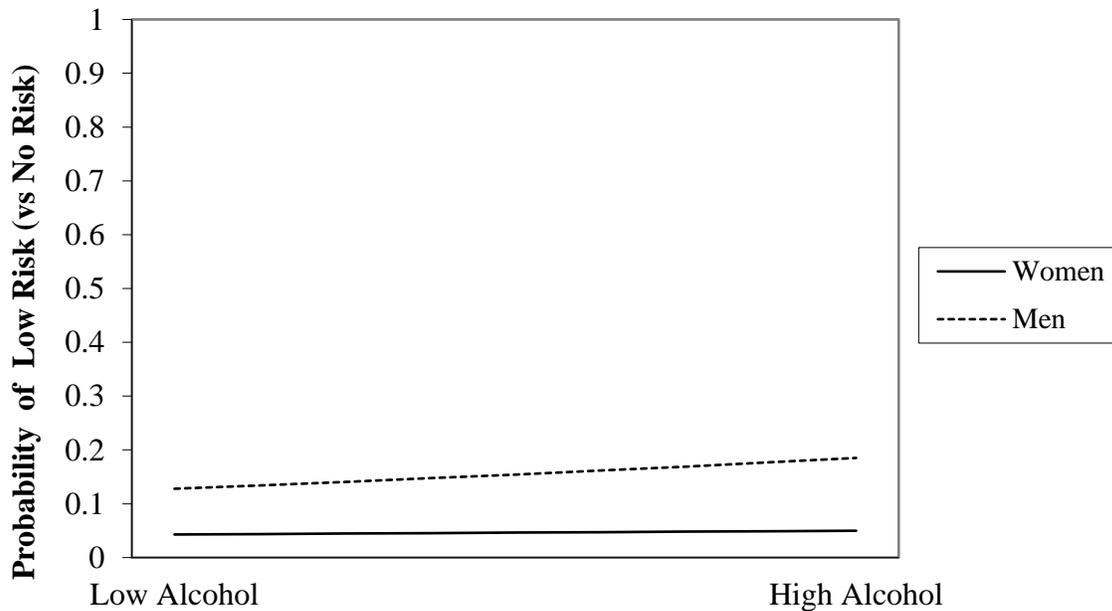


Figure 6a shows the insignificant interaction between alcohol and gender on probability of membership in the low risk category. The alcohol use variable here is the independent variable,

with gender being the moderator. The results for the low risk category compared to the no risk category with the interaction of gender and alcohol use was not significant, therefore indicating that there is no interaction effect between gender and alcohol for the low risk problem gambling category.

Figure 6b: Interaction between Alcohol Use and Moderate/High Risk Problem Gambling as Moderated by Gender

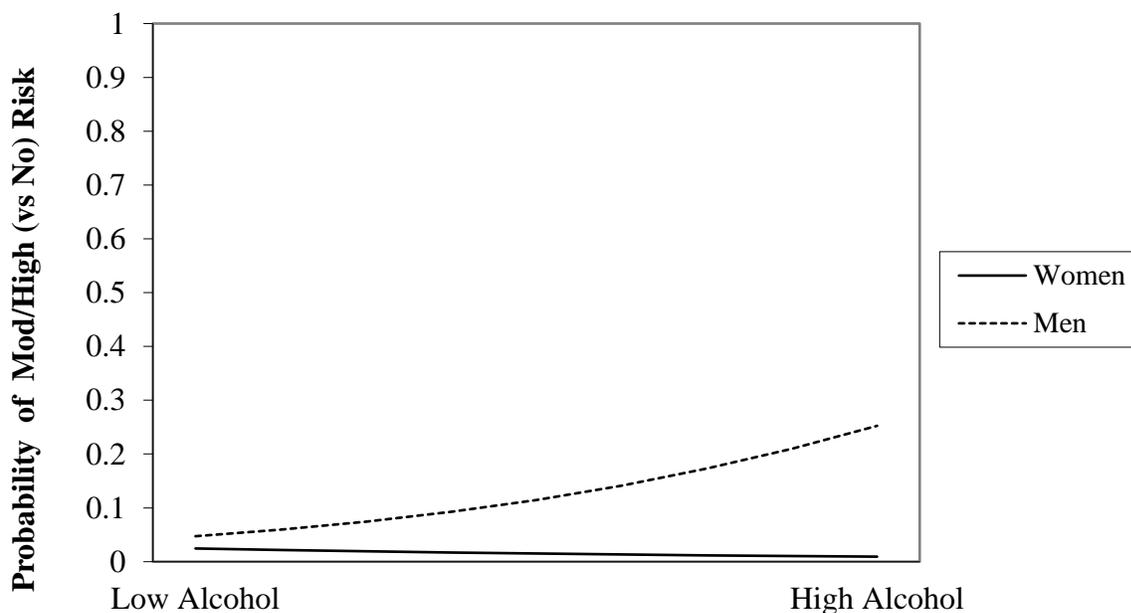


Figure 6b shows the significant interaction between alcohol and gender on the probability of membership in the moderate/high risk category. The results show the association between alcohol use and likelihood of problem gambling is moderated by gender. The graph shows that for women, there is little to no change in slope between low alcohol use and high alcohol use on the likelihood of belonging to a higher risk category. For men however, as indicated by the slope, as alcohol use increases, so too does the likelihood of being in a higher risk category.

Table 6c: Interaction between Alcohol Use and Low Risk Problem Gambling as Moderated by Drug Use

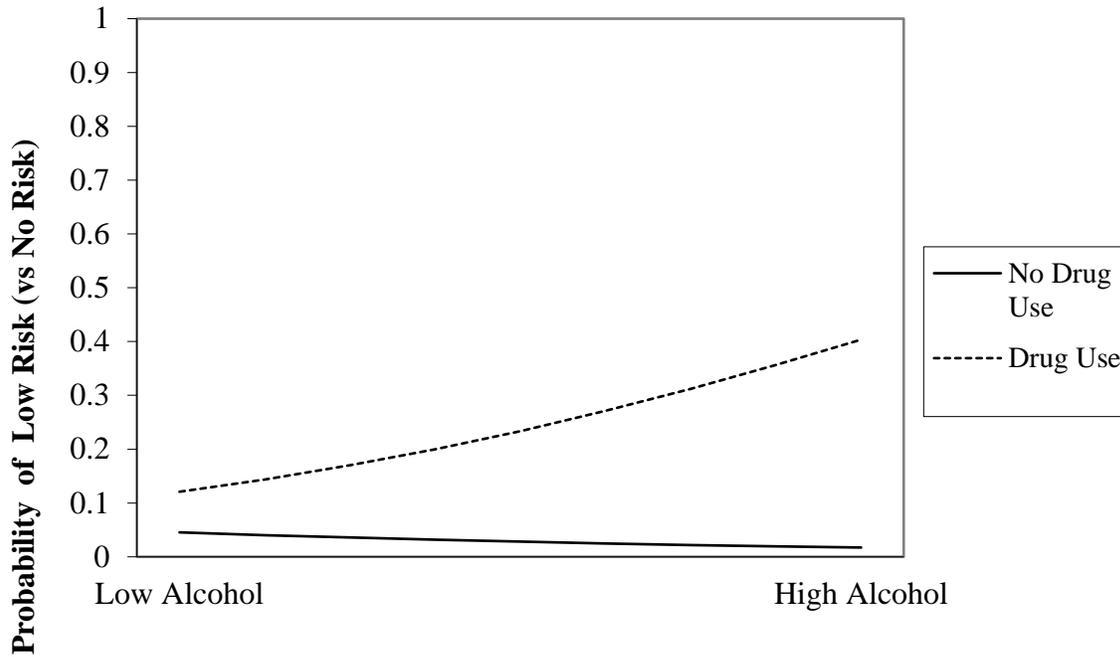
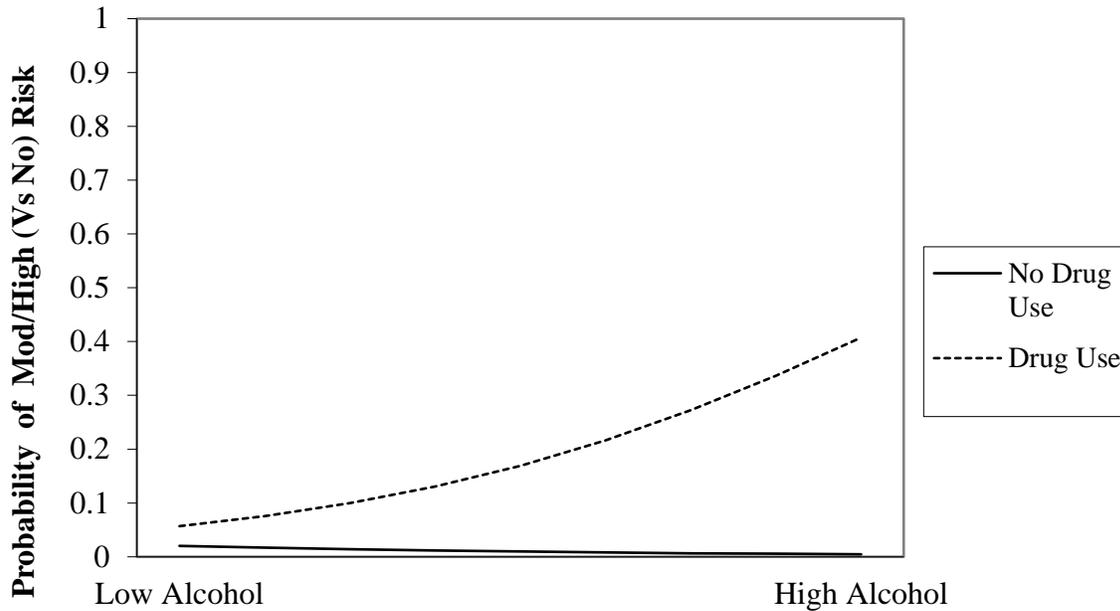


Figure 6c shows the significant interaction between alcohol and drug use on probability of membership in the low risk problem gambling category. The association between alcohol use and probability of low risk problem gambling is moderated by drug use. As the graph shows, those who do not use drugs have a near-zero slope regardless of level of alcohol use. However, of those who scored higher on alcohol use, also using drugs is associated with increased likelihood of membership in the low risk problem gambling group.

Table 6d: Interaction between Alcohol Use and Moderate/High Risk Problem Gambling as Moderated by Drug Use



Lastly, Figure 6d shows the interaction between alcohol and drug use on probability of membership in the moderate/high risk gambling category. Here, the association between alcohol use and probability of membership in the moderate/high risk group is only significant for those who also use drugs. As seen above, the slope between low and high alcohol use is basically flat for the no drug category, but increases markedly for the drug use category.

Furthermore, cross-tabulations were also run to show the trends of these interactions, along with running the models separately, stratifying by gender, for the alcohol x gender interaction, and by drug use, for the alcohol x drug use interaction. To do this, the variables of gender and drug use were simply reverse-coded and entered into the models (i.e. reference group and target group were changed). The resulting odds ratios should indicate (as per the hypotheses) that first, men and higher alcohol scores are more likely than women to be associated with the high risk problem gambling group; and second, using drugs and having higher alcohol scores

will have an association with the high risk gambling group. Table 7a shows the percentages for the alcohol and gender interaction, while Table 7b shows the percentages for the alcohol and drug use interaction. Two issues that became apparent, and subsequently modified, were the lower number of valid cases in the moderate/high risk problem gambling category, and the alcohol use scale having 9 points (ranging from 0-8). Percentages for the alcohol use scale are then calculated for scores of 0, 1, 2, and 3 or higher. The reason for having the percentages of scores of 3 or higher combined is that at scores of 3 and higher, cell sizes fall below 5 cases.

Table 7a: Cross-tabulation for Alcohol Use and Gender by Problem Gambling Risk Level

PG Risk Level	Alcohol Use Scores				
	0	1	2	3 or greater	N
No Risk - Women	70%	8%	9%	13%	277
No Risk - Men	69%	9%	7%	15%	212
Low Risk - Women	47%	15%	12%	26%	34
Low Risk - Men	46%	8%	11%	35%	52
Mod/High Risk - Women	60%	7%	20%	13%	15
Mod/High Risk - Men	47%	9%	6%	38%	34

Based on the percentages, it is evident that for those scoring 3 or greater on the alcohol use scale, the percentage of men is greater than for women. When the models are run separately for men and women, the resulting odds ratios further provide evidence to the hypothesis that men with higher alcohol scores are more likely to be in the high risk category. For men, the odds ratio is 1.96, while for women it is 1.54.

Table 7b: Cross-tabulation for Drug Use and Gender by Problem Gambling Risk Level

PG Risk Level	Alcohol Use Scores				
	0	1	2	3 or greater	N
No Risk - No Drug use	84%	7%	5%	4%	302
No Risk - Yes Drug Use	46%	13%	13%	72%	179
Low Risk - No Drug Use	68%	8%	8%	16%	37
Low Risk - Yes Drug Use	31%	12%	14%	43%	49
Mod/High Risk - No Drug Use	67%	0%	17%	16%	18
Mod/High Risk - Yes Drug Use	42%	14%	7%	37%	29

The percentages overwhelmingly provide evidence that the use of drugs is associated with higher scores on the alcohol use scale. When the models are run separately for having used any drugs in the past 12 months, the odds ratios for those who have used drugs are 1.47 for the low risk category, and 1.80 for the moderate/high risk category (when compared to the no risk category). The odds ratios for those who did not use any drugs, the odds ratios are 0.71 and 0.62 respectively, indicating that drug use is likely associated with higher alcohol scores and problem gambling risk.

With these results in mind, we can now return to the hypotheses and assess which ones are supported and which are not.

H1: Lower scores on the Multidimensional Scale of Perceived Social Support (MSPSS) will be associated with an increased likelihood of being categorized by the Problem Gambling Severity Index (PGSI) as an at-risk or problem gambler.

First, with regards to the question of whether or not level of social support would help determine the probability being at high risk, the results show that based on the MSPSS, level of perceived social support does not appear to affect the probability of being a no-risk, low-risk, or moderate/high risk gambler. Therefore, the hypothesis that individuals who score lower on the MSPSS are more likely to be categorized as a moderate/high risk gambler, is not supported by the data.

H2: Higher scores on the Barratt Impulsiveness Scale will be associated with greater likelihood of being classified as at-risk for problem gambling on the PGSI.

For impulsivity, the results show that impulsivity is significant in differentiating between the moderate/high risk problem gambling and non-gambling/no risk categories, but did not differentiate between the low-risk and no-risk categories. This would partially confirm the hypothesis as it does show that those who scored higher on the BIS are more likely to be classified in the moderate/high risk problem gambler category than the no-risk, but no such difference was found between the moderate/high risk compared to the low risk category, nor were differences evident between the low-risk and no-risk categories.

H3: (a) Higher scores on the playful problem solving coping style subscale of the Ways of Coping Questionnaire will be associated with decreased probability of being classified an at-risk or problem gambler by PGSI.

(b) Higher distancing coping style subscale scores on the Ways of Coping Questionnaire will be associated with an increased probability of being classified an at-risk or problem gambler on the PGSI.

(c) Higher escape-avoidance coping subscale scores on the Ways of Coping Questionnaire will be associated with an increased probability of being classified an at-risk or problem gambler on the PGSI.

On one hand, neither (a) planful problem solving nor (b) distancing are significant predictors for either the low risk or moderate/high risk categories. Whether the individuals scored low or high on either subscale did not significantly predict their probability of placement into either the low risk or moderate/high risk categories, relative to the no-risk category. In other words, contrary to expectations, one is not significantly more likely to be categorized as a low risk or moderate/high risk for problem gambling than no-risk based on one's score for using task-based methods or distancing as a way of coping. On the other hand, the significance of escape avoidance coping (c) is supported by the data – higher scores on the escape avoidance subscale are associated with an increased probability of being in the at-risk categories compared to the no-risk category (although differences between low-risk and moderate/high risk groups were insignificant).

H4: (a) Higher alcohol use scores will be associated with an increase the likelihood of being classified at-risk or problem gamblers by the PGSI.

(b) Use of drugs will be associated with increased likelihood of being categorized as an at-risk or problem gambler.

(c) The effect of alcohol use on the probability of being classified an at-risk or problem gambler will be moderated by drug use, such that the effect of higher

alcohol use scores on the likelihood of being classified as an at-risk or problem gambler will be even greater for those who also use drugs.

Alcohol use on its own is a significant predictor for the low risk category, but not the moderate/high risk category. In the initial model, alcohol use is significant for the low risk group. However, when entered into the model with interaction terms, alcohol use was no longer significant as a main effect, but rather significant when entered with the interactions. In contrast, drug use was not a significant predictor in both initial models of low risk and moderate/high risk, but when placed into the final models are found to help distinguish both at-risk categories from the no-risk category. This means that drug use significantly increased the likelihood of individuals being in the low (versus no-risk) and the moderate/high risk (versus no-risk) categories. Lastly, although alcohol use on its own did not predict gambling risk in the final model, the use of both alcohol and drugs as an interaction term significantly predicted whether an individual would be classified as a low risk or moderate/high risk gambler. This is evident for both at-risk categories as the effect of alcohol use scores on the probability of being low-risk or moderate/high risk compared to no-risk is greater for those who also used drugs. Thus the hypothesis that drug use moderates the effect of alcohol use on the likelihood of being an at-risk or problem gambler is supported.

H5: Having a mental health disorder is associated with an increase in the likelihood of being classified an at-risk or problem gambler.

The variable of depression and anxiety combined is not a significant predictor for the low risk category, but is a significant predictor for the moderate/high risk category, both in comparison to the no-risk and the low risk categories. This was the case for both models, the initial model, and the final model with interaction terms entered. This would partially confirm the hypothesis, in

that those who have either anxiety or depression are more likely to be classified as a moderate/high risk problem gambler. This will be discussed further in the next section.

H6: (a) Men will be more likely to be classified by the PGSI as at-risk or problem gamblers than women.

(b) The effect of alcohol use on the probability of being classified an at-risk or problem gambler on the PGSI will be moderated by gender, such that men who drink will have greater likelihood than women who drink of being classified an at-risk or problem gambler.

With regards to hypothesis (a), surprisingly, in the initial model, gender on its own is a significant predictor of membership in any at-risk category, with odds ratios of 1.9 and 3.28 for low risk and moderate/high risk groups respectively. However, gender, as its own variable in the final model, when placed with the interaction terms, no longer becomes significant as a main effect. For hypothesis (b), the gender by alcohol use interaction did not significantly predict membership in the low-risk category compared to the no risk category; however, it did significantly predict membership in the moderate/high risk category. That is, the effect of alcohol use on predicting moderate/high-risk gambling is greater for men than women. In other words, there appears to be an interaction between alcohol and gambling risk when gender acts as a moderator for those in the higher risk categories.

CHAPTER 5

DISCUSSION

The results of the present study were somewhat mixed, with some hypotheses confirmed and others contradicted. First, no support is found for the first hypothesis; there is no relationship between perceived social support and probability of membership in one of the at-risk gambling categories. Several possibilities and factors may have contributed to this. One of the most prominent explanations that other researchers have theorized is due to the self-report nature of the scale (Blumenthal et al., 1987; Zimet et al., 1988; Jacobs et al., 1989). More specifically, in most cases where the population under study were college-aged students, as is the case with the MLSYA dataset, individuals tend to perceive themselves as being highly supported by their social environment. Barnes and colleagues (1999) also find that the relationship between gambling and social support, specifically parental monitoring and support, is not significant. Instead, they find that for parents and young adults, the effect of social support, is stronger when it came to issues such as drugs and alcohol, but not gambling. Furthermore, gambling by young adults provoked greater tolerance if not greater parental approval (Barnes et al., 1999). This would reflect the trend mentioned in my literature review, that the history of gambling has been in recent years characterized by diminishing pejorative perceptions of gambling as harmful vice, and increasing perception and/or approval of legal gambling as a form of 'harmless' entertainment.

For the second hypothesis, impulsivity is differentiated between the moderate/high risk and no risk categories but not between the low risk and no risk categories. This is consistent with previous research where the variable of impulsivity tends to only be significant in a subset of those who were compulsive gamblers (Blaszczynski et al, 1997; Blaszczynski and Nower, 2002; Derevensky et al., 2007). What is important about the present findings is that they align with

previous research on impulsivity and adolescents in gambling—those who exhibit higher/elevated scores for lack of impulse control in their early years, also show an increased risk to become problem gamblers in their later years (Vitaro et al., 1999). Thus it may be that impulsivity is a greater concern for higher risk gamblers than low risk gamblers. This possibility is echoed by Suomi and colleagues' (2014) study, which note four subgroups pertaining to impulsivity and gambling. Of the four groups, the researchers show that it is the fourth group—similar to Blaszczynski and Nower's (2002) 'anti-social impulsivist' pathway—that exhibited the greatest severity of risk and challenge to engage into treatment. Support for this conclusion is, however, somewhat qualified in the present study, by the finding that impulsivity did not help distinguish between low risk and moderate/high risk categories. This may be in part due to the modest size ($n = 49$) of the higher risk category. Other studies have found that addressing impulsivity alone, does not necessarily yield an answer. For example, Marmurek and his colleagues' (2015) study report that although the independent contribution of impulsivity is not statistically significant, it is significant when coupled with other cognitive factors. This is also seen in Lightsey and Hulsey's (2002) study where impulsivity is significant only when included in interaction terms with various coping styles.

Turning to the hypotheses regarding coping styles, in this study, only escape-avoidance coping is significantly related to at-risk gambling. Neither planful problem solving nor distancing are significant predictors of problem gambling. The present findings regarding coping styles are in keeping with the generally mixed results found in the literature regarding the impact of coping styles on problem gambling. For example, according to studies by McCormick (1994), Lightsey and Hulsey (2002), and Bergevin et al. (2006), those with higher degrees of problem gambling displayed a significant avoidant style of coping when compared to those with little or no problem

gambling markers. However, other studies report that both planful problem solving (task-based coping) and distancing (emotion-based coping) are significant in predicting problem gambling. More specifically, severe problem gamblers tended to use more maladaptive forms of coping such as emotion-based and escape-avoidance styles, while those with no problems used more task-based coping (Nower et al., 2004; Bergevin et al., 2006). This is contrasted by studies which report that emotion and avoidance coping styles, but not task-based styles are significant in differentiating between non-problem and problem gamblers (e.g. Gupta et al., 2004). However, one common aspect several researchers note regarding task-based/ problem focused coping is that with regards to gambling, research on this style of coping is not as in-depth as negative coping styles such as distancing and avoidance coping (Bergevin et al., 2004; Dixon et al., 2016). What becomes apparent is that while the use of problem focused styles are telling of whether or not an individual is more or less likely to be reported as a problem gambler, it is a rather weak relationship when compared to how much more emotion-based or avoidant styles of coping have an effect on those with gambling problems (Dixon et al., 2016). Due to this, more emphasis is placed onto the latter two styles of coping and the research on coping is usually driven towards a greater focus on the negative coping styles rather than positive styles such as problem solving strategies (Farrelly et al., 2007). For example, as both McCormick (2004), and Sheperd and Dickerson (2001) note, research examining the relationship between styles of coping have focused primarily on emotion-based strategies and escaping strategies. The researchers state that this is in part due to the evidence from earlier studies that would suggest gambling itself as being a form of escape from some other stressors in the individual's life, and the avoidance strategies uses is only further compounded with problem gambling. Furthermore, Nower and colleagues' (2004) also distinguish the differences between problem and non-problem gamblers coping

strategies, and find that escaping strategies provided the strongest evidence of problem gambling, while task-based/ problem focused strategies have marginal differences between problem and non-problem gamblers (Nower et al., 2004).

The basic principle behind distancing as a coping strategy is to remove oneself from the object or source of the stressor. In the present case, it would require the individual to stay away from all gambling activities. But confounding this method/coping strategy and its relation to gambling is the widespread availability and ease of access to gambling opportunities nowadays, be they casinos, lounges, and even online. In the present study, distancing as a coping strategy appears to have no discernable effect on the probability of at-risk gambling behaviour. Again, similar to planful problem solving, the results from the literature is mixed. For example several studies report that distancing, as a coping strategy, is significant and utilized more by problem gamblers than non-problem gamblers (Lightsey and Hulse; Gupta et al., 2004; Bergevin et al., 2004). However, Farrelly and colleagues (2007) argue that while the correlation between distancing and problem gambling was in the expected direction, in their study the relationship was not significant (Farrelly et al., 2007).

Escape-avoidance is the only coping strategy that is a significant predictor of at-risk gambling. The results show that for both the low risk and moderate/high risk groups, those who tend to use this method are also be more likely to be at-risk of becoming problem gamblers. This is consistent with expectations since escape avoidance strategies usually entail the individual shifting their attention from one stressor to something else, and as evidenced in gambling research, alcohol and/or drugs become the new "distraction". This method of escaping and avoiding one's stressor, rather than seeking help and/or combating the issue itself only hides the original stressor, but does not remove it (Nower et al., 2004).

With regards to the topic of stress, the current dataset did not have a variable specifically measuring stress. While the Life Events Questionnaire is in the original dataset, the events themselves, as noted by the Gaming Control Commission can be a "potential indicator" of stress. The problem is that the data and subsequent subjective interpretation would have to be extrapolated and at best, an estimation of actual stress. This is somewhat disappointing since several previous studies used stress as a variable and measured it with other factors such as gender, coping styles, and social support (Lightsey and Hulsey, 2002; Nower et al., 2004; Bergevin et al., 2006). Of specific interest in relation to coping styles is the different ways in which stress affected men compared to women, those with low versus high impulsivity, and which styles of coping one tends to use (el-Guebaly et al., 2006).

Drug use, in the initial model, was not a significant predictor of membership for any risk category. However, when entered into the final logistic regression model with the interactions, became a significant predictor. This may be attributed to a suppression effect along with the low number of cases available in both at-risk categories, leading to potential reliability issues with the estimates.

As for drug use in the final model, the variable significantly predicted membership in the at-risk problem gambling categories, with each increasing the probability of membership in at-risk groups. This result appears to corroborate past research which also identifies drug use with an increased risk of problem gambling (Petry, 2001; Ste-Marie et al., 2006). However, contrary to past research, alcohol as a main effect in the logistic regression model is not a significant predictor of problem gambling risk. Interestingly, it is the interaction between the use of drugs and alcohol use which shows an effect on the likelihood of being classified as an at-risk gambler. That is, the effect of alcohol use on increasing the probability of being at-risk is even greater for

those who also reported using drugs(Winters and Anderson, 2000; Ste-Marie et al., 2006; Estevez et al., 2015). As shown in the literature, comorbid lifetime prevalence rates of alcohol and drug consumption are high in the adult problem gambling population(Black and Moyer, 1998; Derevensky, 2002). Since the legal age to buy alcohol is 18 (in most Canadian provinces), this age group of 18-25 year olds are at their prime for alcohol consumption and drug use. The use of drugs and alcohol, as noted earlier, is associated with use of avoidance coping methods, compounding one's susceptibility to developing gambling problems and other negative behaviours. Furthermore, as found by Barnes and colleagues (1999), while the main effects of drug use on problem gambling and alcohol use on gambling could be mitigated by impulsivity and social factors, the effect of comorbid use of both remained strong regardless (Barnes et al., 1999).

For the depression and anxiety variable, the results show that although having a Generalized Anxiety Disorder and/or depression is not a significant predictor for the low risk population, it is for the moderate/high risk population. This is in agreement with previous studies where those identified as problem gamblers had higher scores than non-problem gamblers on several mental health related scales, such as obsessive-compulsive behaviour, depression, and anxiety (Blaszczynski and McConaghy, 1988; Petry, 2000; el-Guebaly et al., 2006; Shead et al., 2010; Estevez et al., 2015).The results show that those with anxiety and/or depression are 2.67 times more likely to belong in the higher risk group. This confirms previous research, as noted in the earlier sections, which found a range of 2-5 times increased probability of mental health/mood disorders among problem gamblers (Cunningham-Williams et al., 1998; Stuhldreher et al., 2007; Kessler et al., 2008). Furthermore, it appears that mental health disorders are even more of an issue for the higher risk group, although it is not possible with the cross-sectional design to

determine the time ordering of the relationship between these mental health disorders and problem gambling (Scholes-Balog et al., 2015). Those with higher anxiety and/or depression scores are also more susceptible to developing gambling problems as their anxiety and/or depression is likely to only be compounded by gambling. The literature notes that the anxiety and depression levels are likely to be exacerbated by a multitude of factors such as substance abuse (el-Guebaly et al., 2006) and stress (Ste-Marie et al., 2006). More than likely, those with higher levels of anxiety and/or depression are also using negative coping strategies, and gambling becomes an escape (Abbott and Volberg, 2000).

Finally, although gender is a significant predictor in the initial logistic regression models, they are not significant as main effects in the final logistic regression model. There is however a significant effect in the interaction for the interaction between gender and alcohol use for the moderate/high risk category. Although the majority of the research on gender and gambling show that men are more susceptible to developing severe gambling problems (el-Guebaly et al., 2006) there are a few reasons why no main effect was evident in the final model. First, the dataset itself contains a modest number of cases at the low-risk and moderate/high-risk levels, in particular any gender differences at higher risk level may be underestimated due to lack of statistical power. This may be due to a Type 2 error – failure to reject a false null hypothesis. In this case, given the lower number of cases in the higher risk category of problem gambler, false negatives may be present. This possibility is further underscored when we look at the upper and lower bound limits in Tables 3 and 4. Clarke (2005) and Abbott and his colleagues (2004), also note that despite earlier research which consistently show men being more likely to develop gambling problems than women (Steel and Blaszczynski 1996), the recent trend in rates between the two genders are not statistically significant when only addressing gender independently. The

reason, as some speculate, is in part due to the proliferation of electronic gaming machines and increased number of non-traditional gaming venues such as bars and restaurants which may have increased participation amongst women (Clarke, 2005).

When alcohol is added into the equation, it is a significant predictor for the men being in the moderate/high risk category, that is, the effect of alcohol use on the probability of being classified as moderate/high risk for problem gambling is significantly greater for men than women. This seems to echo what past studies have found in clinical studies of pathological gamblers in treatment programs (Vitaro et al., 1998; Barnes et al., 1999; Ste-Marie et al., 2006). Men, more specifically, men with other addictions, most notably alcohol, tend to be the overwhelming majority of treatment seekers in problem gambling clinics. Barnes and colleagues (1999), report that over 75% of men in their study consume alcohol on a regular basis or when gambling. This confirms the notion that gambling and alcohol use co-occur, and is similar to rates (74%) found in Canadian studies (Potenza et al., 2003). Also consistent with the present findings, men who drank more (both in terms of frequency and intensity), are far more likely to be problem gamblers than those who either abstained or drank less. Of interest however, is that the relationship between women, alcohol consumption, and gambling was not clear (Barnes et al., 1999). Again, this may be in part due to a lack of research and cases.

Two other studies have also analyzed the MLSYA dataset, using slightly different variables and/or statistical methods, and the results are comparable to this project. First, Afifi and colleagues' (2016) study looks at the relationship between problem gambling and mental and substance use disorders in a longitudinal study. Their study found that, cross-sectionally, those who are categorized as being at-risk or problem gamblers in Cycle 1, compared to non-problem gamblers, showed increased odds of being depressed (2.33 times more likely); higher alcohol use

(2.48 times more likely); drug use (1.47 times more likely), and mental disorders (2.09 times more likely) (Afifi et al., 2016: 106). Furthermore, when accounting for the subsequent cycles, in a longitudinal study (Cycles 2-4), at-risk or problem gamblers remain associated with increased odds when compared to non-problem gamblers (Afifi et al., 2016). Despite a few differences in which variables are used and/or combined, these findings are mostly comparable to what is evident in the present project. While this project combined both anxiety and depression, the odds ratio of 2.7 times more likely for moderate/ high risk problem gamblers is similar to that of those found for depression (2.33 at Cycle 1, and 1.98 Cycles 2-4), and any mental disorders, which collapsed depression, anxiety, OCD (not used in the present project), drug use, and alcohol use (2.89 in Cycle 1, and 3.84 Cycles 2-4) (Afifi et al., 2016). Drug use is also significant for both projects, with the current study finding an odds ratio of 2.58 times more likely compared to Afifi and colleagues' study reporting an increased odds ratio of 1.47 in Cycle 1 for at-risk and problem gamblers compared to non-problem gamblers, and 2.72 times greater odds for cycles 2 through 4 (Afifi et al., 2016). Interestingly, in contrast to Afifi and colleagues' (2016) study, the alcohol use variable is not initially a significant predictor of problem gambling. But when alcohol is used in interaction terms, moderated by gender and by drug use, it becomes significant, indicating stronger association between alcohol use and probability of higher risk gambling for men (compared to women) and for drinkers who also use drugs (compared to those who don't).

In another study, Edgerton and colleagues (2016) address the multiple gambling trajectories in emerging adults. While the results are not directly comparable to this project, due to the number of cases and use of different categories for the dependent variable, some findings are in line with this project. The study, also utilizing MLSYA data, consists of two parts, first a latent class growth model to test if there are multiple distinct trajectories of change in the severity

of problem gambling risk, and second, a multinomial logistic regression to assess whether any risk/protective factors for problem gambling help predict trajectory class membership (Edgerton et al., 2016). Of interest here are the results emerging from the second part of their study; the multinomial logistic regression analysis. Their study found that gender, alcohol use, and the escape-avoidance style of coping are significant predictors of trajectory class membership (Edgerton et al., 2016). However, the difference of their findings is that while gender, alcohol use, and escape-avoidance coping are useful in distinguishing between the classes, they do not predict who is more likely to be in the low risk or moderate risk (Edgerton et al., 2016). Still, the finding that gender, alcohol use, and escape-avoidance coping, is similar to what is found in this project. Again, gender and alcohol for this project, as individual covariates in the multinomial logistic regression model, are not significant. It is however significant as an interaction term, indicating that there may be a stronger effect than as individual variables. As for coping styles, similar to this project, only the negative coping style of escape-avoidance was significant. Planful problem solving does not appear to be significant, as indicated by both studies. Impulsivity and drug use are significant in the current project but not in the study by Edgerton and colleagues (2016). This may be in part due to the number of cases and coding of the classes. The current project combined low and moderate/ high risk gamblers into a single category to increase power, and thus may inflate the meaningful differences seen in between these two categories. As for drug use, Edgerton and colleagues' (2016) study assesses regular/frequent drug use, whereas this project, again in order to increase power, looks at any drug use, thus the number of cases are different. Lastly, Edgerton and colleagues' study examines depression as a variable, whereas in this project, depression is combined with anxiety to create a new variable that allows for a greater number of cases to be analyzed in the multinomial logistic regression analysis.

Findings and Implications

It is apparent that biological, psychological, and social factors all contribute to gambling behaviour in young adults. Furthermore, the theoretical framework that I use in this project—Jacobs' (1986) APS model and the syndrome model of addiction that Shaffer and his colleagues (2004) proposed—are mostly supported. For Jacobs, his second condition of the APS model argues that there must exist an essential pre-condition where the adolescent feels a sense of insecurity and inadequate form to address potential issues. This is evident in the current results with negative ways of coping, specifically escape avoidance, emerging as a contributing risk factor to developing a gambling problem. However, Jacobs' model in this project does not explain why social support is not a significant predictor of problem gambling.

With Shaffer and colleagues' model, regarding the three aspects of addictions, first there does appear to be biological aspects to the issue of gambling addictions. Although not the strongest factor, impulse-control, or a lack thereof, does appear to be a biological risk factor, in part at least for a subset of problem gamblers. Second, with psychosocial antecedents, the present study finds that the use of multiple substances such as drugs and alcohol is another common indicator of risk factors in addiction-related research. Finally, with the 'shared experiences' aspect of the model, the commonalities for gambling addictions also show similar comorbid mental health disorders like other addictions (notably drug and alcohol addictions). In sum, once there is an addiction, its path is similar in various types of addictions.

The current research shows that at least for the province of Manitoba, factors such as impulsivity, escape-avoidance coping, alcohol use (especially for men) and drug use, both separately and in combination, and mental health disorders can help predict the likelihood of

being classified as an at-risk gambler. With this in mind, several potential policies and treatment programs are recommended.

First, as noted by several researchers, when it comes to the issue of treating problem gambling, a major difficulty is that there is no one single factor that definitively contributes to, or perfectly encapsulates, the causes to the problem (Volberg, 1992; McCown and Chamberlain, 2000; Pavalko, 2001; McCown and Howatt, 2007). Consequently, it is of little surprise that there is not a single treatment program, to the writer's knowledge, that has a complete solution to the issue of problem gambling. However, having said that, there are a few basic principles and best practice strategies that are commonly seen across a range of treatment programs. First, and perhaps most importantly, is that treatment programs must be readily available and must tailor to the multiple needs of the individual. Based on this project's findings, several factors are likely to contribute to the risk of being a problem gambler; anxiety and depression, negative coping styles, impulsivity, drug use and alcohol use (as moderated by gender and drug use). Going back to the theoretical framework established earlier in this project, and seen by the results of the multinomial logistic regression analysis, problem gambling is a syndrome. Simply focusing on one specific factor, for example, alcohol use, while ignoring others, does not necessarily lead to an effective treatment program. Along with continued counselling, in order for a program to be effective, the individual must remain in treatment for an adequate amount of time, while their treatment is continually assessed and modified as necessary to ensure the treatment plan is not only working, but meeting the changing needs of the individual (Blaszczynski and Silove, 1995; Pavalko, 2001; McCown and Howatt, 2007). Again, similar to Shaffer and colleagues' 'outcome stage', the problem gambling syndrome and its cluster of symptoms tend to mirror that of other addictions in its temporal progression. Subsequently, the potential treatment then must be twofold.

First, the problem gambling syndrome will have some characteristics that are unique to the problem, and second, at the same time also share common characteristics of other addictions. Treatment programs then must be able to identify both aspects, the unique and the common.

Several different types and models of treatment programs exist, ranging from inpatient to outpatient, behavioural to cognitive, and proactive versus reactive. For example, Volberg (1992) notes that in the United States, from a theoretical perspective, cognitive approaches tend to be used most often, while British and Australian models of treatment tend to focus on the behavioural aspect of treatment (Volberg, 1992). The former, as the term implies, is about changing the thinking of the problem gambler. That is, to change the incorrect or irrational behaviours and beliefs of the individuals (Pavalko, 2001). An example of this strategy would be early public education (proactive programs such as the AFM's workshops for youths and McGill University's youth gambling workshops discussed below), or Gamblers Anonymous (typically a reactive program). Behavioural treatment, on the other hand, focuses on changing, or modifying, the behaviour of the individual. As noted by Blaszczynski and Silove (1995), the main aspect of this type of treatment model is that a negative behaviour (in this case, gambling), can be unlearned through processes such as aversion therapy (Blaszczynski and Silove, 1995). It should be noted however, that many contemporary programs are a combination or hybrid of those listed above. In other words, simple behavioural or cognitive models alone, do not necessarily work. The contemporary model that several researchers have noted, is a shift towards a cognitive-behavioural model, which incorporates multiple aspects of both treatment models implemented in the same treatment program in an effort to help the problem gamblers (Sharpe et al., 1993; Walker, 1993; Stinchfield and Winters, 1998; McCown and Howatt, 2007).

Given what has been presented in this research, it would make sense to enact such programs not only in Manitoba and Ontario, but in other provinces across Canada. All too often, gambling has been seen as less of a problem than drugs and alcohol, and in many instances, is lumped in with them. However, given the rise of evermore forms of gambling and ease of access to gambling, it would be irresponsible of provincial governments not to understand the potential harmful impacts that gambling may have on youth and young adults. There is no one quick solution or program that can encompass all the factors discussed in this paper, but overall, problem gambling awareness and prevention must start at an early age, and resources need to be committed long term.

Limitations

This project is not without its limitations. One of the first and most obvious ones for research into problem gambling is the relatively low percentage of individuals who are classified as being problem gamblers. As the literature has shown, in most gambling research around the world, on average, there are about 2-7% of people who fall into the problem gambling category. Given that Cycle 2 of the MLSYA has 607 valid cases, the number of problem gamblers is relatively low and may have affected the reliability of estimates. This in turn also means that the scale used to classify no risk, low risk, and moderate/high risk gamblers are limited. In other words, rather than using the updated scale that Currie and colleagues (2013) proposed, where scores of 5 or higher on the PGSI scale would be categorized as problem gamblers, the low number of cases meant that for this project, the old scale had to be used. In addition, the MLSYA dataset utilizes the CPGI to distinguish problem and non-problem gamblers, and therefore may not necessarily be directly comparable to other studies that use other scales such as the South Oaks Gambling Screen or

Massachusetts Gambling Screen. Another limitation to the project is the nature of the MLSYA dataset for this project. Despite the MLSYA dataset being a longitudinal study that followed over 600 Manitoba young adults over a span of two years, certain variables used for this logistic regression analysis were only available for two of the four cycles. This makes this current research a cross-sectional study since only Cycle 2 is being examined. Given the cross-sectional design, the time-ordering of associations between variables cannot be accounted for. In other words, when looking at variables such as drug use and alcohol use, this project cannot identify nor comment on whether or not heavy alcohol and drug use precipitates the gambling, or if the gambling is what leads to alcohol and drug use. Furthermore, this data is almost 10 years old at the time of this project, and may not be indicative of the current picture of gambling given the new forms of gaming available, most notably online gambling, along with the expansion of slot machines, new rules and regulations involving casino hours, and locations in Manitoba.

Another limitation to this project is that it is tailored specifically for Manitoba young adults. While the sample can tell us certain aspects of gambling amongst young adults, we are limited in that this is not a national study. The numbers and results found in this project may not necessarily portray other provinces as national surveys in Canada have shown that problem gambling rates for adults vary by region and provinces (Cox et al., 2005), and a national average is used in most cases when reporting on the rates for a country. A third limitation is that the dataset is not representative of the overall population of Manitoba. This is in part due to the way participants were recruited for this study. The initial call for research subjects was done through advertising, which means that only young adults who saw the calls for research subjects may have replied. The second form of recruitment was by snowball sampling. Once the initial respondents were screened and interviewed, they would be asked if they could recommend any of

their friends for the study. The problem with this form of sampling is that while it is cost-effective, its disadvantages lie in the fact that the subjects will tend to nominate their friends, which more often than not are like-minded individuals with similar traits, which may not be representative of the general population. Consequently, this form of convenience sampling is also limited since it is not a shot of the general population.

In addition, the nature of this dataset and the results are self-reported. Self-reports are subjective and susceptible to bias on the part of the respondent(s). For some of the covariates, such as the Multidimensional Scale of Perceived Social Support and Ways of Coping subscales, the self-reporting is subjective. What one individual may perceive as receiving a little or a lot of support may vary from person to person. In other words, the dataset does not contain a measure of actual social support. As noted by Lightsey and Hulsey (2002) on their research into gambling amongst university students, the use of self-report inventories can result in social desirability on the part of the respondents. For example, respondents may answer with more moderate answers in an effort to be within the boundaries of what society what deem as normal.

With respect to the statistical method chosen, one limitation of using multinomial logistic regression analysis in SPSS is the issue of case-wise deletion. Case-wise deletion is where the SPSS program deletes the case/individual from the logistic regression analysis if that case/individual is missing a value in any of the independent variables. For example, if a case is missing a value in just one of the independent variables, but has values for all other independent variables, they are still deleted from the model. The problem with this is that we are losing more information in a dataset that is already trying to address the low number of cases for analysis. This deletion problem is also why this project combined some independent variables (anxiety and depression) in an effort to minimize the number of cases being deleted. However, in doing so,

some depth and precision is lost and can potentially conflate variables and overestimate their effect(s). This can also lead to Type 2 errors where we falsely reject a null hypothesis when there really is significance.

Future research

The uniqueness of this project is that the MLSYA dataset is strictly Manitoba-based. This means that the findings and results are specifically relevant to the province of Manitoba. At the same time, the implication of this is that the measures can be replicated and tested among other Canadian provinces to examine if such factors are similar in other jurisdictions. In addition, the dataset is a first in Manitoba. Prior to this, there are no longitudinal studies, to my knowledge, on gambling tailored specifically to assessing young adults in Manitoba. The MLSYA dataset incorporated knowledge from the Alberta Gaming Research Institute's (AGRI) research project two years earlier to create a similar study. However, given that the sample is not representative of the population is limiting. Future studies should be more representative of the entire population in order to have the results be a more true representation. Knowing which factors increase or decrease the likelihood of becoming a problem gambler for young adults is also useful in policy formation. In other words, if certain variables are found to be contributing to problem gambling, then it would make sense to enact policies and programs tailored specifically to the factor(s)/finding(s) that become present. For example, given what has been found in this project and results from other studies in the past, understanding that both drug and heavy alcohol use are a likely predictor for developing a potential gambling problem, treatment centres and clinics must incorporate the knowledge that such factors are intertwined rather than independent. In addition, understanding that various coping styles can increase or decrease the likelihood of problem

gambling, education should be given on which methods tend to help, and which ones—such as escape-avoidance in the present study—are maladaptive. Finally, from a psychological perspective, understanding that impulse control, along with mental health related issues such as anxiety, depression, and stress all contribute to an individual's psyche and subsequent behaviours related to gambling, it would make sense for practioners and/or therapist to readily engage in all aspects rather than focus on each issue as an isolated problem. With regards to the variables used in this project, one direction for future research is to address other interactions between the variables. While this project only looks at two; the interaction between gender and alcohol use, and drug use and alcohol, there exists a number of other possible interaction terms (some used in other studies) that could be of interest to furthering the knowledge of problem gambling. Possible interactions to investigate include: interactions between gender and coping styles, mental health issues such as anxiety, depression, and stress with gender, or social support. On the topic of social support and stress, it would be beneficial for future studies to develop a more objective measure of these two variables. This would be especially helpful for the topic of stress, given how much is seen in clinical research and treatment on anxiety and depression. The role of stress would further incorporate another dimension to the mental health aspect of problem gambling and its treatment.

Lastly, and perhaps most importantly, this project helps demonstrate the importance of attempting to better understand problem gambling through not only one field of research, but rather multiple fields. Using a multidisciplinary biopsychosocial approach to understanding addictions, including gambling, helps provide a fuller understanding of the issues as it encompasses a more comprehensive set of explanatory factors.

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