Problem Gambling Among Post-Secondary Students and Student-Athletes

by

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A thesis submitted in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

in

Counselling Psychology

Department of Educational Psychology

University of Alberta

Abstract

This correlational study examines the predictive utility of several demographic and psychological variables on problem gambling categorization and severity within a population of post-secondary students and student-athletes. The current research used a integrative model of problem gambling developed by Blaszczynski and Nower (2002) to guide selection of problem gambling predictors. Analyses aimed to highlight differences in gambling predictors between sample groups that could shed light on problem gambling identification and treatment. In this study, 153 post-secondary students participated in the current study, made up of 100 students and 53 student-athletes. The average age of the sample was 21.9 years old, with the two most common ethnicities reported being Caucasian (50.3%) and Asian (39.2%). Participants completed an online survey containing four questionnaires, including the Problem Gambling Severity Index (PGSI), as subset of the Canadian Problem Gambling Inventory (CPGI; Ferris & Wynne, 2001), which measures various gambling domains including (1) gambling involvement, (2) problem gambling, (3) adverse consequences of gambling, and (4) problem gambling correlates. It also includes the gambling motivation measure (Lee, Chae, Lee, and Kim, 2007), Impulsivity Scale (UPPS-P; Cyders et al, 2007), and Brief Symptom Inventory (BSI 18; Derogatis, 1993) as a measure of general psychological distress. Logistic regression tested primary hypotheses regarding the significance of predictor variables on problem gambling categorization. Specifically, it was hypothesized that (a) student-athletic status, (b) identifying as male, and (c) beginning gambling at an early age would predict problem gambling categorization. Results indicated that the logistic regression model was statistically significant, $\chi^2(3) = 28.60$, $p < .05$ and explained 26.0% of the variance in problem gambling identification. Further, athletic status and sex were found to be significant predictors of problem gambling classification. Additionally, a secondary group of hypotheses were tested using multiple

regression. Specifically, it was hypothesized that suspected correlates (i.e., gambling motivation, impulsivity, and psychological distress) would predict problem gambling severity in both samples, but with different risk profiles. A significant regression equation was found in the student sample $F(4, 95) = 6.80$, $p < .05$ and student-athlete sample ($F(4, 48) = 8.06$, $p < .05$), with overall model fits of 22% and 40%, respectively The significant predictor variables included in this equation were gambling motivation in the student sample and impulsivity in the student-athletes sample. Results of the study found no support for psychological distress predicting problem gambling in either group. Finally, descriptive data collected regarding gambling-related details, such as game preference, were investigated. Observed similarities and differences in gambling characteristics between students and student-athletes were reported, such as rates of gambling involvement, game preference, and betting size. Practical and theoretical implications of these results, as well as suggestions for further research, are discussed.

Preface

This thesis is an original work by Dustin Marcinkevics M.Ed. The research project, of which this thesis is part, received research ethics approval from the University of Alberta Research Ethics Board, Project Name “PROBLEM GAMBLING AMONG POST-SECONDARY STUDENT-ATHLETES”, No. Pro00084310, January 18, 2019.

Acknowledgements

I would like to extend my deepest gratitude to my doctoral supervisor, Dr. William Hanson, for his extensive support, direction, and guidance regarding my research. His trust to take me on as a doctoral student made this all possible. Starting as my first graduate professor, to my dissertation supervisor, your mentorship helped me grow as a clinician and researcher in psychology.

I am also grateful to the other members on my supervisory and examination committee for their feedback and support. I would like to thank Dr. Damien Cormier, Dr. Ying Cui, Dr. Martin Mrazik, Dr. Rebecca Hudson-Breen, and Dr. Randy Stinchfield. Without their valued and considerable input, this dissertation would not have been possible.

I would also like to thank the Alberta Gambling Research Institute for providing me with scholarship funding that was used to support my research endeavours.

I further want to thank my wife, Kathleen. When you entered my life, I doubt you realized the significant role you would play in my doctoral degree, and most notably, my dissertation. You were instrumental in keeping me going through all the frustrations and challenges that arose during this process. From the countless hours we spent walking around campus putting up posters, to your brilliant editing and writing suggestions, I could not have completed this research without you. Your edits, patience, and sometimes tough encouragement gave me the strength to finish. I could not ask for a better partner in my life.

Finally, I would like to acknowledge my family who took the time to read and edit parts of my writing and provide helpful suggestions. Thank you, mom, Nicole, and Kristine, for your contributions. Dad, thank you for teaching me to “keep my foot on the pedal until you pass the finish line.” To my mother and father-in-law Eleanor and Mitch, your words of support and encouragement helped me push myself all the way to the end. You are all a true testament to the support of family.

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Glossary of Terms

Atheoretical. A peer-reviewed study that does not rely on a theoretical foundation to guide the research questions.

Correlational design. A type of observational research design that looks to test relationships between variables. The experimenter does not manipulate or change any variables.

Gambling. Placing something of value, for example, money, on the occurrence of an event of unknown probability, potentially resulting in a profitable result (Petry, 2005). Wildman (1997) further suggested that gambling should involve some sort of excitement or thrill in the pursuit of the activity.

Gambling Disorder. The most severe form of problem gambling as defined by a score of eight or more on the Problem Gambling Severity Index (PGSI). They are individuals who have experienced adverse consequences as a direct result of their gambling. They may have lost control over their behaviour, endorse the cognitive distortion items, and commonly chase after their losses.

Gambling involvement. The number of different types of games played by the person during a period.

Impulsivity. A psychological tendency to act suddenly or quickly, with little or no forethought, reflection, or consideration of the consequences (VandenBos, 2007). Impulsive actions are characteristically "poorly conceived, prematurely expressed, unduly risky, or inappropriate to the situation that often result in undesirable consequences."

Logistic regression. A statistical analysis used to predict the probability that an observation falls into one of two categories of a dichotomous dependent variable based on one or more independent variables (Laerd Statistics, 2015).

Multiple regression. A statistical analysis used to predict a continuous dependent variable based on multiple independent variables. Multiple regression also allows the ability to determine the overall fit (variance explained) of the model and the relative contribution of each of the predictors to the total variance explained (Laerd Statistics, 2015).

Odds ratio. A statistic that quantifies the strength between two variables and defines the changes of one variable in the presence of another variable.

Post-Secondary students. Individuals who are enrolled in full-time studies at university.

Integrative model of problem gambling. Well-established theoretical model of problem gambling proposed by Blaszczynski and Nower (2002). In this model, problem gamblers are categorized into three subgroups based upon their behavioural conditioning, emotional vulnerability, and genetic or personality traits. Each subsequent pathway is predicted to capture more severe problem gamblers.

Problem gambling/gambler. A person with an urge to gamble despite experiencing significant adverse consequences resulting from excessive or inappropriate gambling. In this study, a Problem gambler is defined as an individual who scores three or more on the PGSI.

Problem Syndrome model. A model that suggests maladaptive coping, such as alcohol and substance use or gambling, are linked through general dimensions of problematic behaviours and coping motives. Therefore, problematic behaviours are a similar problem expressed in different ways.

Student-athletes: Post-secondary students who are currently participating on a varsity sports team.

Problem Gambling among Post-Secondary Students and Student-Athletes

This dissertation is divided into five parts. First, in chapter 1, I introduce the topic by discussing historical developments of gambling and elaborating on the issue of problem gambling among students and student-athletes. Additionally, I highlight the purpose of this dissertation study along with the specific research questions driving the study. Second, I critically review the pertinent literature in the field by dissecting 26 studies of problem gambling and summarising important trends in the literature, as well as methodological strengths and weaknesses. Third, I discuss the current study, including the methodology, study design, and data collection methods used to investigate gambling among this population. Fourth, I discuss the results of logistic and multiple regression analyses. Fifth and finally, I conclude with a general discussion of the results, including implications and recommendations for future research.

Chapter 1

Introduction

In today's culture, gambling has significantly changed from its historical roots. Modern gambling is big business. It is one of the most popular forms of entertainment and includes wagering on games of chance, such as cards, dice, slot machines, lotteries, casino games, bingo, races, and sporting events. Petry (2005) defines gambling as placing something of value, most commonly money, on the occurrence of an event of an unknown result, in the hopes of producing a profitable outcome. Thus, an essential feature of a gamble is the uncertainty of winning or losing. The popularity of chance games, combined with the inherent risk of losing, results in gambling being positioned between an enjoyable pastime and a public health concern.

History of Gambling

Gambling is a highly pervasive activity, played across time and throughout the world. There are numerous examples of gambling permeating civilizations throughout history. The

earliest gambling evidence dates to roughly 4000 BC, where our ancestors used hucklebones as dice, called astragali (Ferentzy & Turner, 2013). Further, archaeological evidence has been found in Egyptian tombs and ancient Chinese discoveries, suggesting how pervasive gambling was around the world. In 1300 BC, early forms of square, six-sided dice were adopted by the infamous Roman Emperor Claudius, who actively promoted gambling. Later, Claudius published a manuscript on the strategy of dice, further establishing gambling as a legitimate recreational activity. Archeological evidence showed that Indigenous Canadians played various games of chance long before Europeans arrived in 1497 (Sheppard & Smith, 2006). Though gambling is clearly embedded throughout various cultures, it did not occur pervasively until modern civilizations adopted these practices and promoted gambling as a leisure activity.

Historically, acceptance of gambling behaviours within societies ebbed and flowed with changes in government policy and, interestingly, church tolerance (Ferentzy & Turner, 2013). The first form of organized lotteries occurred about 600 years ago in 1444 to fund public services in Paris. Similarly, the American government used a state lottery to fund the construction of Columbia University in the mid 1700s. Evidently, governments recognized the benefits of organized gambling and used profits to fund various projects, including academic institutions and churches. However, the late 1700s saw a movement towards religious temperance and outlawed public gambling. This attitude shift is underscored by the 1835 public lynching of gamblers in Vicksburg, Mississippi (Ferentzy & Turner, 2013). By this time, almost all states in America outlawed lotteries. Of course, this did not inhibit gambling, but instead drove it underground and private house games, such as poker, flourished.

Following the founding of Canada in 1892, the national government banned all forms of gambling apart from horse racing, an activity viewed as more sport than wager (Beare, Jamieson, & Gilmore, 1988). Canadian citizens enjoyed this taste of gambling more and more, and

eventually, the government made exceptions, allowing gambling on behalf of charities or during summer fairs, beginning in 1925. Following the success of lottery fundraising and legalization of Nevada casinos, the Canadian government amended the criminal code in 1969 to allow government formed lotteries (Ferentzy & Turner, 2013). It was not long until the government began generating significant income from state-run lotteries and taxing diversified gambling options (Vaillancourt, Roy, & Canadian Tax Foundation, 2000). In 1985, a landmark legislative amendment influenced the future of Canadian gambling. Provincial governments were given full control over gambling and began introducing slot machines in licenced establishments (Campbell, & Smith, 1998). From there, 1989 marked the opening of the first commercial casino in Winnipeg (Sheppard & Smith, 2006). Today, there are over 80 active casinos around the country and about one-third are located in Alberta.

The first gambling-related concerns as a bona fide problem was illustrated by Fyodor Dostoyevsky in his 1866 book *The Gambler*. Ironically, Dostoyevsky wrote and published this book about the perils of problem gambling to pay off his gambling debts (Ferentzy & Turner, 2013). Sigmund Freud made the next mention of problem gambling in 1928. Freud published an analysis of disordered gambling based on the life and novel of Dostoyevsky. Freud (1928) suggested that compulsive gambling resulted from an unconscious desire to lose and relieve lingering guilt (as cited in Dias, Cano-Prais, Kehdy, & Teixeira, 2008). Although he had no empirical evidence to support his claims, Freud was acutely aware of potential pathological dynamics within excessive gamblers. Research on compulsive gambling grew and eventually led to the inclusion of Pathological Gambling in the Diagnostic and Statistical Manual of Mental Disorders III (DSM-III; American Psychiatric Association, 1980).

Currently, gambling is one of the most pervasive and widespread leisure activities in North America and produces significant revenue for governments. In 2000, consumers in the

United States spent $61.4 billion on legal gambling, which is more than they spent on movie tickets, recorded music, theme parks, spectator sports, and video games combined (Christiansen & Sinclair, 2000). In Canada, the 2017 gambling net revenue exceeded $17.3 billion (Fantini, & Diem, 2018), not including the profits of online casinos based in the United States. In Alberta, gambling activities produced a total income of $1.7 billion, along with $1.4 billion in national lottery sales between 2018 and 2019 (Alberta Gambling, Liquor and Cannabis, 2019). For comparison, the Alberta oil and gas revenues for 2019 totalled $2.48 billion across bitumen, crude oil, and natural gas royalties (Government of Alberta, 2019). These economic reports underscore gambling as a major contributor to the overall Albertian economy and a popular activity among Albertans. With a significant financial motivation for government to continue expanding gambling opportunities, the rate of active gamblers, and consequently problem gambling, will likely rise.

On post-secondary campuses, increasing access and availability to gambling may lead to emerging gambling-related health issues among this young adult group. These concerns range from increased stress, interpersonal conflict, financial difficulties, and declining grade point averages (Ladouceur, Dube, & Bujold, 1994; Stinchfield, Hanson, & Olson, 2006), as well as debilitating emotional stress and financial hardship. At the extreme end, problematic gambling could lead to safety concerns as highlighted by McComb & Hanson, (2009).

With the range of gambling behaviours seen on campuses and the fine line between harmless and harmful gambling practices, adopting a public health perspective on gambling could precipitate several helpful strategies for protecting students. As summarized by McComb and Hanson (2009), a public health perspective inherently conceptualizes gambling on a continuum from enjoyable behaviour to harmful activity and is better able to capture the recreational nature of gambling. Further, this perspective encourages student services to provide

education on the possible risks and consequences of gambling, including information related to support and treatment. At the University of Alberta, such examples exist regarding drug and alcohol dependence. For instance, the university provides information regarding substance use versus addiction, identified early warning signs of harm, and provides both on campus and off campus resources that can be accessed. Finally, student gambling, as a public health matter, encourages school administration and staff to become aware of the costs and benefits of post-secondary student gambling. In turn, it would produce well-informed policies that balance supporting student autonomy and protecting those at risk from the potential enduring consequences of problem gambling. Next, I will explore the risky side of gambling and describe pathological, or disordered, forms of gambling behaviour.

What is Gambling Disorder?

The term *problem gambler* describes a person experiencing significant harmful and deleterious consequences as a direct result of excessive gambling. Gambling becomes a pathological "disorder" when a person holds steadfast motivation to gamble or wager on games of chance despite the personal, professional, social, and financial toll it takes on their life. Disordered gambling results in cascading consequences that outweigh any positive or reinforcing benefits from gambling itself. Since problem gambling and gambling disorder are categorized primarily by the direct consequences of gambling itself, the category of gambler is therefore broad and can describe those who play as a profession, such as World Series of Poker players, as well as those playing recreationally. Further, the label of gambler includes those who find success at their chosen game and those who lose. A gambler crosses the line to problematic when their losses create more than a sense of defeat, but precipitate problems in various life areas and roles.

The Diagnostic and Statistical Manual of Mental Disorders 5 (DSM; American Psychiatric Association, 2013) defines Gambling Disorder (GD) as a persistent or recurrent gambling problem leading to significant impairment or distress (APA, 2013). Diagnostic criteria capture both adverse outcomes of excessive playing, as well as gambling-specific behaviours that indicate such a problem exists. For example, jeopardizing relationships or opportunities defines one such negative effect, whereas chasing losses (i.e., returning to gamble to win back previously lost money) is a behavioural indicator. Importantly, the DSM-5 makes no comments regarding gambling frequency or monetary spending as it relates to a diagnosis of gambling disorder. Though increased gambling activity and spending size are correlated with problem gambling, they are not included as diagnostic criteria considering the important of personal context regarding the same. DSM-5 reclassified GD from an impulse-control disorder to a substance-related and addictive disorder in 2013. This transition reflects a paradigm shift amongst professional conceptualizations, suggesting GD is now viewed more similar to substance dependence (APA, 2013) than to impulsivity or other personality traits. This reconceptualization aligns more closely with the medical model and changes research-based etiological foci. When it was classified as an impulse-control disorder, problem gambling research focused on genetic predispositions, including childhood impulsivity and hyperactivity (Goldstein, Manowitz, Nora, Swartzburg, & Carlton, 1985). As a behavioural "addiction," research now tends to focus on the role of environmental and individual constituents such as neurobiological profile (i.e. brain scans) that summate a problem gambling (Yau, & Potenza, 2015).

In the next section, I introduce a popular, well-established model of gambling, the Integrative Model, and further discuss GD and post-secondary students, the target population of this study.

Integrative Model of Problem Gambling. Long-time gambling studies researchers, Blaszczynski and Nower (2002), developed a theoretical pathway model of problem gambling development. Their model separated problem gambling into three related, but distinguished, etiological paths. Accordingly, problem gambling is classified into one of three progressively severe subgroups: behaviorally conditioned, emotionally vulnerable, and antisocial impulsivist. Each sub-group differs concerning premorbid psychopathology, early history, and neurobiological maturity. Pathway one (behaviorally conditioned) gamblers are void of premorbid vulnerabilities. Instead, their gambling became problematic through behavioural conditioning (e.g. excitement, monetary gain) and maintained through distorted thinking. Pathway two (emotionally vulnerable) gamblers have the characteristics of pathway one gamblers, but also experience mood disturbances, have poor coping skills, and adopt risk-taking behaviours. They may gamble to cope with adverse stimuli and distress or to deal with boredom. Pathway three (antisocial, impulsivist) gamblers possess similar traits from both previous pathways but also present with biological traits of impulsivity antisocial behaviour.

This conceptual model of problem gambling helps promote our understanding of the varying precipitating factors that lead to problematic behaviours and are the focus of this study. Also, observed variations among pathway elements may explain differences in problem gambling severity among various post-secondary student groups and inform subtype-specific treatment and policy implications.

Gambling and Post-Secondary Students

Collectively, post-secondary students are young, emerging adults proceeding through a critical stage of psychological development. Young adulthood is marked with profound psychological maturation in addition to developing interpersonal relationships, advancing educational achievement, seeking employment opportunities, and self-exploration (Arnett, 2004).

This exploration is characterized by increased risk-taking behaviour, as they experience reduced parental and societal controls, including age of legal status, previously imposed during adolescence. As such, post-secondary students commonly engage in increased drinking, illegal substance use, and gambling as common leisure activities. Shinew and Parry (2005) suggested considerably more attention be awarded to the effects such behaviours have on students, as negative repercussions from behaviours such as problem gambling could have detrimental implications on their future wellbeing.

Many studies have declared that gambling on post-secondary campuses is strikingly common among students (Winters, Bengston, Dorr, & Stinchfield., 1998; Platz & Millar, 2001; Neighbors et al., 2002; Engwall, Hunter & Steinberg, 2004). Conservatively, over 80 percent of post-secondary students engaged in some form of gambling within the past school year (Lostutter, Lewis, Cronce, Neighbors, & Larimer, 2012). To put this into local perspective, we can estimate that about 32,000 University of Alberta students gambled this past year. These studies also indicated that a higher proportion of post-secondary students met criteria for GD than the population at large. As a unique group, post-secondary students have one of the highest incidence rates of problem gambling (7.89%), followed by adolescents (4.25%), and adults in general (1.71%; Blinn-Pike, Worthy & Jonkman, 2007). A considerable proportion of students are gambling – not just for fun – but excessively, uncontrollably and adversely. The effects of problem gambling among post-secondary students are substantial, and they could result in personal, social, emotional, financial, health, and legal repercussions (Derevensky, 2012). These effects are even more pronounced amongst post-secondary student-athletes.

Student-Athletes. Student-athletes are a subgroup of students whose gambling behaviours are largely unexplored by Canadian researchers. While student-athletes face similar challenges of student life (e.g. social adjustment, career development, intellectual growth), they

also navigate sport-related tasks (e.g. daily practices, injuries, travel for away games; Ferrante, Etzel, and Lantz, 1996; Martens and Lee, 1998). With increased demands and challenges among student-athletes, poor coping may lead to increased high-risk behaviours, including alcohol use, substance use, promiscuity (O'Brien, McCoy, Rhodes, Wagoner, & Wolfson, 2008), and gambling. In support of this assertion, previous studies in the United States have shown that student-athletes are more likely to problem gamble compared to non-athlete students (Engwall et al., 2004; Kerber, 2005). Indeed, when it comes to gambling, Weinstock, Whelan, Meyers, and Watson (2007) found the majority of student-athletes gambled often, with a small but significant proportion endorsed problem gambling. Furthermore, Sullivan (2005) found that 15 percent of student-athletes reported a South Oaks Gambling Screen (SOGS; Leiseur & Blume, 1987) score greater than or equal to three, indicating problem or gambling disorder. Owing to their dual roles as a student-athlete, they carry an increased demand to balance academic, athletic, and social responsibilities. Therefore, they are at a particularly elevated risk for problematic health-related behaviours. As suggested previously, their dual status exacerbates physical and psychological stress, leading to behaviours such as gambling in an effort to cope (Yusko, Buckman, White, & Pandina, 2008).

Post-secondary students and student-athletes are more susceptible to problematic gambling behaviours than the population as a whole. Equally, American student-athletes exhibit higher rates of problem gambling than their non-athletic peers (Sullivan, 2005). This trend likely exists within Canadian varsity sports and is the area of research in this study. Through a bio-psycho-social model of gambling, several factors that either increase or lessen the propensity to play problematically can be studied within this population and used to suggest changes to protect students. As summarised by Dowling and colleagues (2017), some pertinent risk and protective

factors related to gambling include gender, motivation, cognition, intrinsic traits (e.g. impulsivity, sensation seeking, extroversion), and age of gambling onset.

As there is no current literature exploring Canadian student-athlete gambling to date, it is unknown what influences the rate of gambling among this group. As such, identifying student groups susceptible to problem gambling is important for prevention and intervention strategies on post-secondary campuses.

At the University of Alberta alone, prevalence estimates (Nowak & Aloe, 2014) suggest that at least 4,000 students meet criteria for problem gambling, with many more experiencing some form of negative consequences as a result of their gambling behaviours. This rate is likely to be higher among student-athletes (Shead, Derevensky, & Paskus, 2014). Importantly, problem gambling is not an issue commonly monitored by other health professionals involved with student-athletes such as coaches, physiotherapists, or physicians. The lack of awareness means that student-athletes may experience unfettered problem gambling, which can lead to long-term negative consequences.

Relevance to Counselling Psychology

Based on their historical overview of Counselling Psychology, Gelso, Williams, and Fretz (2014) posit that gambling-related research fits within two primary roles and functions of Counselling Psychology, including remediation and prevention. Concerning remediation, gambling behaviours could become deleterious, leading to – and associated with – other physical, mental, and substance-related problems. Continued research on this topic helps to inform detection strategies used to identify individuals needing support and provide efficient pathways to care. Further, researching treatment approaches and effectiveness with post-secondary students could help lead to the development of programs related to treating gambling disorder. Second, understanding gambling patterns on post-secondary campuses could lead to

campus-based education and policy development to reduce the effects of harmful gambling behaviours. By addressing problem gambling among post-secondary students, counselling psychologists could identify gaps in current services, increase awareness and advocacy of problem gambling treatment, and provide access to intervention, prevention, and education services. As noted by Stinchfield et al. (2006), the best way to protect post-secondary student-athletes from problem gambling is to increase awareness, identify risk and protective factors, and provide campus-based education to students and counselling staff.

Further, researching gambling among students and student-athletes fits with the field's core values (Gelso, et al., 2014). These values include a focus on strength and optimal functioning of individuals, consideration of life-span development and vocation, social justice and multicultural awareness, educational or preventative interventions, and a scientist-practitioner perspective. Specifically, this research falls under the scientist-practitioner framework, with emphasis on contributing new knowledge to the field. Additionally, this study attempts to explore how student-athletics relates to gambling behaviours, including questions about lifetime gambling experiences to capture features of gambling development. Finally, results from this study may contribute to the field by influencing educational and preventative strategies aimed at reducing the negative impacts of gambling dependency among students and student-athletes.

Gambling amongst post-secondary student-athletes also has personal significance. During my first three years of post-secondary, I was a varsity athlete and experienced firsthand the dual roles of student and school athlete. I was part of the practices, games, and team comradery, as well as team-related gambling activity. Regularly, our team had poker nights or went as a group to a casino, and I knew teammates who would use their scholarship money to gamble. At the time, I did not consider gambling a notable issue among student-athletes because it was a

normalized team activity. Only after I became academically interested in behavioural dependencies, such as gambling, did I reflect on my experiences as a student-athlete and wonder about the role of gambling among this group. This dissertation topic, therefore, combines my experience as a student-athlete with my interest in gambling as a psychological phenomenon in an effort to draw awareness to a problem seemingly understated by many post-secondary institutions.

Present Study

Statement of the Problem. Many individuals begin gambling and participating in other risky behaviours, such as smoking and alcohol use, in adolescence (Ladouceur et al., 1994). Therefore, by the time students enter post-secondary, they have either already had experience gambling, or they begin playing as a "rite of passage" while in post-secondary school (Stinchfield et al., 2006). Gambling is a bona fide problem on post-secondary campuses with a significant portion of students problem gambling (Platz & Millar, 2001; Engwall, et al., 2004; Shaffer & Hall, 2001). Further, gambling researchers postulated that post-secondary students experience more associated problems with gambling than adults in general (Engwall et al., 2004; Shaffer & Hall, 2001). This is a concern magnified in American student-athletes, with the literature suggesting that this subpopulation merits additional attention (Engwall et al., 2004; Kerber, 2005; Weinstock et al., 2007). As such, there is a substantial gap in research on Canadian student-athlete gambling.

Considering athletic cultures between countries are distinct, it is not possible to accurately extrapolate American findings. The limited empirical knowledge of gambling behaviours in this population results in a lack of supportive services for Canadian student-athletes. Ultimately, problem gambling could have severe and immediate effects on students such as an inability to pay tuition, being indebt to others, reduced academic performance or other

cascading long-term consequences. With gambling projected to rise, additional research is needed to support campus-wide awareness campaigns, prevention efforts, and intervention programs.

There is a marked discrepancy between rates of problem gambling among young adults and awareness of the same in post-secondary staff and administration (Shaffer, Forman, Scanlan, & Smith, 2000). Shaffer and colleagues (2000) suggested students, as well as staff, do not have sufficient opportunities to learn about gambling and potential negative consequences. One reason for limited support for problem gambling on campus is due to the fact no government mandates exist requiring schools to monitor problem gambling (Shaffer, Donato, LaBrie, Kidman, & LaPlante, 2005). Out of 97 Canadian post-secondary institutions, only 31 schools (32%) had any form of gambling policy in their student handbook. Of those institutions that did, most (23 of 31) only restricted gambling in campus residences. In comparison, every institution had alcohol and substance use policies (Shaffer et al., 2005). The authors concluded there is a missed opportunity to inform students about the dangers of excessive gambling and provide resources or supports. To summarise, problem gambling results in severe adverse outcomes, often associated with other high-risk behaviours. Further, students, especially student-athletes, are at a heightened risk for problem gambling behaviours. Finally, post-secondary institutions have limited or no policies on gambling, which exposes students to a higher risk of excessive and unchecked gambling. Therefore, there is a need for studying student-athlete gambling behaviours and exploring factors that moderate the risk of problem gambling. Research has suggested several risk and protective factors predict problem gambling behaviours such as gambling motivations, impulsivity, and psychological distress, which distinguishes between problem and non-problem gambling in student samples (Marmurek et al., 2014). This research extends the risk-factor paradigm by including student-athletes in an effort to elucidate gambling behaviours in this at-risk group.

Objectives and Research Questions. The objectives of this dissertation study are twofold. First, to examine the relationship between problem gambling and student athletic status. Second, to examine the influence of predictive factors on student and student-athlete gambling severity.

Researchers from Canada and the United States previously studied American student-athletes gambling (see Ellenbogen, Jacobs, Derevensky, Gupta, & Paskus, 2008; Huang, Jacobs, Derevensky, Gupta, & Paskus, 2007). However, no research to date has investigated gambling and Canadian student-athletes. The athletic cultures between the countries are different enough to warrant an independent, full-scale study of Canadian student-athletes and problem gambling.

The current study is guided by two overarching research questions and multiple sub-questions:

1. Do participant-related variables predict problem gambling among students and student-athletes?
    a. Does athletic status predict problem gambling among post-secondary students?
    b. Does the sex predict problem gambling among post-secondary students?
    c. Does the age of gambling onset predict problem gambling among post-secondary students?
2. Do covariate measures of problem gambling differ between students and student-athletes while controlling for predictor variables?
    A. How does gambling motivation influence problem gambling severity among students and student-athletes?
    B. How does impulsivity influence problem gambling severity among students and student-athletes?

C. How does psychological distress influence problem gambling severity among students and student-athletes?

Research Design and Hypotheses. A correlational design was used to answer these questions including the use of logistic and multiple regression analysis. The hypotheses below are grounded in previous research findings, as well as the integrative theoretical model of problem gambling developed by Blaszczynski and Nower (2002). It is hypothesized that:

- Student-athlete will have higher rates of problem gambling severity status than students because they possess more pathway 2 and 3 traits of impulsiveness and sensation seeking (Blaszczynski & Nower, 2002; H1a).
- Being male will predict higher rates of problem gambling categorization because they possess more pathway 2 and 3 traits of risk-taking, impulsiveness and sensation seeking (Blaszczynski & Nower, 2002; H1b).
- Those who began gambling at an earlier age will be more likely to gamble problematically because they would have more established habitual gambling patterns as indicated in pathway 1 gamblers (Blaszczynski & Nower, 2002; H1c).
- Gambling motivation will predict higher problem gambling severity across both samples (H2a).
- Students and student-athletes will have different gambling motivations (H2b).
- Impulsivity will predict higher problem gambling severity across both samples and student-athletes will have higher impulsivity scores as seen in pathway 3 gamblers (Blaszczynski & Nower, 2002; H2c).
- Psychological distress will predict higher problem gambling severity across both samples but not between as seen in pathway 2 gamblers (Blaszczynski & Nower, 2002; H2d).

Before addressing the research questions and testing these hypotheses, in the next chapter, I systematically and comprehensively review the existing literature, which includes 26 relevant studies. Such an in-depth review further informs my study and associated research methods.

Chapter 2

Review of the Literature

Gambling research in psychology began, in earnest, in 1902, with a study investigating the origins and nature of gambling instincts and motivations (France, 1902). Since then, hundreds of studies have been conducted and published in mainstream gambling journals, such as the Journal of Gambling Studies, the Journal of Gambling Issues, and International Gambling Studies. The empirical literature spans diverse research topics areas, including the study of gambling in various populations, such as ethnicities and countries, but also in subpopulations such as adolescents, treatment-seeking and non-treatment seeking problem gamblers, individuals with substance dependence, post-secondary students, and American student-athletes. Studies have looked at various comorbidities with gambling, including substance use (El-Guebaly et al., 2006), neurobiology (Miedl, Fehr, Meyer, & Herrmann 2010), psychopathology (Specker, Carlson, Edmonson, Johnson & Marcotte, 1996), personality (Slutske, Caspi, Moffitt, & Poulton, 2005), and cognition (Emond & Marmurek, 2010).

Studies included in this chapter reflect the current understanding of gambling and problem gambling related to post-secondary student populations, as well as important variables that need to be considered with this population. More specifically, the review focuses on 26 studies related to (a) gambling prevalence, (b) consequences of problematic gambling, (c) risk factors of problem gambling, and (d) covariates of interest, including gambling motivation, impulsivity, and psychological distress. First, a general overview of the literature is presented followed by a critical study-by-study assessment of each study. The chapter ends with a summary critique of the literature as a whole.

General Overview

Post-secondary students participate in a wide variety of gambling game types. Most notably, students play lotteries, casino-based table games, and video lottery terminals (VLT). As a country, Canadian rates of gambling disorder among young adults is approximately 2%, which is similar to other countries like the United States, Australia, and United Kingdom (Blinn-Pike et al., 2007; Sullivan, 2005; Weinstock, al., 2007). In a prominent Canadian study, over 68% of participants gambled within the past year in a recreational and/or pathological manner. Concerning problem gambling, the number of different types of games played by an individual, commonly defined as gambling involvement, is significantly correlated with gambling severity (LaPlante, Nelson, LaBrie, & Shaffer, 2009). That is, those that gambling problematically tend to play a greater variety of games, opposed to a single gambling activity.

Though most individuals reduce their severe gambling behaviours as they age, post-secondary students present with such an elevated rate of problem gambling that they ought to be considered a separate cohort worthy of clinical attention. Furthermore, student-athletes, a subgroup of post-secondary students, experience more than twice the rate of problem gambling than their peers (7.9% versus 15%; Blinn-Pike et al., 2007; Sullivan, 2005). Therefore, student-athletes are considered an ultra high-risk group for problem gambling. The next area to consider is the consequences and impacts of problem gambling, which based on their young age, could precipitate other comorbid and enduring problems.

Outcomes and comorbidities of gambling can range from minor disruptions in daily living to severe consequences such as deteriorated mental health. Some of these issues include alcohol or substance abuse, financial difficulties, and social or occupational impairments. Overall, student problem gambling was significantly more likely to demonstrate higher rates of binge drinking, adverse consequences of alcohol consumption, and regular tobacco and marijuana use (Engwall et al., 2004). Two cases in the literature highlighted a deadly outcome

linked to gambling debts (McComb & Hanson, 2009). A group of researchers have suggested problem gambling was part of a general problem syndrome, signifying that other forms of dependence, such as substance or alcohol use, will go hand in hand. Further, problem gambling accompanies co-morbid psychiatric illnesses such as depression, anxiety, and eating disorders. Finally, Ledgerwood and Petry (2004) showed that suicidality is extremely high among individuals with gambling disorder. They reported 40% of their participants with severe problem gambling experienced suicidal ideation, with as much as 10% attempting suicide at least once. Next, known risk-factors and characteristics of problem gambling are discussed.

The literature has identified several common risk factors and associated variables present in problem gambling. One of the most robust predictors of problem gambling is being male. Overall, men tend to gamble more often than women, bet larger amounts, and report higher rates of problem gambling (Edgerton, Melnyk, & Roberts 2015; Sullivan, 2005; Weinstock et al., 2007). Among students, those that problem gamble tend to have parents who commonly gamble, use more illicit drugs, and have more disposable income (Mihaylova, Kairouz, & Nadeau 2011; Winters et al., 1998). The literature also concludes that adults over the age of 30 gamble more frequently, but young adults experience higher rates of problem gambling (Welte, Barnes, Wieczorek, Tidwell, & Hoffman, 2007). This underscores the important distinction between gambling frequency and problem gambling. Finally, culture and ethnicity influence the rates of problem gambling (Volberg & Abbott, 1997; Zhang, 2008). Though Indigenous and Asian populations are shown to be the strongest ethnic predictors of problem gambling, most ethnically diverse groups report elevated rates of problem gambling (Volberg & Abbott, 1997; Zhang, 2008). In the following section, gambling correlates relevant to the current study are reviewed.

The literature on problem gambling identifies several relevant correlates when comparing gambling differences among groups. First, the age of gambling onset influences the development

of problem gambling, with younger first-time gamblers having an increased risk of subsequent problem gambling that continues into adulthood (Jiménez-Murcia et al., 2010). Gambling motivation is also important to consider. Post-secondary students gamble more often for enjoyment and monetary gain, as opposed to escaping distress (Mercer & Eastwood, 2010). That is, students gamble more for arousal than altering negative emotional states. Further, overall gambling motivations increases as gambling frequencies intensify, creating a cycle of increasing gambling behaviours. Student-athletes are similar to students in gambling motivation, except they report a greater competitive motivation to gamble (Curry & Jiobu, 1995). As well, impulsivity is a strong predictor of gambling frequency among both recreational and problem gambling (Hodgins & Holub, 2015; Shin & Montalto, 2015). Finally, psychological distress is associated with increased gambling behaviours. Likely, this is a cause and effect of problem gambling. The literature indicates that overall psychological distress is associated with increased gambling activities, finding that depressive and anxious symptoms strongly correlate with problem gambling (Welte, Barnes, Tidwell, & Wieczorek, 2017).

In the next section, I provide an in-depth critical review of highly relevant and pertinent individual studies, highlighting important elements used to inform the current study. I discuss four key topics: gambling prevalence (7 studies), consequences and co-morbidities of problem gambling (4 studies), risk factors and characteristics of problem gambling (6 studies), and relevant correlates, like gambling motivation, impulsivity, and psychological distress (9 studies).

Gambling Prevalence

Weinstock et al., (2007) investigated gambling behaviours between student-athletes and student cohorts at four American Universities. This was a quantitative study, using a correlational design. It was atheoretical and did not posit any research questions. The purpose of this research was to collect further prevalence data on post-secondary student and student-athlete

gambling, investigate risk factors for gambling behaviour, and understand the similarities and differences between students and student-athlete's gambling behaviours. A total of 736 National Collegiate Athletic Association (NCAA) student-athletes and 1,071 non-athletic students from the same universities participated in this study. The sample was ethnically diverse and representative of the overall population of the United States. Weinstock and colleagues (2007) measured gambling severity using the SOGS (Leiseur & Blume, 1987) and included follow-up gambling behaviour questions. The authors used chi-squared testing to determine absolute differences between athletes and non-athletes as well as completed an ANOVA with continuous data. Further, regression models were created to analyse risk factors for gambling behaviour and disordered gambling.

Weinstock et al. (2007) observed rates of disordered gambling were similar between students and student-athletes. That is, athletes did not disproportionally represent either problem or gambling disorder categories. As a follow-up analysis, the researchers completed a regression analysis of problem gambling risk factors. They found that athletes, males, and Caucasians are more likely to gamble and were significant predictors of SOGS severity scores. Specifically, student-athletes were 1.5 times more likely to gamble throughout the year. Despite their higher SOGS scores and increase gambling participation, student-athletes did not significantly differ from non-student athletes in their classification of problem gambling membership. This finding may suggest that the categorical labels used on the SOGS fail to accurately capture the relationship between student-athletes and problem gambling. Overall, they concluded that student-athletes suffer higher instances of negative consequences from problem gambling. Strengths of this study include a large sample size and diverse university settings. Weaknesses of this study include limited predictor variables that might elucidate the difference in gambling between student and student-athletes. One notable variable may be sensation-seeking behaviour,

a sub-factor of impulsivity. Further, considering the NCAA's zero tolerance for sports betting policy (10.3e in the Ethical Conduct section of NCAA Division I Manual; NCAA 2004), participants would be motivated to under-report any gambling behaviours that violate NCAA rules. Therefore, it is a plausible assumption that actual rates of problem gambling among student-athletes are higher than reported in this study.

Sullivan (2005) studied the rate of problem and gambling disorder among post-secondary student-athletes in the United States. This was a quantitative study, using a correlational design. It was atheoretical and did not posit any research questions. The purpose of this research was to examine attitudes toward gambling among college athletes and to determine the prevalence of problem and gambling disorder in this sample. The author hypothesised that demographic and behavioural variables of student-athletes place them at a greater risk of developing problem gambling. The study included a total of 620 randomly selected intercollegiate student-athletes from three different American universities. The SOGS (Lesieur & Blume, 1987) was used to measure problem gambling severity and specific gambling activities. Participants also completed the Gambling Attitudes Scale (GAS; Kassinove, 1998), which reports one's general attitude towards gambling, as well as identifying their game preference. The authors used multiple regression analysis to test all predictor variables (i.e., age, gender, race, marital status, year in school, GPA, fraternity/sorority, family member/friend with a gambling problem, liberal/conservative, risk-taking, gambling attitudes, and the sum of gambling) on SOGS scores.

The SOGS scores indicated that approximately 15% of student-athletes have either problem gambling or gambling disorder. The most popular game among student-athletes was betting on games of skill such as billiards, golf, bowling, followed by card games. There was a strong effect between problem gambling and gender. Over 21% of males, compared to 5.2% of females, met criteria for problem gambling. Other significant predictors of problem gambling

included the frequency of gambling, the number of family members or friends with gambling problems, identifying as an ethnic minority, and being younger in age. The principal conclusion of this study was that student-athletes have a higher rate of problem gambling, though few variables significantly predicted problem gambling scores. A strength of this study is the inclusion of many different sports within the student-athlete sample. However, they failed to test some stated conclusions as to why some variables predict gambling scores and why others do not. Further, this study did not include other relevant individual variables such as motivation, impulsivity, and psychological health as predictor variables. A more thorough exploration is needed to extend this paradigm to account for other relevant predictor variables. Finally, due to NCAA guidelines prohibiting gambling, underreporting of gambling behaviours was likely.

Cox, Yu, Afifi, and Ladouceur (2005) completed a large-scale nationwide Canadian study on gambling behaviours. This was a quantitative study, using a descriptive design. It was atheoretical and did not posit any research questions. The purpose of this research was to determine the current prevalence of gambling problems in Canada with representative interprovincial data. The authors hypothesized that provinces with the greatest number of VLTs would have the highest rates of problem gambling. The study involved participants from the Canadian Community Health Survey, where a sample of 34,770 Canadians over the age of 15 were asked about their gambling behaviour. Cox and colleagues (2005) used the Canadian Problem Gambling Index (CPGI; Ferris & Wynne, 2001) to measures rates of problem gambling among this community sample. They completed a descriptive analysis of the data.

The 12-month prevalence rate of gambling problems in Canada was 2.0% (Cox et al., 2005). There was noticeable interprovincial variability in problem gambling rates. Manitoba (2.9%) and Saskatchewan (2.9%) reported the highest prevalence. These two provinces were significantly different from the two lowest provinces, Quebec (1.7%) and New Brunswick

(1.5%). Cox et al., (2005) found that the provinces with the highest rates of problem gambling were also observed to have the highest concentration of VLTs and permanent casinos. One exception to this conclusion was Alberta, which had the third highest rates of gambling problems (2.2%) even though it had the seventh highest concentration of VLTs. Strengths of this study include a large, diverse sample, which captures the inter-provincial variability. A weakness of this study includes collecting limited demographic information and not asking pertinent gambling-related variables that could have expanded their findings if they had been included.

Young adults are a broad cohort often punctuated by characteristics such as elevated rates of risky behaviours. Edgerton et al., 2015 studied gambling rates as people transition from youth to adulthood. This was a quantitative study, using a correlational design. It was atheoretical and addressed the research question: "Do specific predictors of problem gambling influence the trajectory of change in gambling rate from adolescence to young adulthood?" They hypothesised that being male, gambling at an earlier age, experiencing a big win early in a gambling career, having comorbid substance dependence, reporting anxiety or depression, endorsing a low level of social support, having high illusion of control, and high impulsive traits would increase initial gambling severity. Further, each variable would have unique effects on either increasing or decreasing gambling rates over time. In total, the authors surveyed 679 Canadians between the ages of 18 to 20. Researchers collected data over 5-years and four measurement cycles. Gambling behaviour was assessed using the CPGI (Ferris & Wynne, 2001), while social support was measured with the Multidimensional Scale of Perceived Social Support (Zimet, Dahlem, Zimet, & Farley, 1988). Latent growth curve modelling was used to assess the mean level of gambling over time and investigate any systematic changes as a result of predictor variables.

Over the five-year study, Edgerton and colleagues (2015) observed an overall decrease in gambling severity over time. As predicted, males had a higher rate of problem gambling than

females, but the findings indicated no change in gambling behaviour over time. Similar results were found for depression, alcohol dependence, illusion of control, and impulsiveness. The only predicting variable that had a significant effect on gambling change was impulsiveness. That is, as impulsiveness decreased over time, so did gambling severity. There were no observed effects of age of gambling onset, experiencing an early big loss or big win, drug dependence, anxiety, and perceived social support on either initial gambling severity or change trajectory. They noted that there was significant individual variability, as some students lessened their gambling behaviours while others increased. A poignant finding was that individuals with more severe problem gambling at the initial assessment experienced a larger decrease in gambling behaviours over time. It is unclear whether the consequences of problematic gambling organically improve over time or if this sample statistically regressed towards the mean gambling rate. Nevertheless, this study shows gambling problems are high during young adulthood and, on average, decreases with age. Therefore, it is important to identify and support young adults who experience gambling problems to prevent long-term consequences. Strengths of this study include its longitudinal design that tracks participants problem gambling, as well as various other predictor variables. A weakness is their single cohort design that is susceptible to confounding cohort effects and systematic attrition.

Blinn-Pike, and colleagues (2007) completed a meta-analysis on North American post-secondary student gambling. They included 15 studies published up to 2005. The research question was: “What is the estimated proportion of disordered gambling among college students in North America?” Across all the studies, 9,794 students were surveyed using the SOGS, collected in school settings (Lesieur & Blume, 1987). To analyse the results, Blinn-Pike and colleagues (2007) used a random-effects model. This approach assumes each sample represents an independent sub-sample drawn from the North American student population.

Of note, estimates from studies in the United States and Canada showed no difference in problem gambling rates. Findings from both countries were therefore pooled for further analysis. The estimated percentage of problem gambling among post-secondary students was 7.90% (Blinn-Pike et al., 2007). A 95% confidence interval was reported to range from 5.37% to 10.41%. Further, there was a significant sex effect observed. A greater number of males in the sample reported higher rates of problem gambling. The results of this analysis suggest higher rate of gambling among post-secondary students compared to the general population. This is the only meta-analysis focusing exclusively North American student gambling. The strength of this study is that it provides overwhelming evidence that post-secondary student gambling is a bona fide problem. However, a weakness may be that using the SOGS, instead of a more contemporary measure such as the CPGI (Ferris & Wynne, 2001), to measure problem gambling inhibits comparisons to future studies or meta-analytical reviews. Although the exact prevalence rate should be interpreted with caution when comparing to other gambling measures, it nevertheless identified the issue of problem gambling among students.

Player characteristics are not the only factor influencing problem gambling; the type of game chosen also affects the level of gambling involvement. LaPlante and colleagues (2009) studied the relationship between types of gambling games and problem gambling. The authors utilised the 2007 British Gambling Prevalence Survey (BGPS), which collected information on 8,968 residents above the age of 16 years old. This was a quantitative study, using a correlational design. It was atheoretical and posed no research questions. The studies aim was to examine the relationships between types of gambling and disordered gambling, with and without controlling for gambling involvement. Previous studies have demonstrated game type is a predictor of gambling severity (Welte, Barnes, Tidwell, & Hoffman, 2009); however, LaPlante and colleagues (2009) hypothesised that by controlling for gambling involvement, that is, the number

of different types of games played by the person within a year, would eliminate the correlation between game type and problem gambling severity. This study used two measures. First, the researchers included a brief survey of participation in gambling game types during the past year. Second, the PGSI measured rates of gambling severity. In the analysis, the authors used weighted data to correct for age and sex. The weighted data helped the findings better generalise to the overall population. Chi-squared analysis was used to determine gambling participation rates and problem gambling status per game type. Further, the authors employed logistic regression, using participants in each gambling type to predict problem gambling classification. The logistic regression was conducted once without controls and once while controlling for gambling involvement.

Altogether, 68% of participants engaged in some form of gambling over the past year (LaPlante et al., 2009). The most popular games were the national lottery (57.2%), scratch cards (19.7%), betting on horses (17.1%), and VLTs (14.5%). They observed significant sex differences in gambling participation. Men participated more in every game type except scratch cards and the lottery. Further, more women played bingo than men. When looking at problem gambling prevalence, the highest risk games were slots or VLTs, casino table games, and sports betting. The regression analysis found all game types except lottery significantly predicted problem gambling severity. That is, the more participants played most types of games, the higher their score on the PGSI. Without controlling for gambling involvement, VLT use and disordered gambling status were observed to have the highest odds ratios (24.01), followed by spread betting on casino tables (21.84), and internet gambling (9.58). Further, when controlling for involvement, game type remained a significant predictor of problem gambling, although to a reduced degree. Overall, this study showed game type is a relevant predictor when differentiating problem gambling from non-problem gambling but is not as meaningful as previously suggested.

A strength of this study is their large nationally representative sample of gamblers. A weakness is the exclusion of relevant predictor variables that could account for a greater variance of problem gambling than game type alone.

To explore the characteristics of problem gambling among Canadian post-secondary students, Williams, Connolly, Wood, and Nowatzki (2006) investigated several variables related to problem gambling in this cohort. This was a quantitative study, using a correlational design. It was atheoretical and did not propose any research questions. The purpose of this research was to identify the nature of post-secondary student gambling, including popular game types, money and time spent gambling, and demographic characteristics differentiating between problem and non-problem student gamblers. Williams and colleagues (2006) sampled 585 undergraduate students from a single university in Alberta, Canada, all of who completed the study for course credit. The students completed six measures including (a) Gambling Attitudes Scale, (b) Gambling Knowledge Scale, (c) Gambling Fallacies Scale, (d) Gambling Odds Scale, (e) Gambling Behaviour Scale, and (6) PGSI (Ferris & Wynne, 2001). Various descriptive statistics were used to characterise gambling among the student population. Further, the researchers used logistic regression to highlight characteristics distinguishing problem and non-problem student gamblers.

Similar to previous studies on student gambling, Williams et al. (2006) observed high rates of problem gambling among post-secondary students (7.6%). Of those students who gambled, the most common types of games were lotteries and instant win tickets (44%), followed by games of skill (34%), VLTs or slot machines (29%), and casino table games (26%). Students played 1.7 games on average, with most of them gambling on only a single type of game. The greatest average loss of money was on VLTs and casino games, underscoring their high level of risk. Altogether, five variables were found to reliably predict problem gambling in

student populations. They are positive attitudes toward gambling, ethnicity (41% of Asian gambled problematically), university major (18% of kinesiology majors, 18% of education majors, and 14% of management majors), superior ability to calculate gambling odds, and older age at the time of the study. Further, the researchers speculated that student-athletes experience higher rates of problem gambling, which leads to higher rates of gambling among kinesiology majors. A strength of this study is the inclusion of multiple predictor variables used to differentiate groups of problem and non-problem gambling. A weakness of this study is that they did not test athletic status as a predictor variable for problem gambling behaviours but inferred it from school major enrollment.

Taken together, these seven articles informed my dissertation in several ways. Collectively, they explored gambling rates among the current study's populations of interest, students and student-athletes. This literature highlighted the prevalence of post-secondary student gambling and emphasized the pattern of problem gambling among student-athletes as a critical point of interest. Further, the national sample gathered by Cox et al. (2005) provided an anchor to compare the higher rate of gambling among student groups compared to the general population. Again, this comparison further justified the need for additional research involving post-secondary students and student-athletes. Next, I explore several studies that discuss the consequences and comorbidities of problem gambling.

Consequences and Co-Morbidities of Problem Gambling

Engwall et al. (2004) studied gambling and risky behaviours occurring on post-secondary campuses. This was a quantitative study, using a correlational design. It was atheoretical and posed the research question: "Is student gambling accompanied by other high-risk behaviours such as drug and alcohol use?" They hypothesised that higher rates of gambling are associated with greater alcohol and substance use. Researchers surveyed 1,348 post-secondary students

across four American universities. Most participants were between the ages of 18 and 25 years old (85%). The survey contained 120 questions and included items on drug and alcohol use, attitudes towards drug and alcohol, and demographic questions. A shortened version of the SOGS was used to assess problem gambling severity that reduced the emphasis on borrowing money as an indicator for problem gambling. Engwall and colleagues (2004) compared categories of problem gambling against scores on their drug and alcohol measure. They analysed their data using chi-squared analysis as well as ANOVA procedures.

Overall, they found 18% of males and 4% of females met the criteria for problem gambling on campus. Students who identified problem gambling, compared to non-problem gambling, reported significantly higher rates of binge drinking, adverse consequences of alcohol consumption, and regular tobacco and marijuana use. Further, they assessed gambling against athletic status. Post-secondary students who were involved in recreational or intermural sports were also found to have significantly greater rates of problem gambling than nonathletic peers in men (26% versus 16%) and women (7% versus 4%). Strengths of this study include the large sample of post-secondary students surveyed as well as the consideration of alcohol and substance use consequences as a variable, instead of frequency alone. A weakness includes using binary labels of problem gambling based upon SOGS scores not supported in the research. Considering a score of three or more describes problem gambling, there is no way to differentiate between those who barely meet criteria versus those who suffer from mounting consequences of problem gambling.

Hodgins, von Ranson, & Montpetit (2015) investigated the relationship between gambling motivation, drinking, and disordered eating. This was a quantitative study, using a correlational design. It was theoretically driven by the Problem Syndrome model that suggests maladaptive coping, for example alcohol dependence and gambling, are linked through

overlapping dimensions of problematic impulses and maladaptive coping styles. There were no presented research questions, but the aim of the study was to assess links among drinking, gambling, and disordered eating in university students. They hypothesised drinking and gambling were linked through a general problematic syndrome, resulting from deficient coping skills with negative affect. Further, they expected to observe a similar relationship between eating pathology and gambling. Hodgins and colleagues (2016) sampled 301 Canadian post-secondary students across one University campus. Students completed three gambling measures including questions of gambling involvement, Gambling Motives Questionnaire (GMQ; Stewart & Zack, 2008) and the Scale of Gambling Choices (Dickerson & O'Connor, 2006), which measures levels of impaired control. To measure drinking, the students completed the Timeline Followback (TLFB; Sobell, Sobell, Maisto, & Cooper, 1985), Drinking Motives Questionnaire (DMQ; Cooper, 1994), and the Impaired Control Scale (Heather, Booth, & Luce, 1998). The survey included specific questions about eating disorders. Canonical correlation analysis was conducted to examine the relationship among a set of alcohol, gambling, and eating variables. Further, they completed a principal component analysis of drinking, gambling, and eating variables to determine if patterns varied across sex.

Hodgins and colleagues (2015) observed the canonical analysis for the alcohol and gambling variables yielded three significant canonical variates, indicating a strong relationship between gambling and drinking sets of behaviours. Significant cross loading was present showing an association between drinking for social motives and gambling, and gambling for social motives and drinking. The principal component analysis indicated four factors were present in the 25 total variables, which accounted for 62% of the variance. The factors included drinking, gambling, eating pathology, and normative eating behaviours. There was no difference between men and women regarding the relationship between these factors. In conclusion, the

research found an association between alcohol and gambling frequency. Students who drank more heavily had more negative consequences and higher social and coping motives for drinking. Participants also had greater gambling involvement, impaired control, negative consequences, and a greater motivation for gambling. However, there was no link between gambling and eating-disorder variables. The conclusions reached by Hodgins and colleagues (2015) are consistent with a general problem syndrome model, suggesting particular problems, such as gambling, are accompanied by further problems like substance and alcohol abuse dependence. Therefore, gambling may have larger negative implications for post-secondary students than just issues related to problematic gambling. A strength of this study includes the use of multivariate statistics that uncover specific variances among variables related to gambling behaviours. A weakness is that no problem gambling measure was used to compared non-problem and problem gamblers' relationship to alcohol use.

In a study comparing the problems and negative consequences of gambling, Mihaylova, et al. (2011) compared online and land-based poker players. This was a quantitative study, using a correlational design. It was atheoretical and did not posit any research questions. The stated purpose of this study was to examine differences between online and land-based poker gamblers in gameplay patterns and associated problems. They hypothesised online poker players would exhibit increased problem gambling patterns such as higher spending and debt, more frequent playing, and betting larger sums of money. In addition, they anticipated that online players would have a higher rate of gambling disorder than land-based players. The study surveyed 366 Canadian post-secondary students who have played poker in the past year, gathered from a larger pool of 2,139 respondents. The CPGI (Ferris & Wynne, 2001) was used to measure gambling behaviours and gambling severity. Further, the Alcohol Use Disorder Identification Test

(AUDIT) and a cannabis and illicit drug use survey were used to measure substance use. Logistic regression was used to determine differences between online and land poker players.

The results indicate post-secondary students who play online poker suffer greater gambling-related consequences than land-based players. Online poker gamblers were more likely to be frequent gamblers, spend more monthly on poker, and significantly more likely to be gamble problematically. Regarding risky behaviour, both online and land-based poker players had similar rates of alcohol dependence (22.1%), weekly cannabis use (30%) and illicit drug use (18%). Males engaged in online poker more often than females. Overall, this study suggested online poker gambling may pose a higher risk for gambling frequency and severity. Poker players, in general, are associated with elevated substance abuse among post-secondary students. A strength of this study is the stratified sampling procedure, allowing them to attain a representative sample of Canadian students. A weakness is studying online gambling through poker play alone, instead of including a wider range of gambling forms.

One of the most severe outcomes related to problem gambling is suicidality. Ledgerwood and Petry (2004) investigated the experience of gambling-related suicidal ideation and attempts in those seeking treatment for problem gambling. Their primary aim was to explore psychological factors that distinguish gamblers with and without suicidal ideation or attempts. They hypothesized that gambling-related suicidality would correspond with greater severity of gambling problems. The study included 149 participants receiving treatment for gambling disorder across several American and Canadian treatment centres. The authors excluded participants with uncontrolled, severe psychiatric disorders including substance use disorder, psychosis, or mania. They measured gambling with the National Opinion Research Center, DSM Screen for Gambling Problems (NODS), a self-report measure of lifetime gambling disorder based on Diagnostic and Statistical Manual of Mental Disorders, fourth addition (DSM-IV)

criteria (Gerstein et al., 1999). Further, participants completed the Gambling Experience Measure (Ledgerwood & Petry, 2004), which measured gambling as a means of emotional escape, gambling as a dissociation experience, and gambling for attention seeking or egoism. Dissociative experiences were assessed with the Dissociative Experiences Scale (Bernstein & Putman, 1986). The Eysenck Impulsiveness Scale (Eysenck & Eysenck, 1978) measured various scales of impulsivity. Researchers used chi-squared analyses and an ANOVA to compare participants with and without a history of gambling-related suicidality. They included several demographic and psychological variables in their analysis.

Ledgerwood and Petry (2004) observed 40% of participants acknowledged lifetime gambling-related suicidal ideation and an additional 10% acknowledged at least one lifetime gambling-related suicide attempt. Those who attempted suicide at least once were more likely to be married, while those who had been divorced reported more suicidal ideations. Increased suicidality was associated with earlier gambling experiences; higher gambling severity scores; more frequent gambling; using gambling for escaping, dissociating, and attention-seeking; and more impulsiveness. The authors concluded that all individuals with problem gambling should be assessed for suicidality, especially those who began gambling at a younger age and demonstrate more severe problem gambling. Further, individuals who gamble to escape aversive emotions are more likely to have a suicide history. One limitation of this study was the recruitment of only treatment-seeking gamblers opposed to investigating problem gambling in general. Consequently, these participants may have heightened suicidality compared to those with problem gambling issues as a whole. Nevertheless, this study demonstrated that suicide is a real concern among problem gambling, which highlights the extreme consequences of problem gambling behaviours.

The four studies included in this section provide an overview of the deleterious effects of problem gambling. When evaluating the consequences of problem gambling, consideration should be given to the direct results of excessive playing, such as lost time or money, as well as the indirect and comorbid issues that occur. These studies inform the current research by also using post-secondary students as their samples, which better captures the adverse effects in this population. Therefore, the results closely relate to the sample. In the next section, studies highlight the relevant literature on risk factors and characteristics of problem gambling.

Risk factors and Characteristics of Problem Gambling

Winters and colleagues (1998) were some of the earliest researchers to explore gambling prevalence and risk factors among college students. This was a quantitative study, using a correlational survey design. It was atheoretical and did not posit any research questions or hypotheses. Their aim was to determine whether environmental or psychosocial factors would predict college problem gambling and whether gambling behaviours were related to problems of money management such as increased debt. They surveyed 1,361 post-secondary students from two campuses in Minnesota. Researchers asked participants questions regarding school performance, drug use, spending habits, and income. Gambling was measured using the SOGS (Leiseur & Blume, 1987). To understand the impact of the subject variables on gambling involvement, the researchers used an odds ratio (OR) analysis by dichotomizing subject variables.

Their results showed over 91% of men and 84% of women have gambled at least once in during the past school year (Winters et al., 1998). Of those who gambled, 12% reported playing at least once a week. Gambling severity was quite high among students; nearly 3% of participants scored in the pathological range of gambling and 4.4% scored in the potential pathological range. Numerous subject-related variables were associated with higher rates of

gambling involvement including parents having a gambling problem (OR = 8.2), being male (OR = 4.4), weekly or greater drug use (OR = 4.5), disposable income over $200 per month (OR = 2.9), and taking less than four classes (OR = 1.4). This study identified important predictors of gambling involvement that are commonly replicated in more recent studies of post-secondary students. Strengths of this study included the use of several influential subject-variables that are not commonly considered (i.e. disposable income, course load), while a weakness is the exclusion of other intrapsychic variables that may better explain the variance of problem gambling (e.g. gambling motivation, impulsivity).

Adams, Sullivan, Horton, Menna, and Guilmette, (2007) investigated the impact of casino proximity on post-secondary student gambling behaviours. This was a quantitative study, using a correlational survey design. It was atheoretical and did not posit any research questions. The authors made two hypotheses. First, male students will have higher rates of gambling problems than female students. Second, of those students who gamble, both men and women will have increased gambling activity if they attend a university closer to a high-profile casino compared to students who do not. The sample included 1,579 students from four Canadian universities. Adams and colleagues (2007) used the SOGS (Leiseur & Blume, 1987) to measure gambling behaviours and severity. Chi-squared analysis was used to detect any differences in gambling pathology between close and far proximity students.

Across all students, Adams and colleagues (2007) found 4.2% of students were gambled problematically, with a higher proportion of problem gambling among males (9.2% versus 2.7%). There was a significant relationship between close proximity to a casino and problem gambling. In addition to reported greater problem gambling rates, students attending a school near a casino played more slots and table-based games. The authors concluded that greater gambling accessibility and availability from campus increases gambling frequency and

inevitably, problem gambling among students. This study demonstrated a strong relationship between the proximity of casinos around post-secondary intuitions and gambling behaviours. A strength of this study is the large sample size gathered from four universities with distinct distances from casinos. A weakness is not considering student residential proximity, which may have a substantive influence on problem gambling.

Welte et al. (2007) studied problem gambling with respect to game preference and its interaction with age and sex. In addition, they also assessed casino distance as a predictor of problem gambling. This was a quantitative study, using a correlational survey design. It was atheoretical and posed one research questions: "How do particular types of gambling and gambling availability relate to problem gambling by age and sex?" They hypothesized age and sex would have a moderating effect on the rates of problem gambling and influence the games of choice. The study randomly surveyed 2,631 Americans over the age of 18. The sample was stratified by county within Washington, DC. To assess the risk of problem gambling, Welte and colleagues (2007) used a revised SOGS (Volberg, 1996). Other variables measured included demographic information, the frequency of gambling, levels of ideological traditionalism, and proximity to a gambling establishment. The statistical method chosen for this study was the Tobit regression, used when the dependent variable, gambling severity, is commonly zero. However, the outcome still tests for predictor variables of gambling severity.

Overall, individuals over the age of 30 gambled more frequently, but younger adults had significantly more adverse consequences from gambling. Again, males reported higher rates of gambling than females, while also experiencing more negative gambling-related consequences. In addition, increasing the frequency of playing any game also increases the associated risk of problem gambling (Welte et al., 2007). However, some games, such as internet betting, casino gambling, horses, or dog track, are associated with significantly worse consequences when

played at an increased rate. Younger adults were more likely to show higher problem gambling severity scores for casino gambling and off-track betting than older adults. Casinos and VLTs significantly predicted problem gambling in both sex and age groups. Women tended to show more problem in the lottery and bingo, whereas men experience a problem with card games. SES had opposite effects on young and old adults. Specifically, higher SES increased the risk for problem gambling among young adults, whereas it decreased the risk for older adults. The number of casinos in a 10-mile radius was predictive of problem gambling only for males over the age of 30. Other common variables increasing the risk for problem gambling included being an ethnic minority and having family or friends' approval of gambling. Strengths of this study include large sample size and analysing main and interaction effects that further helped clarify findings. One limitation of this study was the use of a revised SOGS when other more popular measures were available, such as the CPGI because further cross-study comparisons are limited.

A Finnish study explored sociodemographic and mental health risk factors, and their relation to gambling (Nordmyr, Forsman, Wahlbeck, Björkqvist, & Österman, 2014). This was a quantitative study, using a correlational survey design. It was atheoretical and did not posit any research questions or hypotheses. Their aim was to examine associations between problem gambling and gambling type, psychological distress, alcohol-related problems and socio-demographic variables. The researchers collected survey data from 2,984 participants who have gambled in the past 12 months from the Western Finland Mental Health Survey. Participants were between the ages of 15-80 years old. The Lie/Bet tool (Johnson et al., 1997) was used to screen for problem gambling based on DSM IV criteria for Pathological Gambling. The General Health Questionnaire (GHQ-12, Goldberg & Hillier, 1979) assessed psychological distress and psychological symptoms. The study used chi-squared tests and logistic regression analysis.

Nordmyr and colleagues (2014) found men had more than double the rate of problem gambling than women. In men, psychological distress increased the incidence of problem gambling (OR = 2.4). Though women tended to gamble more when psychologically distressed, it did not significantly predict problem gambling. Further, the youngest group, ages 15-29, had higher rates of problem gambling than the those in the upper groups (e.g. 50-80). This study demonstrated the association between psychological health, sex, and gambling. That is, male problem gambling typically show elevated rates of psychological distress compared to control groups of non-gamblers. However, it is not clear in the study whether gambling increases psychological distress or represents an unhealthy coping strategy. Strengths of this study are the large nationally representative sample and the inclusion of mental health distress as a predictor for problem gambling. A weakness is that the study was completed in Finland and may have limited generalizability to a Canadian population.

Volberg and Abbott (1997) studied problem gambling rates among Indigenous people in the United States and New Zealand. This was a quantitative study, using a descriptive survey design. It was atheoretical, and did not posit any research questions or hypotheses, but aimed to compare the rates of gambling involvement in two Indigenous and two Caucasian communities. A nationwide sample of 3,933 people over the age of 18 was randomly telephone surveyed from New Zealand. Respondents who identified as Maori or Pacific Islanders were considered Indigenous. In North Dakota, researchers telephone surveyed 1,517 adults over the age of 18 years old. Participants were asked about their gambling involvement and activities. Further, participants completed the SOGS (Lesieur and Blume, 1987) to assess problem gambling severity. For the analysis, data from both countries were combined and separated into Caucasian and Indigenous samples. Chi-square analysis was used to identify statistically significant

differences between the Caucasian and Indigenous samples from each jurisdiction regarding demographics, gambling involvement, and SOGS category.

Volberg and Abbott (1997) found substantial differences between the Caucasian and Indigenous samples in both countries. The lifetime rate of gambling disorder was 7.1% in Indigenous groups and 0.8% in Caucasian groups, amounting to a high odds ratio of 9.83. Further, the mean number of weekly gambling activities was greater amongst Indigenous groups than Caucasians, though there was no difference in the type of gambling activity played. Along with gambling behaviours, both groups differed along demographic backgrounds. The Indigenous sample was less likely to complete secondary education and more likely to have a lower annual household income than Caucasian respondents in both countries. A strength of this study is the comparisons of cultural groups across different countries that highlights distinctions between not only Caucasians and Indigenous groups, but across countries as well. Weaknesses of this study include not controlling for subject-variables such as SES or education, that moderate the rates of problem gambling and obtaining a smaller number of Indigenous respondents compared to Caucasians.

To study variables influencing gambling behaviour across the lifespan, Welte, Barnes, Tidwell, and Hoffman (2011) analysed past survey data containing youth and young adult samples (age 14 to 21, N = 2,631), as well as an adult sample (age 18 and above, N = 2,274). This was a quantitative study, using a correlational survey design. It was atheoretical and did not posit any research questions or hypotheses. Their aim was to look for a variable that moderated gambling prevalence, frequency, and problems across the lifespan, and if these variables are similar to alcohol use. Their survey included questions on gambling frequency and what types of games were played. Gambling severity was assessed using the Diagnostic Interview Schedule for

the DSM-IV criteria. The researchers used a DSM-IV score of 3+ to indicate problem gambling. They used logistic regression to predict problem gambling based on demographic variables.

Welte and colleagues (2011) observed several demographic variables predicted problem gambling across both cohorts. First, being male was associated with problem gambling with an OR of 2.6. Of note, gambling between ages 14 to 17 related to increased problems from gambling, suggesting that gambling at a younger age may lead to greater rates of problem gambling in adulthood. Ethnic minority status was also correlated with problem gambling. Specifically, identifying as Black, Hispanic, or Asian predicted higher DSM-IV scores. Participants who identified as Asian had the greatest risk of problem gambling with an odds ratio of 2.9. Similar to other studies, the peak age for gambling problems occurred between the ages of 22 to 30. In fact, after the age of 21, problem gambling was considerably more common than alcohol dependence (Welte et al., 2011). Finally, there was an association between problem gambling and SES. Those represented in lower SES categories reported higher rates of problem gambling compared to those in moderate or higher categories. A strength of this study was that it expanded the paradigm of measuring gambling risk-factors by comparing multiple age-based cohorts across the lifespan. A weakness of this is the uncommon use of direct DSM-IV criteria to assess problem gambling, which limits comparisons to other studies that use common approaches to measuring problem gambling severity.

The six studies helped inform the current research in several ways. Like other studies included in this chapter, these six studies include post-secondary student samples, which makes it easier to generalize their results to the current work. The articles included in this section identified the characteristics and risk factors of problem gambling that are representative of the current sample. In particular, these studies help informed which demographic variables to

include in the analysis. Next, I will review the literature on relevant correlates of problem gambling that are the variables of interest in this study.

Relevant Correlates

Jiménez-Murcia and colleagues (2010) studied problem gambling's association to age of gambling onset, as well as clinical and personality correlates. This was a quantitative study, using a survey and quasi-experimental design. It was atheoretical and addressed age of gambling onset and the relationship to other psychopathology, personality traits, and prognosis of problem gambling. They hypothesised that earlier age of onset would correlate with greater psychopathology, including gambling disorder, and a worse prognosis following treatment. The researchers collected information from 904 treatment-seeking pathological gamblers. The researchers administered the SOGS and the Diagnostic Questionnaire for Pathological Gambling (Stinchfield, 2003) to assess gambling severity. They assessed personality variables using the Temperament and Character Inventory-Revised Version (TCI-R; Cloninger, 1999). Finally, the Symptom Checklist-90 items-Revised (SCL-90-R; Derogatis, 1994) quantified psychological distress and psychopathology. They used multiple linear regression models to test the effect of age of onset on the other psychological variables. Researchers adjusted the models for sex, duration of gambling problems, and severity of the disorder.

The study concluded older age of onset predicted higher current scores on Depressive, Paranoid Ideation, and Psychoticism subscales. Moreover, those with younger ages of onset scored higher on Novelty Seeking and low on Self-Directedness. Additionally, earlier ages of gambling were correlated with higher current levels of gambling pathology on both the SOGS and DSM-IV criteria. There was no significant difference in treatment efficacy as a factor of gambling onset. Their findings suggest pure problem gambling occurs when a person begins gambling earlier, in combination with certain personality correlates. For those who start later,

gambling is a part of a greater presenting psychopathology. Indeed, this research may indicate two separate mechanisms behind the precipitation of problem gambling. One based on personality characteristics and early experiences, and the other on collective psychopathology. A strength of this study is the inclusion of developmental variables such as age of onset, while controlling for other mediating variables like sex and gambling severity. Weaknesses include a sample of only individuals who sought treatment for problem gambling, which are uncommon in the student population. Consequently, any conclusions have limited generalizability regarding this population.

Motivation. Mercer and Eastwood (2010) investigated the link between boredom and problem gambling among post-secondary students. Boredom was considered as two distinct constructs. First, boredom reflecting an aversive state of under-arousal that motivates activities to increase arousal. Second, boredom as an unpleasant emotional state to be avoided or escaped. This study was quantitative, using a correlational survey design. Also, it was atheoretical and addressed two research questions: “Is one type of boredom more strongly related to gambling problems than the other?” and “Does behavioural activation or behavioural inhibition account for gambling problems better than boredom?” They provided no hypotheses. The sample included 202 Canadian undergraduate students, the majority female (n = 137), between the ages of 18 to 55 years old. Several boredom measures were used to determine which construct of boredom, if any, are associated with problem gambling in students. These measures included Boredom Proneness Scale (BPS; Farmer & Sundberg, 1985) Boredom Susceptibility Scale (ZBS; Zuckerman, 1979) and the Sensitivity to Punishment (SP) & Reward (SR) scale (Torrubia, Avila, Molto & Caseras, 2001). Researchers measured problem gambling with the CPGI (Ferris & Wynne, 2001). They used both correlational and regression analysis to assess boredom as a risk factor for problem gambling.

The results of this study suggest those with gambling problems aim to increase their level of arousal, rather than to avoid the negative affect associated with boredom. Indeed, a need for arousal significantly and uniquely predicted PGSI scores. Further, increased sensitivity to reward was also predictive of problem gambling behaviour. This study demonstrated that boredom and rates of problem gambling are associated, as well as that boredom susceptibility motivates individuals to gamble as a way to increase arousal and not to escape the negative emotion of boredom. Boredom susceptibility may represent people who are more likely to engage in excitement-seeking behaviours, including impulsive and risky activities. A strength of this study is dividing boredom into two separate concepts and testing how they relate to problem gambling. Most research correlate boredom broadly with gambling behaviours, which limits interpretation. A weakness includes limiting predictor variables to boredom. Other researchers have proposed different problem gambling subtypes that imply different motivations to gamble. Boredom would only describe one subtype of problem gambling while ignoring others.

Zhang (2008) studied the motivation and impact of post-secondary student gambling. This was a quantitative study, using a correlational survey design. It was atheoretical and posed three research questions: (a) “Are gambling activities prevalent campus?” (b) “What are the primary motivations that draw students to gambling?”, and (c) “Is there a relationship between gambling participation and students’ gender, age, grade point average (GPA), and household income?” Zhang (2008) hypothesised that individuals with problem gambling will have different motivation to gamble than those students who either do not gamble or play recreationally. The author collected data from 362 post-secondary students from a single institution in New York. An adopted questionnaire from Harvard School of Public Health estimated gambling prevalence among students and participants were asked to indicate their top reasons for why they gamble. These answers were categorised into motivational themes. Further demographic information was

collected, including age, gender, ethnicity, year of school, (GPA), and household income. The study used chi-squared analysis and one-way ANOVA to compare groups of problem gamblers versus non-problem gamblers and their primary motivation to gamble.

Overall, 5.6% of students reported gambling at least once per week, which may suggest problem gambling (Zhang, 2008). The strongest motivations for gambling were enjoyment (66.3%) and winning money (59.9%). Other motivations for gambling included excitement (35.8%) and escape from school or work stress (8.2%). The only sex difference in motivation was with monetary gains. Men were significantly more likely than women to be motivated by winning money. Further, there was a significant difference between the motivations of recreational and problem gambling on all motivations except escape from school or work stress, implying that those who gamble problematically expressed greater overall motivation to gamble. Finally, Zhang (2008) found an inverse relationship between GPA and problem gambling behaviours; as gambling frequency increased, students' GPAs decreased. A strength of this study was the inclusion of school performance, which is a unique variable for student populations. Academic performance is not typically considered in studies of problem gambling, but this study suggested students face additional consequences from gambling compared to the public. Weaknesses of this study include the absence of any problem gambling severity measure and published gambling motivation measure.

Curry and Jiobu (1995) conducted research on post-secondary athletes and their motivations to gamble on sports. This was a quantitative study, using a correlational survey design. Their study was predicated on the theory of self-involvement postulated by Turner (1978), that those who identified as an athlete would seek out additional activities that confirmed their role, specifically if student-athletes viewed gambling as a sport or competition. No research questions were reported. There were several hypotheses reported: (a) Competitive, extrinsic,

excitement, and social motives would be positively associated with gambling, (b) men would gamble more than women, and (c) self-involvement as an athlete would be positively associated with gambling. They surveyed 492 student-athletes across three colleges. Participants completed a motivation questionnaire containing 13 reasons for gambling, ranking each reason on a five-point Likert scale. Also, participants recorded their average betting frequency and the largest amount they had ever bet. Curry and Jiobu (1995) conducted principal component analysis of the 13 motivations, producing five significant components (competition, extrinsic, sociability, fitness, and other directedness). Questions about gender, fan involvement, religion, and self-involvement were also included. They used multiple regression analysis to compare the betting frequency and largest bet size against motivation and demographic variables.

Curry and Jiobu (1995) observed the motivations of student-athletes were slightly different from non-athlete students. Although money, an extrinsic motivation, still drove athletes to gamble, they were mostly motivated by a sense of competition. This finding suggests that some unique characteristics of athletes such as their competitiveness, may generalise into other activities such as gambling. Male athletes gambled more than female athletes. Finally, fan involvement in sports was positively associated with betting frequency and size. Overall, this study demonstrated that gambling motives of student-athletes differ slightly from student motivations that have been published in prior literature. Further, these additional motivation to gamble may increase the risk of problem gambling behaviours within the student-athlete population. Strengths of this study include sampling student-athletes from three diverse colleges to capture various student experiences and the use of multivariate statistics and control variables. Weaknesses of this study include the absence of any problem gambling severity measure, opting for less reliable measures such as gambling frequency and largest bet size. Further, there results lacked a direct comparison method by using a control group of students.

Impulsivity. Shin and Montalto (2015) studied post-secondary students and the factors influencing gambling in this group. This was a quantitative study, using a correlational survey design. The authors applied the theory of reasoned action (TRA) while incorporating the constructs of impulsivity and cognitive bias. TRA posits that gamblers are rational actors driven by reasoned economic motivation. Therefore, if problem gambling occurs, gamblers must hold more cognitive biases towards winning and have higher impulsive traits that impair their inhibition. No research questions were proposed. Their hypotheses include (a) "College students with positive gambling attitudes will gamble more", (b) "College students with a higher level of impulsivity will gamble more", and (c) College students who have a cognitive bias toward gambling will gamble more." The researchers used online surveys to collect information from 5 024 students across 19 universities in the United States. The dependent variable, gambling frequency, was measured by asking participants to indicate how often have they spent money gambling within the past month. Student's response to the prompt *I like to gamble* was used to measure general attitudes towards gambling. The researchers used the Eysenck Impulsivity Scale (Eysenck & Eysenck, 1977) to measure impulsivity. Shin and Montalto (2015) asked one question to categorise participants as cognitively biased or not: "*When I gamble, I try to win back the money I have lost*." This response is a typical measurement of chasing behaviour, indicative of cognitive bias in gambling. Researchers used an ANOVA and logistic regression to analyse results.

Shin and Montalto (2015) concluded that gambling frequency differed by attitude towards gambling, impulsivity, and cognitive bias. In addition, they observed significant differences in gambling frequency between sex, race, and employment status. Specifically, men and unemployed students gambled more frequently, whereas Asian students gambled less often. Impulsivity was shown to predict gambling frequency even among non-problem or infrequent

gamblers. When the model included the theoretical variables of gambling attitude, impulsivity, and cognitive bias, all the demographic variables, except Asian ethnicity, were insignificant. Overall, students with high impulsivity and cognitive bias gambled more than their peers. However, this study runs counter to previous findings in the literature that reports demographic variables such as sex, ethnicity and SES as influencing gambling behaviours. Strengths of this study are the large sample size gathered from 19 separate colleges in the United States, and the strong statistical controls used to model gambling behaviour. Weaknesses include the lack of standard measures for problem gambling severity, gambling attitudes, and gambling cognitions.

Recently, Hodgins and Holub (2015) investigated the relationship between impulsivity and gambling disorder. This was a quantitative study, using a correlational survey design. It was atheoretical and did not posit any research questions or hypotheses. The aim was to explore how the cognitive and behavioural constructs of impulsivity relate to gambling behaviour. This study included 104 adults who had a score of eight or greater on the PGSI, which indicates problem gambling. Four instruments measured constructs of impulsivity. The instruments included the Barrett Impulsiveness Scale (BIS), version 11 (Patton, Stanford, & Barratt, 1995), the Eysenck Impulsivity Scale (Eysenck & Eysenck 1978), the Impulsive Sensation Seeking Scale of the Zuckerman-Kuhlman Personality Questionnaire III (Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993), and Conners' Continuous Performance Test (CPT; Conners, 1995). Exploratory principal components analysis was conducted with all impulsivity measures. The Principal components, demographic variables, and PGSI scores were all compared.

Principal component analysis yielded two significant components, trait impulsiveness and sensation seeking/response impulsivity, which cumulatively accounted for 67.5% of the total variance of PGSI scores. Sensation seeking/response impulsivity correlated with the increased frequency of play and the number of different games played, but not with problem gambling

severity. The opposite was true for trait impulsivity, which correlated with both PGSI scores and DSM IV-TR criteria, but not the frequency of play. The finding suggests cognitive components of impulsivity (i.e. trait impulsivity) better predict problem gambling than behavioural indicators (i.e. sensation-seeking/response impulsivity). As well, respondents with high cognitive and behavioural impulsivity reported increased alcohol and substance dependence, Attention deficit Hyperactivity Disorder (ADHD), and other medical conditions. Though PGSI scores differed significantly between men and women, there was no difference in either trait impulsivity or sensation-seeking/response impulsivity, suggesting sex differences in problem gambling are due to other variables not accounted for in this study. Strengths of this study include measuring impulsivity as numerous constructs and the strong multivariate analysis completed. A weakness is the lack of non-gambler controls to compare scores of impulsiveness.

In a comprehensive study of the influences on gambling, Marmurek, Switzer and D'Alvise (2014) compared problematic gambling between university students and a community sample. This was a quantitative study, using a correlational survey. It was atheoretical and did not posit any research questions or hypotheses. The authors wanted to know if gambling motivation, impulsivity, and gambling cognition differed between problem gambling and non-problem gambling across both samples, as well as whether they predicted problem gambling. The study included 123 post-secondary students and 113 adults in the community. They used the PGSI (Ferris & Wynne, 2001) to measure problem gambling severity. Researchers also included a modified Gambling Motivation Scale (Lee et al. 2007), Gambling related Cognition Scale (Raylu & Oie, 2004), and an Impulsivity scale (Cyder et al., 2007). Various types of statistics were used to analyse the observations. First, the researchers used an ANOVA to determine if the community sample differed from the student sample. Subsequently, with a cut-off score of three

on the PGSI, they used MANOVA procedures to compare non-problem with problem gambling across the variables.

Marmurek and colleagues (2014) observed individuals with problem gambling in the community were more likely to have greater gambling involvement than students. That is, community gamblers played more types of games than student gamblers. There was no significant difference in the rate of problem gambling between the community and student samples, but students did have more individuals score in the moderate-risk and high-risk groups. In both samples, males had higher rates of problem gambling than females and those with gambling problems were more likely to play VLTs and other casino games, confirming results from previous research signifying VLTs and casino games are high-risk gambling preferences. Regarding motivation, those with reported problem gambling scored significantly higher than non-problem gamblers on amusement, avoidance, and monetary gains; this was after controlling for sample group and sex. Students overall scored higher on sensation seeking than the community sample. Those with problem gambling scored significantly higher on all gambling-related cognition subscales and higher on two impulsivity subscales of positive urgency and negative urgency. Therefore, those with problem gambling concerns demonstrated greater fallacious thinking when gambling, as well as increased difficulty controlling behaviour following positive or negative emotional swings. Further, this study showed aspects of gambling motivation, gambling cognitions, and negative and positive urgency moderate the rates of problem gambling slightly differently among community and post-secondary student samples. A strength of this study is the multiple gambling correlates measured and the use of multivariate statistics to discern their influence on problem gambling. A relative weakness is that they only recruited students who had gambled at least once in the past year, thereby missing information on those individuals who are non-gamblers.

Psychological distress. Psychological distress has commonly been touted as an important correlate of problem gambling behaviour. Welte, and colleagues (2017) studied the relationship between several suspected predictor variables and problem gambling in the United States. Specifically, they investigated how participant characteristics, ecological/social variables, impulsivity, and depression predicted rates of problem gambling. They used a quantitative, correlational design. It was grounded in Blaszczynski and Nower's (2002) theory of gambling pathways and did not pose any research questions or hypotheses. The study included 2 963 telephone interviews representing adults across the U.S. They measured problem gambling using non-overlapping questions from three measures: (a) Diagnostic Interview Schedule (Robins, Marcus, Reich, Cunningham, & Gallagher, 1996), the SOGS - Revised (Abbott & Volberg, 1991), and the CPGI (Ferris & Wynne, 2001). They measured depression and anxiety using the BSI-18 (Derogatis, 2001) and impulsivity with the Barratt Impulsiveness Scale (Spinella, 2007). The researchers used a negative binomial regression analysis to count the number of symptoms of problem gambling as the dependant variable.

Welte and colleagues (2017) observed that being male, between the ages of 31 to 40 years old, and identifying as Black were strong predictors of problem gambling. Further, education and self-reported job significance were significant predictors. Family income did not predict problem gambling. Regarding gambling correlates, the bivariate relationships showed that impulsiveness, anxiety, and depression were all related significantly to problem gambling symptoms. However, after all the variables were accounted for, only impulsiveness and depression remained significant predictors. The authors concluded that their results fit with aspects of Blaszcynski and Nower's (2002) model of an emotionally vulnerable antisocial/impulsivist problem gambling. A strength of this study was their use of a theoretical model of problem gambling to guide their research questions and contribute to the existing

model support. Some limitations of this study include the mixture of multiple gambling measures used as a frequency of problem gambling compared to using one complete measure.

Goudriaan, Slutske, Krull, and Sher (2009) studied patterns of gambling activities and associated risk factors in college students. They investigated the relationship between years of schooling, gender, Greek membership, alcohol and drug use, personality indicators of behavioural undercontrol, and psychological distress. They chose measures known to be associated with gambling behaviours but had no underlying theory. Further, they posed no research questions; however, they hypothesized that higher alcohol and substance use, novelty seeking, and psychological distress would be associated with greater gambling participation. In addition, they hypothesized that identifying as male and being part of a Greek fraternity or sorority would be associated with increased gambling activities. They collected gambling data from 3 073 college students who completed a paper-and-pencil survey. They measured gambling by asking students how often they participated in gambling activities. They determined alcohol and substance use by asking participants their frequency of use in the past 30 days. A shortened novelty seeking survey from the Tridimensional Personality Questionnaire (Cloninger, Przybeck, & Svrakic, 1991) assessed behavioural undercontrol, and the BSI 18 measured psychological distress. Latent class analyses (LCAs) were employed to investigate patterns of gambling activity involvement.

Goudriaan and colleagues (2009) observed several factors predicted higher gambling participation. Variables that predicted higher gambling frequency included (a) a greater number of game types played, (b) identifying as male, and (c) Greek membership. Regarding self-identified problem gambling, more participants played cards and other casino games such as VLTs. Further, being male and Greek members increased the rates of self-identified problem gambling. In addition, higher alcohol and substance use correlated with greater gambling

frequency. Moreover, high sum scores on the BSI 18 differentiated excessive gamblers compared to none or low gamblers. Finally, higher novelty seeking predicted higher frequency of gambling. The authors concluded that several factors were significant in differentiating none or infrequent gamblers from high or excessive gamblers. Some notable limitations of this study include the absence of standardized gambling measures that would account for gambling frequency and problem gambling behaviours. Instead, they relied on tallying gambling frequency and self-reported problem gambling. Nevertheless, this study demonstrated that several factors influence gambling frequency and involvement, which has been shown to predict problem gambling rates.

These final nine studies were chosen to capture an overview of problem gambling correlates that are relevant to the current research. These studies used a combination of community and post-secondary samples to investigate factors that proved useful in differentiating problem and non-problem gambling. Many of the same scales to measure covariates were used in the current study, including similar methodology and statistical analysis. To conclude the chapter, I critically summarize the literature review, address gaps in current knowledge, and suggest how my dissertation addresses these areas.

Summary Critique and "Gaps" in the Literature

Taken together, the 26 studies included in this review capture a cohesive picture of problem gambling among students and student-athletes, as well as various correlates relevant for the current study. Most studies found comparable rates of problem gambling among various populations such as community members, students, and student-athletes, including similar correlations with demographic and predictor variables. There is a heavy emphasis on quantitative methodology, specifically using correlational survey designs to compare various demographic or predictor variables with problem gambling rates. Most studies did not report research questions,

and less than half provided testable hypotheses. Many researchers took an exploratory approach to research gambling. Research questions commonly asked about the moderating effects of certain variable on prevalence rates of problem gambling, while usually limiting the scope of variables chosen. Further, much of the literature was not guided by any theoretical foundations, likely a result of divergent viewpoints of problem gambling as a behavioural addiction or public health problem. Therefore, most hypotheses were atheoretically derived and based on other results of past studies. Sample sizes varied greatly, with some studies surveying nationwide, while others targeted specific populations. Excluding national surveys, the average study contained 614 participants, ranging from 60 to 1,579. A collective strength of these studies was the use of large samples, and a common weakness was not using standardized measures to study gambling and the related correlates.

Certainly, the existing research is important; however, gaps remain in the understanding of gambling, including how problem gambling relates to Canadian post-secondary student-athletes. Further, previous studies typically focused on singular variables of interest and rarely chose multivariate methods of analysis. That being said, a plethora of notable variables of interest could be included to provide the most in-depth and detailed analysis of problem gambling. As noted in Chapter 1, the current study focuses on the relationship between problem gambling and student-athletes with an emphasis on identifying prominent predictive factors related to gambling severity. The current study addresses some of the identified gaps, including the use of post-secondary student-athletes in the sample and utilizing a multivariate approach to data analysis. Before discussing the study methods, I remind readers of the overarching research questions:

1. Do participant-related variables predict problem gambling among students and student-athletes?

   a. Does athletic status predict problem gambling among post-secondary students?
   b. Does sex or the age of gambling onset predict problem gambling among post-secondary students?

2) Do covariate measures of problem gambling differ between students and student-athletes while controlling for predictor variables?
   a. How does gambling motivation influence problem gambling severity among students and student-athletes
   b. How does impulsivity influence problem gambling severity among students and student-athletes?
   c. How does psychological distress influence problem gambling severity among students and student-athletes?

Chapter 3

Methods

Participants and Sample Characteristics

153 individuals (100 students and 53 student-athletes) completed the study. The average age of the total sample was 21.94 with a range between 18 and 39. The participants represented students from 13 university faculties. Most participants were from the Faculty of Arts (26%) or Faculty of Science (23%) and their year of study ranged from one to eight with an average of 2.89. The sample groups were similar in median age, faculty distribution, and year of study, but differed in terms of identified sex and ethnicity. Among the student sample group, 44% were male. The most commonly endorsed ethnicities were 51% Asian and 39% Caucasian. In comparison, 77.4% of the student-athletes were male. This group was represented by significantly more students identifying as Caucasian (72%) than Asian (17%). A full description of the demographic variables across the student and student-athlete sample is displayed in table 1.

Table 1
Demographic Statistics

Variable	Percentage (%)		
	Students (n = 100)	Student-Athletes (n = 53)	Total (N = 153)
Sex (male)	44	77.4	55.6
Ethnicity			
Caucasian	39	71.7	50.3
Black	2	7.5	3.9
First-Nations, Metis, or Inuit	1	3.8	2
Asian	51	17	39.2
Native Hawaiian or Pacific Islander	1	0	0.7
Other	6	0	3.9
Faculty			
Agriculture	8.0	1.9	5.9
Arts	29.0	18.9	25.5
Business	8.0	17.0	11.1
Education	10.0	13.2	11.1

Engineering	9.0	13.2	10.5
Native Studies	9	1.9	.7
Nursing	6.0	1.9	4.6
Recreation	2.0	9.4	4.6
Rehabilitation	1.0	0	.7
Science	25.0	18.9	22.9
Other	2.0	3.8	2.6
Year of Studies	2.9	2.8	2.9

Gambling involvement and form. This study collected data on student and student-athletes' gambling patterns. Specifically, how often do students and student-athletes gamble, how many different games do they play, and what are their preferred forms of gambling? Overall, 73% of the samples had gambled in the past 12 months (68% of students and 83% of student-athletes). Gambling involvement, meaning the number of game types a person plays, differed slightly between sample groups. Among students, the gambling involvement was 1.75 (SD = 1.12) compared to student-athletes who played 1.98 (SD = 1.39) games on average. Additionally, the relationship between gambling involvement and problem gambling was maintained within both samples. Clearly, problem gambling within both student and student-athlete groups participated in more forms of gambling than the non-problem gambling participants. See table 2 for results.

Table 2
Total Gambling Involvement by Sample and PGSI Group

	Sample					
	Students		Student-athletes		Total	
	Non-problem (n = 82)	Problem (n = 18)	Non-problem (n = 28)	Problem (n = 25)	Non-Problem (n = 110)	Problem (n = 43)
Total Gambling Involvement	0.80 (1.07 SD)	2.00 (1.85 SD)	0.86 (1.01 SD)	2.28 (1.72 SD)	0.82 (1.05 SD)	2.13 (1.76 SD)

* $p < 0.05$

In addition to the number of unique games played differing, there were also distinctions respecting the types of games played. The student samples most common forms of gambling in

the past year included lottery (21%), scratch tickets (12%), and casino slots (10%). Comparatively, student-athletes' most popular forms of gambling were scratch tickets (19%), lottery (19%), and casino poker (19%). Table 3 shows the participation rates in each form of gambling by sample and PGSI category. In addition, the types and frequencies of games played differed between problem and non-problem gambling. Subsequent analysis focused on the particular games played by non-problem and problem gambling in each sample group. Among the student group, the most popular forms of gambling within problem gambling were casino roulette (33%) and casino blackjack (28%). Student-athlete who gamble problematically reported casino poker (36%) and casino blackjack (28%) as the most common activities. Overall, gambling frequency, irrespective of game type, differed between the sample groups. Student-athlete gamblers played more often per year than student gamblers (44.6 times per year compared to 21.1 times per year, respectively). A test for association was conducted between game participation and problem gambling membership; however, several expected cell frequencies were less than five and therefore Fisher's Exact test is recommended over a chi-squire test (Blalock, 1999). Across both students and student-athletes, casino poker and casino blackjack were played significantly more among problem gambling participants, $p < 0.05$. Within the student group, problem gambling was more likely to participate in casino roulette, casino craps, and internet gambling, $p < .05$. Problem gambling student-athletes reported playing bingo and fantasy sports more often, $p < .05$.

Finally, data were collected on the largest monetary amount bet on a single game. Across the total sample and all forms of gambling, the average max bet was $346.02, with a large standard deviation of $741.46. There was a large positive skew in both samples, with the largest student bet being $4,000 and the largest student-athlete bet being $3,000. The median scores of students and student-athletes respectively were $45.00 and $150.00.

Table 3
Participation rates for the Forms of Gambling by Sample and PGSI Group (%)

	Sample				
	Students		Student-Athletes		Total
	Non-problem (n = 82)	Problem (n = 18)	Non-problem (n = 28)	Problem (n = 25)	(N = 153)
Scratch tickets	12.0	11.1	21.4	16.0	14.4
Lottery	20.1	22.2	14.3	24.0	20.3
Casino Slots	7.31	22.2	17.6	8.0	11.1
Casino Poker	0.0	11.1*	3.6	36.0*	0.7
Casino Blackjack	2.4	27.8*	3.6	28.0*	2.0
Casino Roulette	2.4	33.3*	3.6	20.0	5.2
Casino Craps	0.0	22.2*	0.0	12.0	2.0
Private Poker game	8.5	5.6	3.6	20.0	9.2
Horse racing	1.2	0	3.6	4.0	2.0
Bingo	3.7	0	0.0	16.0*	2.0
Internet gambling	1.2	16.7*	3.6	4.0	2.0
Sports betting	8.5	5.6	10.7	16.0	9.8
Fantasy sports	4.9	5.6	0.0	20.0*	3.3
Other	7.3	16.7	0.0	4.0	6.5

* $p < 0.05$

Measures

Canadian Problem Gambling Inventory (CPGI) and Problem Gambling Severity Index (PGSI).

The Canadian Problem Gambling Inventory (CPGI; Ferris & Wynne, 2001) was used to measure gambling severity (Appendix E). The CPGI is a 33-item questionnaire measuring four different gambling domains, including (1) gambling involvement, (2) problem gambling, (3) adverse consequences of gambling, and (4) problem gambling correlates. Problem gambling severity is calculated from a subset of five items relating to gambling consequences and four items about problem gambling. These nine items form the Problem Gambling Severity Index (PGSI). Using a 4-point rating scale ranging from 0 (never) to 3 (almost always), the PGSI quantifies gambling severity and assigns prescriptive labels to individual gamblers. Those that do

not gamble, or score zero, qualify as non gambling and non-problem gambling, respectively. A total score of 1-2 qualifies as low risk. A total score of 3-7 qualifies as a moderate risk. Finally, a total score of 8 or more qualifies as gambling disorder. Although not a diagnostic tool, these nine questions identify individuals at-risk for gambling disorder (Ferris & Wynne, 2001). Though the entire CPGI was given to participants, the PGSI contained study-related scores that were used in quantitative analyses.

The PGSI is a theory-driven measure of problem gambling in community samples (Ferris & Wynne, 2001), drawn from a dependence and addiction framework rather than a harm-oriented model. Dependence frameworks can be described as focusing on aspects of the individual and how their thoughts and actions perpetuate the problem. Harm-oriented models emphasize outcomes of behaviours and seek to reduce negative consequences.

A possible alternative method of categorizing problem gambling has been proposed to adequately classify gambling severity instead of the traditional distinctions of severity categories of non-problem, low-risk, moderate-risk, pathological (Orford, Wardle, Griffiths, Sproston, & Erens, 2010). This is because these categories may not represent an even progression of risk in gamblers (Currie, Hodgins, & Casey, 2013). Similar to other gambling studies (see Afifi, Cox, Martens, Sareen, & Enns, 2010; Currie et al., 2006; LaPlante, Afifi, & Shaffer, 2013; Orford, Griffiths, & Wardle, 2013; Williams & Wood, 2007), severity categories could be simplified into non-problem gambling (0-2) and problem gambling (3+). Combining the non-problem and low-risk groups into a non-problem group is consistent with their original descriptions, which suggests these types of gamblers do not experience significant adverse consequences from gambling (Ferris & Wynne, 2001). Further, in a comparison study, Michalczuk, and colleagues (2011) found that healthy controls scored a maximum of 2 on the PGSI, helping to justify pooling the categories. Of note, using the cut-off score of 2 on the PGSI opposed to the category

of problem/pathological gambler indicated by a score of eight or more would have effects on the results that need to be acknowledged. Crucially, the rates of problem gambling will be greatly inflated compared to other studies that use the original PGSI category. Direct comparisons would therefore be misleading. Again, this study acknowledge problem gambling as experiencing notable direct negative consequences as a result of their behaviours and not only those who are most severely impacted.

Researchers posit the PGSI is the most efficient screen for problem gambling, promoting its use over the South Oaks Gambling Screen and Victorian Gambling Screen (McMillen & Wenzel, 2006) in student populations (Holtgraves, 2009). The PGSI scores have excellent internal consistency, test-retest reliability, and criterion validity with other gambling measures (Ferris & Wynne, 2001; Holtgraves, 2009; Neal, Delfabbro, & O'Neil, 2005). The PGSI has also been shown to have good concurrent validity with both the SOGS (0.83) and the DSM-IV (0.83). Finally, it has the highest predictive validity (0.48) with a clinical assessment interview than both the SOGS and DSM-IV measures.

Internal consistency was calculated for this study's sample and the PGSI score demonstrated good reliability (coefficient alpha = .82).

Gambling motivation (GM). Gambling motivation is measured by the modified five-factor gambling motivation scale (Lee et al., 2007). This measure contains 27 items where respondents indicate their level of agreement using a 5-point scale where 1 = strongly disagree, 3 = neutral, and 5 = strongly agree (Appendix F). The scale measures five separate factors of gambling motivation: amusement (e.g., "I enjoy leisure time"); avoidance (e.g., "I feel troubled"); excitement (e.g., "I enjoy the thrilling experience in risk"); money (e.g., "I want to win money easily"); and socialization (e.g., "I meet new people").

The coefficient alpha for the five-factor gambling motivational total scale score was high in the original development study (alpha = 0.94; Lee et al., 2007). Further, internal consistency estimates among factors were: amusement, .72, avoidance, 0.87, excitement, 0.90, monetary, 0.75, and socialization, .81. Apart from socialization-monetary motives, all factors moderately correlated with one another, ranging from 0.18 (social and avoidance) and 0.59 (excitement and amusement). This five-factor model is a good statistical fit for both post-secondary students and Canadian's in general (Lee et al., 2007).

Internal consistency estimates for this sample were calculated for the total score and demonstrated an excellent level of reliability, as determined by a coefficient alpha of .93. Reliability was also calculated for each of the subscales: amusement, .85; avoidance, 0.91; excitement, 0.90; monetary, 0.81; and socialization, .77.

Impulsive Scale (UPPS-P). The Impulsivity scale (UPPS-P) is a 59-item self-report measure used to identify various facets of impulsivity (Cyders et al., 2007). Participants indicate agreement on items using a 4-point scale, from 1 = agree strongly to 4 = disagree strongly (Appendix G). The original UPPS (Whiteside, & Lynam, 2001) had four impulsivity subscales: Urgency (e.g. "Sometimes when I feel bad, I can't seem to stop what I am doing even though it is making me feel worse"); Planning (e.g. "I usually make up my mind through careful reasoning" – negative loading); Perseverance (e.g. "I finish what I start" – negative loading); and Sensation Seeking (e.g. "I would enjoy the sensation of skiing very fast down a high mountain slope"). However, Cyders et al. (2007) demonstrated that Urgency, the propensity to act rashly, can be in response to both positive and negative affective states. The revised UPPS-P includes a subset of items to assess a fifth subscale, Positive Urgency (e.g. "When I am really excited, I tend not to think of the consequences of my actions.").

In the original development and validation study, coefficient alphas for subscale scores were: lack of premeditation, .87; lack of perseverance, .85; sensation seeking, .91; positive urgency, .96; and negative urgency, .90 (Cyders et al., 2007). Further, Cyders et al. (2007) found the five-factor model accounted for a significant increase in sample variance among problem behaviours such as gambling, drinking, and other risky behaviours. In a confirmatory study, the overall median intercorrelation among subscales was 0.34, suggesting each subscale measures overlapping but different constructs of impulsivity (Whiteside, Lynam, Miller, & Reynolds, 2005).

In this study, internal consistency was calculated for the total score and demonstrated a good level of reliability (coefficient alpha =.85). The calculated reliabilities for the subscale scores include negative urgency, .90; lack of premeditation, .84; lack of perseverance, .85; sensation seeking, .80; and positive urgency, .94.

Brief Symptom Inventory 18. The Brief Symptom Inventory 18 (BSI 18) is an 18-item, norm-based self-report symptom inventory designed to screen for psychological distress (Derogatis, 1993). Participants rate their overall feeling of distress over the past week using a 5-point Likert scale (Appendix H). Scores include 0 (i.e. not at all), 1 (i.e. rarely/occasionally), 2 (i.e. sometimes), 3 (i.e. often), and 4 (i.e. extremely often). The measure contains three subscale scores: depression, anxiety, and somatization. Specifically, the subscales assess core symptoms of depression, anxiety, and distress due to bodily dysfunction, respectively. Additionally, a composite score, the Global Severity Index (GSI), is provided.

Survey designers calculated internal consistency estimates using a community sample. Alpha coefficients for the three symptom scales and a composite score were .84 (Depression), .79 (Anxiety), .74 (Somatization), and 0.89 (General score; Derogatis, 1993). Further, test-retest estimates were completed on a sample of 60 non-patient participants and ranged from .68 to .84

on the symptom scales. The GSI test-retest estimate was .90. These results suggest that BSI 18 is an appropriate tool to use to assess psychological distress for research purposes.

The current study found an excellent level of internal consistency for the total score, (coefficient alpha =.92. Further, the reliability estimates for depression, anxiety, and somatization symptom scales were .87, .85, and .81, respectively.

Procedures

The population of interest is represented by a convenience sample from students and student-athletes enrolled at the University of Alberta. Students were required to be a minimum of 18 years old and enrolled in full-time studies in order to participate. Recruitment occurred through a variety of means to encourage a typical university sample. Specifically, I advertised the study through (a) physical posters across the university campus (Appendix A), (b) the university television screens (Appendix B), which are located in most campus buildings, (c) faculty social media pages (Appendix C), and (d) the University of Alberta athletic list-serv (Appendix D).

To begin, potential participants who were interested in the study contacted the primary researcher through email to find out more information and enrol in the study. They were required to use their institution email address to ensure their student status and they were subsequently provided a link to complete the survey. The primary researcher responded to their inquiry via email (Appendix I) with a link directing them to the study description, including concerns about privacy, confidentiality, and the use of their data. Participants could agree to take part in the study by electronically acknowledging the Research-Ethics-Board-approved informed consent (Appendix J) and then begin the approximately 15-minute online Qualtrics survey. Participants had two weeks to finish the survey before the software would automatically delete their data. The survey contained demographic questions, CPGI, gambling motivation measure, UPPS-P, and

BSI 18. Participant data were downloaded, scored, and kept in a private location on a password-protected file and computer. Participants were advised that they could request their responses be withdrawn from the dataset. The participants' email addresses were cross-referenced with a list of completed surveys to ensure multiple entries were not possible.

No less than 72 hours following the completion of the study, participants received an email from the primary research thanking them for their participation (Appendix K). This email included information about mental health and gambling resources (Appendix L), as well as contact information (Appendix M) for the researchers should they have further questions. Further, they were provided a $5.00 Amazon.ca e-gift card code as a research incentive.

Data Analysis

This study employed two distinct data analysis procedures to examine each research question and associated hypotheses. Regarding the first research question, logistic regression was used to ascertain whether the chosen predictor variables moderate rates of problem gambling among students. Specifically, binomial logistic regression predicts the probability that an observation falls into one of two categories of a dichotomous dependent variable, such as non-problem gambling or problem gambling. This categorical prediction is based on multiple independent variables that can be either continuous or categorical. Regarding the dependent variable, participants fall into either non-problem gambling or problem gambling based on their PGSI scores. A score between a 0 to 2 indicates a non-problem gambling, whereas a score of 3 or greater indicates a problem gambling. This logistic regression assessed the predictability of athletic-status, sex, and age of gambling onset on problem gambling status. Because three independent variables are considered, the binomial regression equation is as follows: $\text{logit}(Y) = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3$ where $\beta 0$ is the intercept or constant, $\beta 1$ is the slope parameter or coefficient for X1, the first variable, and ε represents the errors. The logit is a natural log of the

odds of an event occurring, such as gambling severity membership and is used to classify students indirectly. Variables found to be significant predictors of gambling severity membership will be included in subsequent analyses to control for moderating effects.

In order for binomial logistic regression to be appropriate, several assumptions must be met: (a) the dependent variable must be dichotomous, (b) there is independence of observations, (c) categorical independent variables must be exhaustive, (d) there should be a minimum of 15 cases per independent variable, (e) there should be a linear relationship between the continuous independent variables and the logit transformation of the dependent variable, (f) no multicollinearity, and (g) no significant outliers (Hilbe, 2009). The final three assumptions were statistically tested and included in the results section.

The second primary research question asked whether identified gambling correlates are predictive of the severity of problem gambling among students and student-athletes. This question was answered by a multiple regression analysis that assessed the predictability of three independent variables (IV) gambling motivation, impulsivity, and psychological distress on gambling severity scores within students and student-athletes separately. Additional follow-up analyses examined the relationships between subfactors within each significant IV and problem gambling severity. The following regression equation was used: $y = b1*x1 + b2*x2 +b3*x3+b4*x4+ c$; where y = estimated problem gambling prevalence score, b = regression coefficient, c = constant (error term), and x = each independent variable. Both samples were compared and contrasted.

In order for multiple regression to be appropriate, several assumptions must be met: (a) the dependent variable must be continuous; (b) there should be independence of errors (residuals); (c) there should be a linear relationship between the predictor variables (and composite) and the dependent variable; (d) homoscedasticity of residuals (equal error variances);

(e) no multicollinearity; (f) there should be no significant outliers, high leverage points or highly influential points; and (g) errors (residuals) should be approximately normally distributed (Hilbe, 2009). The last six assumptions were statistically tested and presented in the results section.

Ethical Considerations

Several ethical considerations were addressed with respect to this study. First, it is important to consider and ensure free and informed consent. All participants read the study background form, including risks for participating, before they could acknowledge their consent. This form outlines the voluntary nature of the study, requirements of participation, contact information, and the right to withdraw from the study at any time, without penalty or adverse consequence (see Appendix J).

A second ethical consideration was confidentiality. I required potential participants to contact the primary researcher via their university email, which revealed their identity. It is important to note that, even so, participants' questionnaire answers remained anonymous and included no specific identifying information. I had several reasons why their school email was chosen as a contact method. First, using institution emails ensured participants are post-secondary students at the University of Alberta. Second, the email requirement prevented participants from completing the survey on multiple occasions. A final reason that participants were required to disclose their email address was to receive the research incentive. Every participant received a $5.00 Amazon.ca e-code for completing the survey. The primary researcher sent the incentive through their institution email, which is private and secure. This specific amount was intended to increase interest in the study without being coercive. Results are analyzed in aggregate form with no identifying information or connection to any one participant.

A third concern was data storage and ownership. Participants were advised that research data is stored for five years in a password-protected folder on a password-protected computer

hard drive, only accessible by the researchers, which complies with all ethical standards and the University of Alberta's data retention policy.

The final ethical consideration involved the wellbeing of participants. There were no physical or psychological risks to completing this study. However, there was a slim chance that participants could become distressed by answering questionnaires about their gambling behaviours. To support any participants who needed resources for gambling or other mental health concerns, I provided post-study referrals to all participants, which directed them to several supportive services (see Appendix L). No participants requested mental health-related resources or expressed concerns following study participation.

Chapter 4

Results

The purpose of this study was to determine whether being a Canadian post-secondary student-athlete influenced and predicted problem gambling behaviours and consequences. In this chapter, descriptive statistics are presented first and summarize the rates of problem gambling across sex and sample group. Next, the first research question is addressed, namely, the significance of student-athlete status, gender, and age of gambling onset in predicting problem gambling classification. The third and final section addresses the second research questions and presents results related to gambling correlates between students and student-athletes. A multiple regression analysis was used to measure the effects of gambling predictors on gambling severity within each sample. But, first a comment about missing data.

Missing data

This study contained minimal missing data. In total, the 11 cases of missing data arose from a single independent variable, age of gambling onset. The missing data could have resulted from participants skipping the question or not knowing or remembering their first gambling experience. Because the exact reason for the missing data is undetermined, cases that did not report age of gambling onset were excluded from the analysis. Further, the online survey system would not advance to the next page until a participant scrolled through all the questions. Therefore, all covariate measures were answered completely, and no missing data occurred regarding the second analysis. Finally, participants were given two weeks from the time they started to complete the entire survey. Following theses two weeks, the software automatically deleted their full data and therefore would not be included in the final analysis. Thus, the results of this study include only participants who answered questions on each page of the survey.

Power analyses

Post hoc power analyses were conducted using the software package, GPower (Faul, Erdfelder, Lang, & Buchner, 2007) based on the sample size, effect size, and alpha level of each independent analysis including the logistic regression and both multiple regressions. The analyses revealed the statistical power for these calculations exceeded .99 for all regression analyses. Therefore, there was adequate power to detect significant differences in the total sample as well as each subsample (e.g., student and student-athletes) and interpretations out the sample could be appropriately made.

Descriptive Statistics

Problem Gambling Severity. Overall problem gambling severity categories were calculated across both sample groups. The mean overall PGSI score was 2.14 (SD = 3.06). Between identified sex, the mean gambling severity score was 3.02 (SD = 3.35) in males and 1.04 (SD = 2.22) in females. Between subsamples of athletic status, the severity scores were 1.53 (SD = 2.38) in students and 3.30 (SD = 3.80) in student-athletes. Table 4 presents the distribution of participants by gender across the four PGSI categories defined by Ferris and Wynne (2001). The distribution of all participants across the gambling severity categories was non-problem, 52%; low risk, 20%; moderate risk, 20%; and probably pathological, 8%.

Table 4
Distribution of Participants by Gender and Sample Across PGSI Categories

		PGSI Subtype			
		Non-Problem	Low-Risk	Moderate Risk	Pathological
PGSI score		0	1-2	3-7	>7
Gender	Male	33	17	28	7
	Female	46	14	6	2
Sample	Students	57	25	17	1
	Student-Athletes	22	6	17	8
Total (N = 153)		79	31	34	9

Study variables. Table 5 reports the mean and standard deviations of covariate measures including gambling motivation, impulsivity, and psychological distress for students and student-athletes. Again, problem gambling is defined as a score of three or more on the PGSI.

Table 5
Means and Standard Deviations for Gambling Motivation, Impulsivity, and Psychological Symptoms

Scale	Students				Student-Athletes			
	Non-Problem (n = 83)		Problem (n = 17)		Non-Problem (n = 28)		Problem (n =25)	
	M	SD	M	SD	M	SD	M	SD
Motivation	2.69	0.82	3.18	0.53	2.32	0.78	2.83	0.39
Amusement	2.69	1.09	3.67	0.84	2.40	1.15	2.94	0.62
Avoidance	2.04	0.97	2.43	0.96	1.64	0.89	2.23	0.82
Excitement	3.13	0.99	3.68	0.64	2.78	1.10	3.34	0.76
Money	2.84	1.06	3.04	0.97	2.22	0.97	2.60	0.86
Social	2.84	1.13	2.94	0.98	2.64	1.11	2.95	0.69
Impulsivity	2.20	0.40	2.36	0.31	2.04	0.39	2.54	0.36
Negative Urgency	2.41	0.67	2.51	0.54	1.98	0.57	2.56	0.42
(Lack of) Planning	1.82	0.41	1.80	0.37	1.83	0.36	2.31	0.59
(Lack of) Perseverance	2.09	0.53	2.28	0.44	1.87	0.47	2.21	0.57
Sensation-Seeking	2.63	0.56	2.88	0.50	2.84	0.34	3.09	0.48
Positive urgency	2.01	0.65	2.30	0.74	1.69	0.70	2.47	0.57
Psychological Distress	1.98	0.75	1.83	0.61	1.52	0.61	2.00	0.65
Depression	2.20	0.99	2.20	0.78	1.57	0.63	2.02	0.80
Anxiety	2.06	0.90	1.90	0.91	1.55	0.68	2.14	0.77
Somatization	1.68	0.68	1.40	0.50	1.43	0.66	1.85	0.73

Research Question One

Assumptions of statistical tests. Binomial logistic regression analysis requires a minimum number of cases per level of an independent variable because this multivariate statistic relies on the maximum likelihood estimation, and reliability estimates decline when there are limited cases. The sample satisfies this criterion regarding the two independent categorical

variables, with the smallest levels of an independent variable, student-athletes, having 48 observations included in the analysis.

Next, a linear relationship must exist between the only continuous independent variable, age of gambling onset, and the logit transformation of the dependent variable. I used the Box-Tidwell (1962) procedure to assess the linearity of the continuous variable with respect to the logit of the dependent variable. The interaction term between the only continuous independent variable was found to be insignificant and therefore confirms that age of gambling onset is linearly related to the logit of the dependent variable (Appendix N). In addition, the data were also assessed for multicollinearity; however, since there is only one continuous independent variable, this is not a concern. Finally, there were four outlier cases with the largest standardized residual having a value of 3.23 standard deviations (Appendix O). These outlier cases were manually inspected, deemed appropriate, and kept in the analysis.

Results of hypothesis one testing. The logistic regression model was statistically significant, $\chi 2(3) = 28.60$, $p < .05$. The model explained 26% (Nagelkerke R^2) of the variance in problem gambling identification and correctly classified 75% of cases. The reported sensitivity was 52% and the specificity was 84%. The positive predictive value, meaning those participants predicted to problem gamble who actually reported problem gambling, was 58% and negative predictive value was 81%. Two predictor variables were statistically significant: athletic status and sex (as shown in Table 6). Specifically, being a post-secondary athlete was associated with an increased likelihood of exhibiting problem gambling (3.38 OD) and males were 4.58 times as likely to report problem gambling than females. The area under the ROC curve was .76, 95% CI [.68, .84], which is an acceptable level of discrimination according to Hosmer, Lemeshow, and Sturdivant (2013).

Table 6
Logistic regression Predicting Likelihood of Problem gambling based on Age of Gambling Onset, Athletic Status, Sex, Casino Proximity, and Faculty

	B	SE	Wald	*Df*	*p*	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Sex	1.52	0.48	10.06	1	.002	4.58	1.79	11.73
Athletic Status	1.22	0.49	8.46	1	.004	3.38	1.49	7.66
Age of Gambling Onset	0.007	0.014	0.14	1	.91	1.01	0.89	1.14
Constant	-2.47	1.07	5.32	1	.02	0.084		

Note: Sex is for males compared to females.

Research Question Two

Assumptions of statistical tests. As previously stated, several critical assumptions are required to accurately perform a multiple regression and can be statistically assessed. In the previous analysis, it was determined that student-athletic status is a significant predictor of problem gambling membership. Therefore, the multiple regression analysis was completed with the student and student-athlete groups separately. As described by Berry (1993), the assumptions of a multiple regression analysis are outlined below.

First, the data should have independence of observations, that is, independence of residuals. This procedure tests for first-order autocorrelations. Both sample groups demonstrated independence of residuals, as shown by a Durbin-Watson statistic of 1.84 and 2.01 for students and student-athletes, respectively (Appendix P). According to Field (2009), these results suggest there is no autocorrelation.

Next, the analysis requires linearity between the dependent variable and the independent variables collectively, as well as a linear relationship between the dependent variable and each continuous independent variable. To test the linearity between the dependent variable and the independent variables collectively, a scatterplot between the studentized residuals against the (unstandardized) predicted values was created. In both samples, scatterplots suggest a linear relationship exists between the dependent variables and the independent variables collectively

(Appendix Q). Partial regression plots were used to test the linearity between the dependent variable and each continuous independent variable (gambling motivation, impulsivity, and psychological distress). The scatterplots suggest that a linear relationship exists in both sample groups between the dependent variable and each independent variable (Appendix R).

A further assumption requires homoscedasticity of residuals to confirm that the residuals are equal for all values of the predicted dependent variable. To test this assumption for both sample groups, I plotted the studentized residuals against the unstandardized predicted values. The scatterplot indicated a similar pattern of heteroscedasticity in the data for both sample groups, likely due to the significantly skewed dependent variable (Appendix S).

Next, the data must not show multicollinearity, which occurs when two or more independent variables are highly correlated with each other. Multicollinearity is detected by inspecting correlation coefficients and Tolerance/VIF values. In both sample groups there was no multicollinearity concerns (Appendix T).

In addition, the data should not have significant outliers or unusual points that influence and reduce the predictive power of the regression formula. There were no outliers in the student or student-athlete sample groups. Further, there were no significant leverage points in either group according to Huber's (1981) criteria. Lastly, neither group contained cases that are influential according to Cook and Weisberg's (1982) description.

Finally, the residuals or errors should be normally distributed. Examination of the frequency plot of residual values and P-P plot confirms a normal distribution (Appendix U).

In conclusion, the current analysis does not meet assumptions of normality due to significant heteroscedasticity with the residuals. As a result, any reported coefficient *p* values could be biased. Therefore, a bootstrapping procedure with 1,000 samplings will be used to

report bias-corrected 95% confidence intervals for each coefficient for both the student and student-athlete samples in order to determine statistical significance.

Result of Hypothesis two testing. This study used multiple linear regression with a bootstrapping procedure to predict problem gambling severity based on the significant subject variable (sex) and other gambling-related variables (gambling motivation, impulsivity, and psychological distress) for students and student-athletes separately. For the student sample group, a significant regression equation was found F (4, 95) = 6.80, $p < .01$, with an overall fit of 22% (R^2). Gambling motivation was the only variable included in the regression analysis that significantly predicted problem gambling β = 0.30, $t(95)$ 2.9 $p < 0.05$. That is, as student's gambling motivation increased by a score of one, the index of problem gambling severity increased by 0.70 while controlling for other variables. Results are shown in table 7. Similarly, a significant regression equation was found in the student-athlete sample (F (4, 48) = 8.06, $p <$ .01), with an overall model fit of 40% (R^2). In this model, impulsivity was the only significant coefficient β = 0.40, $t(48)$ 2.66 $p < 0.05$. A one-point increase in impulsivity among student-athletes is associated with a 2.93 increase in gambling severity controlling for other variables. Regression coefficients and standard errors can be found in Table 8.

Table 7

Summary of 1,000 Sampled Bootstrapped Multiple Regression Analyses for Variables Predicting Problem Gambling Severity Scores in the student sample (n = 100)

Variables	B	SE_B	β	95% Confidence interval for B	
				Lower Bound	Upper Bound
Intercept	-1.85	0.85		-3.73	-0.26
Motivation	0.70*	0.24*	0.29*	0.25	1.25
Impulsivity	0.67	0.56	0.14	-0.37	1.70
Psychological Distress	-0.35	0.29	-0.14	-0.90	0.27
Sex	0.80	0.42	0.21	-0.05	1.73

**p < .05. **p < .01; B = unstandardized regression coefficient;* SE_B = Standard error of the coefficient; β = standardized coefficient

Table 8

Summary of 1,000 Sampled Bootstrapped Multiple Regression Analyses for Variables Predicting Problem Gambling Severity Scores in the Student-Athletes sample (n = 53)

Variables	B	SE_B	β	95% Confidence interval for B	
				Lower Bound	Upper Bound
Intercept	-7.96	1.76		-11.77	-4.79
Motivation	0.19	0.51	.04	-0.78	1.13
Impulsivity	2.93*	1.12*	0.40*	0.16	5.07
Psychological Distress	1.42	0..79	0.28	-0.34	3.25
Sex	1.79	1.06	0.23	-0.519	3.81

**p < .05.; B = unstandardized regression coefficient;* SE_B = Standard error of the coefficient; β = standardized coefficient

Finally, a second analysis determined the predictability of the subscales on gambling severity for each sample group. As with the previous regression, this analysis did not meet the assumption of normality due to significant heteroscedasticity of the residuals. Therefore, bootstrapping procedures with 1,000 samplings were used to report bias-corrected 95% confidence intervals for each coefficient. Regarding gambling motivation in the student sample, the overall model was significantly predictive of student gambling ($F (5, 94) = 7.15$, $p < .005$), and accounted for 28% of the model fit. Gambling for amusement was the only significant predictor of gambling severity among students $\beta = 0.71$, $t(94)$ 4.23 $p < 0.01$. As amusement scores increased by one, gambling severity scores increased by 1.20. Regarding student-athletes and impulsivity subscales, a significant regression equation was also found ($F (5, 47) = 6.98$, $p < .005$), with an R^2 of .43. The only significant coefficient was a lack of premeditation $\beta = 0.47$, $t(47)$ 2.83 $p < 0.01$, which indicates that as scores on the premeditation subscale increase by one, gambling severity scores increase by 2.94 See tables 9 and 10 for the regression coefficients.

Table 9

Summary of 1,000 Sampled Bootstrapped Multiple Regression Analyses for Gambling Motivation Subscales Predicting Problem Gambling Severity Scores in the Student sample (n = 100)

Variables	B	SE_B	β	95% Confidence interval for B	
				Lower Bound	Upper Bound
Intercept	-0.80	0.52		-1.85	.06
Social	-0.54	0.28	-0.31	-1.10	-.04
Amusement	1.20*	0.27*	0.71*	.65	1.79
Excitement	0.26	0.25	0.13	-.28	.79
Avoidance	-0.12	0.27	-0.06	-.62	.41
Monetary	-0.15	0.19	-0.09	-.53	.25

**p < .05.; B = unstandardized regression coefficient;* SE_B = Standard error of the coefficient; β = standardized coefficient

Table 10

Summary of 1,000 Sampled Bootstrapped Multiple Regression Analyses for Gambling Motivation Subscales Predicting Problem Gambling Severity Scores in the Student sample (n = 53)

Variables	B	SE_B	β	95% Confidence interval for B	
				Lower Bound	Upper Bound
Intercept	-1.19	2.67		-5.59	5.03
Negative Urgency	.51	1.22	0.09	-1.78	2.36
Lack of Premeditation	2.94*	1.17*	0.47*	0.78	4.97
Lack of Perseverance	-1.36	1.26	-0.22	-3.75	0.45
Sensation Seeking	-1.39	1.03	-0.16	-3.22	0.76
Positive Urgency	1.75	1.03	0.39	-0.14	5.23

**p < .05.; B = unstandardized regression coefficient;* SE_B = Standard error of the coefficient; β = standardized coefficient

In summary, the study's results supported several of the research hypotheses. Overall, gambling behaviours are present among students and student-athletes, with a significant majority of participants in both sample groups participating in some form of gambling within the past 12 months. The first research question proposed three hypotheses: (1) student-athletes will have higher rates of problem gambling status than students (H1a), (2) Males will have a higher rate of problem gambling status than females (H1b), and (3) participants who begin gambling at an

earlier age will be more likely to gamble problematically (H1c). Of the three hypotheses, two were supported (H1a and H1b). The results demonstrate that student-athletes and males have higher rates of problem gambling status; however, the third hypothesis (H1c) was not supported, as the age of gambling onset did not significantly relate to problem gambling classification.

The second research question generated four hypotheses, including the predictions that (1) overall gambling motivation will be associated with higher problem gambling severity across both samples (H2a), (2) students and student-athletes will have different gambling motivations (H2b), (3) impulsivity will predict higher problem gambling severity across both samples, and student-athletes will have higher impulsivity scores (H2c). Finally, (4) psychological distress was hypothesized to predict higher problem gambling severity across both samples but not differ between groups (H2d). The study found mixed support for these hypotheses. Specifically, the study supported hypothesis H2c that impulsivity would be higher and predict gambling severity among student-athletes. The study failed to support the three hypotheses that student-athletes' gambling motivation, student impulsivity, and psychological distress in both sample groups would predict that gambling severity. Of note, gambling motivation was different between the sample groups, just not predictive of gambling among student-athletes. In the fifth and final chapter, I interpret these findings in the context of existing literature.

Chapter 5

Discussion

This chapter discusses the study's results and compares and contrasts the findings with existing gambling literature. Specifically, it includes a discussion of (a) outcomes of the research questions and hypothesis testing, (b) possible implications for counselling psychology, (c) study limitations, and (d) recommendations for future research. The chapter closes with summative comments and conclusions.

The purpose of this study was to determine the relationship between post-secondary student-athletic status and problem gambling behaviours. This examination included assessing the predictive power of athletic status on problem gambling categorization, while controlling for subject-related correlates of gambling. Further, I completed an in-depth analysis to understand the differences between students and student-athletes and how their gambling motives, level of impulsivity, and psychological distress predicts problem gambling severity.

Regarding the current study, I used a quantitative survey methodology to investigate the nature of post-secondary student and student-athlete problem gambling. To analyze the correlational design, I used logistic and multiple regression to create a predictive model of problem gambling and problem gambling severity. To capture an overall picture of gambling across each sample group, demographic findings are explored, including gambling frequencies, game preferences, and maximum betting sizes. But first, I discuss the study's results specific to research questions posed.

Research Question One

The first overarching research question asked if subject-related variables predict problem gambling among post-secondary students, with a particular interest in student-athletes. Specifically, it was hypothesized that athletic status, identifying as male, and being a younger

first-time gambler would predict higher rates of problem gambling. To assess this hypothesis, logistic regression analysis was used to capture the predictive utility of these variables in the classification of problem gambling. The analysis provided support for the hypothesis (H1a) that student-athletes would report higher rates of problem gambling status than their non-athletic peers. Being a post-secondary student-athlete was a significant predictor of being categorized as problem gambling. More specifically, being a student-athlete increased the odds of their gambling being classified as problematic by 3.37. Of note, this observation occurred while controlling for participant sex, a variable commonly touted in the literature as predicting group membership. This finding is entirely consistent with results in several other studies that student-athletes do represent a higher-risk group for problem gambling, although this has only been previously investigated among American students. For instance, American student-athletes have increased rates of problem gambling behaviours compared to their student peers as well as the general population (Sullivan, 2005; Weinstock et al., 2007). The findings reported here suggests that, like American student-athletes, Canadian post-secondary athletes should be considered an at-risk population for problem gambling.

The existing literature suggests several potential reasons why student-athletes tend to have high rates of problem gambling. For instance, post-secondary schools socialize athletes in a climate of competition. Further, this competitive nature could extend past their chosen sports and into other areas in the form of gambling (Curry & Jiobu, 1995). Second, they suggest that student-athletes are highly influenced by extrinsic rewards, such as gaining status as an experienced and knowledgeable gambler. Finally, the nature of varsity sports is such that students would have little-to-no time to earn money through a part-time job. Because schools do not offer sufficient scholarships to all athletes, gambling could become an alternative source of

income. Some of these motivations are examined in the second research question discussed later in the chapter.

Identified sex was a second demographic correlate used to predict problem gambling. The current study confirmed the second hypothesis (H1b) that males report higher rates of problem gambling across both samples. It is widely observed that males gamble more on average, as well as experience increased negative consequences as a result of gambling (Engwall et al., 2004; Winters et al., 1998). Indeed, the robust support of male problem gambling exists in various countries outside North America, including Britain (LaPlante et al., 2009) and New Zealand (Volberg & Abbott, 1997). Researchers propose several hypotheses to explain increased male gambling behaviours, such as how stress affects risk-taking across sexes. In a control group experiment, Lighthall, Mather, and Gorlick (2009) had participants induce a stress response by holding their hands in cold water and playing a risk-reward type game. As measured by salivary cortisol levels, men took greater risks when experiencing stress, whereas women became risk-averse. Applied to gambling, the risk of making a bet, which induces stress, produces risk-seeking behaviour in men and risk avoidance in women.

An additional line of support is that impulsivity precipitates higher risk-taking behaviours and more specifically, problematic gambling behaviours (Hodgins & Holub, 2015; Shin & Montalto, 2015) and men have continually demonstrated higher impulsivity (Chapple & Johnson, 2007). Therefore, it follows that this study found increased impulsivity reported among males, as well as higher rates of problem gambling. Considering athletic status was included in the regression analysis, males gamble more than females regardless of their participation in varsity sports. Based on this finding that sex is a significant predictor of gambling membership, it is included in the subsequent analysis as a moderator variable.

Interestingly, the third hypothesis (H1c), age of gambling onset, proved to be insignificant in predicting problem gambling in this sample. Previously published results identified that the age of first-time gambling influenced the clinical presentation of participants (Jiménez-Murcia et al., 2010). For instance, younger first-time gamblers developed a greater severity of gambling disorder. Further, they showed increased novelty seeking and lower self-directedness traits. Conversely, older first-time people with gambling problems presented with increased general psychopathology, without personality susceptibilities. This distinction may capture the difference between gambling as a dependency and gambling as maladaptive coping; however, the study reported here failed to capture any relationship between gambling onset and gambling severity. Therefore, it failed to provide support for a developmental model of problem gambling that, in the substance dependence literature, posits early exposure to substances dramatically increases the risk of future dependence (Jordan & Andersen, 2017).

One explanation for this discrepancy is how I uncovered first gambling experiences. Specifically, I asked participants to recall their age when they first remember gambling. These experiences could include informal wagers or bets, and not necessarily prototypical gambling events such as horse racing or casino games. This method may be overly simplistic and not capture more objective data of first-time gambling. That being said, there could be greater difficulty identifying a first gambling experience compared to other actions such as first alcohol or drug use. Certainly, gambling at a younger age carries less sense of deviance compared to adolescent substance use and, therefore, it could be more challenging to identify first experiences correctly. Further, the sample contained a narrow range of ages, with over 75% of participants ranging between the ages of 18 and 22. This minimal range accurately captures the typical post-secondary student but does not show differences in gambling across the young adult stage.

In summary, regarding the first research question, there was some evidence to support the hypothesis that certain subject-related variables would predict problem gambling categorisation. Specifically, athletic-status and identified sex help provide a predictive framework based on demographic variables. These subject-related variables highlight individuals within a population that may be at a higher risk for problematic gambling; however, such an analysis falls short in providing explanatory power as to why certain variables hold such significance. Regarding the integrative model of problem gambling (Blaszcynski and Nower, 2002), these relevant demographic variables could elucidate differences in emotional and biological vulnerabilities, captured in pathway two and pathway three of the model, across problem and non-problem gambling. For instance, sex differences in risk-taking and boredom proneness could be higher in males and student-athletes, providing, in part, a theoretical explanation for why these two subgroups exhibit higher rates of problem gambling. Likewise, traits of impulsivity, which is associated with problem gambling (Hodgins & Holub, 2015), is represented in student-athletes at a higher rate than students.

The next section expands the current investigation to explore these traits as they relate to problem gambling among each sample group. I attempt to offer an explanation as to why increased problem gambling behaviours are demonstrated among student-athletes.

Research Question Two

The second overarching research question asked if covariate measures of gambling motivation, impulsivity, and psychological distress predict problem gambling severity differently between students and student-athletes. Multiple regression was used to determine how gambling correlates supported in the literature predict problem gambling severity in students and student-athletes. Results diverged from the literature and provided mixed support for the hypothesis. These conclusions are discussed below.

First, gambling motivation differed between the sample groups (H2b). As expected, student's motivation predicted gambling severity; however, student-athletes showed no such relationship. Therefore, I cannot fully accept hypothesis H2a that gambling motivation would predict problem gambling severity across both samples. Looking at subscales of motivation, students who gambled for the amusement of playing reported greater severity than those who did not. This result suggests that students seek out increased gambling behaviours – to their detriment – because of the enjoyment they receive from playing. Possibly, the positive emotions of gambling outweigh the perceived consequences and thus further motivate students to gamble more frequently. Comparatively, gambling-specific motivations do not drive student-athletes to problematic gambling to the same degree. In a survey study completed in Alberta, Canada, researchers reported that the predominant motives of problem gambling are overwhelmingly to win money and for enjoyment (Smith and Wynne, 2002). Moreover, among students, the literature suggests amusement, avoidance, and money are significant predictors of problem gambling (Marmurek et al., 2014). These types of motivations were present in both samples and therefore provided some justification for gambling motivation and gambling but failed to uncover various other motives that the research has shown to relate to problem gambling specifically.

Even though some of this study's findings appears to run counter to the literature in that most gambling motivations did not predict gambling severity, that is not to say they are meaningless predictors of problem gambling in general. Simply put, gambling for amusement among the student sample differentiates the degrees of gambling severity. In contrast, student-athletes commonly endorsed these motives across all levels of gambling severity, except those who do not gamble or those who play infrequently. Previous research supports this finding and suggests that gambling for amusement significantly diverges when comparing non-gamblers to

gambling disorder (Smith & Wynne, 2002). Essentially, gambling for amusement predicts problem gambling severity insofar as it captures motivations between those who gamble and those who do not. Similarly, this study confirms that gambling for monetary reasons was a commonly endorsed motivations across all categories of gambling severity. Again, this makes sense intuitively because individuals who gamble would be motivated by winning their bets and, by extension, earning money. What the current study concludes is that most gambling motivations among students and student-athletes do not substantively account for the variance when looking at problem gambling as a continuum of severity. Regarding the different findings between students and student-athletes, it is possible that student-athletes, as a result of participation in varsity sports, do not to gamble primarily for entertainment.

The next hypothesis stated that impulsivity predicts increased gambling severity across both sample groups. As well, student-athletes will have higher rates of impulsivity (H2c). Similar to gambling motivation, traits of impulsivity predicted gambling severity in one sample group and not the other; specifically, impulsivity significantly predicted problem gambling severity among student-athletes. Therefore, the results run contrary to the overall hypothesis that impulsivity would predict gambling severity in both groups. Further, there are some inconsistencies compared to the existing literature.

Previous studies observed direct relationships between impulsivity and gambling. The literature posited that overall impulsivity predicts increased gambling frequency (Shin & Montalto, 2015) and subsets of impulsivity, such as negative urgency and positive urgency, predict greater gambling severity (Marmurek et al., 2014). Notably, this study found similar results to Hodgins and Holub (2015) in that trait impulsivity, as opposed to sensation-seeking/response impulsivity, predicts higher gambling severity among student-athletes, but not the student group. In the sample, a subset of impulsivity, lacking premeditation, is significantly

predictive of problem gambling severity. This finding supports Hodgins and Holub's (2015) assertion that gambling frequency and gambling severity are different phenomena, which are driven by various manifestations of impulsivity. Further, student-athletes reported increased sensation-seeking and lacked premeditation compared to other students. In fact, non-problem student-athlete gamblers and problem student gamblers had nearly identical rates of sensation seeking. Other subscales of impulsivity, as well as the overall measure, were similar across the groups. The next step is to meaningfully explain how the current study's findings intersect with the existing literature and help elucidate the impact of impulsivity and problem gambling among post-secondary student groups.

Again, the literature clearly supports the position that impulsivity, as measured differently across studies, positively predicts gambling and problem gambling (Canale, Vieno, Bowden-Jones, & Billieux, 2017; Hodgins & Holub, 2015; Marmurek et al., 2014; Shin & Montalto, 2015). As discussed previously, the results indicate that overall impulsivity, as well as most subscales, do not differ significantly between sample groups. Therefore, in this study, student-athletes are only slightly more impulsive than students; however, the relationship between problem gambling and lacking premeditation could explain why impulsivity predicts problem gambling among student-athletes only. This group is less likely to consider the consequences of an act before engaging in that action. In terms of gambling behaviours, student-athletes are either less deliberate, less risk-averse, or indifferent to the chance of losing a bet. This group may assume larger wagers or take greater risks when gambling, thus inevitably suffering more considerable losses, which is a prerequisite to negative gambling consequences. Indeed, results demonstrated that student-athletes are more likely to wager higher amounts of money on a single bet than their non-athletic peers. This observation provides support for the conclusion that student-athletes are greater risk-takers and thus greater loss-takers as well.

Additionally, I looked at gambling frequency and impulsivity. Specifically, certain measures of sensation seeking/response impulsivity have been found to be predictive of gambling frequency (Hodgins & Holub, 2015). Recognizing that both groups did not differ significantly in the previously mentioned conceptualization of impulsivity overall, though student-athletes did report greater sensation seeking, they did gamble twice as much over the past 12 months. Therefore, results provide some limited support for previous findings, suggesting that impulsivity may predict increased gambling frequency in this sample. To conclude, elevated rates of impulsivity overall are not associated with increased frequency of gambling in the current study; however, diminished premeditation among student-athletes may lead this group to take bigger bets with greater risks and therefore experience greater consequences of losing that are characteristic of problem gambling.

The fourth hypothesis (H2d) for this research question stated that psychological distress would predict higher rates of problem gambling severity across both samples but not differ between groups. Previous studies observed the relationship between mental health and problem gambling (Goudriaan et al., 2009; Welte et al., 2017). These studies suggested that Blaszcynski and Nower's (2002) emotionally vulnerable gambler does indeed use gambling to cope with difficult emotions and distress. Further, they posited that gambling behaviours likely perpetuate or increase mental health distress. This study found no difference between students or student-athletes in terms of psychological distress. As expected, these groups do not report greater rates of depression, anxiety, or somatization; however, these results once again diverge from previous findings. Overall scores of psychological distress were not significantly predictive of problem gambling severity in either group. However, rates of gambling severity do increase with increased psychological distress. Though not significant, psychological distress likely plays a role in gambling behaviours, but its importance may be reduced in post-secondary student

samples. For instance, mental health issues and psychological distress are not uncommon in this group. One-third of Canadian undergraduate students report extreme psychological distress during their post-secondary years (Adlaf, Demers, & Gliksman, 2005). Compared to their non-university peers, students are twice as likely to report suffering from a mental illness, with only 15.4% of them seeking treatment by a professional (American College Health Association–National College Health Assessment, 2009).

One possible reason psychological distress poorly predicts problem gambling is due to the elevated rates of psychological distress across the student body. As a result of its pervasive nature, psychological distress can only differentiate between extremely high levels of problem gambling and those with no problems. Further, I measured psychological distress at a single point in time, which could limit the findings overall. For example, Gourdriaan and colleagues (2009) sampled rates of psychological distress several times across four-years to better capture overall distress throughout post-secondary education and found significantly different rates of distress across measurement times.

A final area of investigation is the interplay of sex and gambling. That is, males tend to report higher rates of problem gambling than females (Adams et al., 2007; Curry & Jiobu, 1995; Hodgins & Holub, 2015; Marmurek et al., 2014; Nordmyr et al., 2014; Welte et al., 2007; Welte et al., 2011; Winters et al., 1998). Logistic regression analysis demonstrated sex to be a significant predictor of problem gambling categorization. In contrast, multiple regression analysis, which focused on problem gambling severity, did not find sex to be a predictor. This surprising result may be because of the inclusion of other variables that overlap and, therefore, account for the variance commonly reported due to sex. However, this is not to say there were no gambling differences between males and females. For instance, males reported more gambling in the past 12 months than females, had higher overall impulsivity and lack of premeditation, and

greater maximum bet size. What these results seem to suggest is that sex may be a crude predictor of problem gambling and in the context of other pertinent variables, it becomes less critical in the risk profile of problem gambling severity.

In summary, the results of this study do not fit neatly into any particular theory or model of problem gambling, which is not necessarily surprising given the complex nature of gambling behaviours among students and student-athletes. Problem gambling represents a heterogeneous category of harmful behaviour that co-occurs with varying levels of behavioural patterns, mental health, and personality characteristics (Nower, Martins, Lin, & Blanco, 2013). That being said, Blaszcynski and Nower's (2002) integrative model of gambling helps delineate harmful gambling behaviours by highlighting the importance of certain variables in the prediction of program gambling. As such, the results of this study suggest that gambling correlates have different significance between the two samples based on their distinct gambling pathways.

First, gambling for amusement was a significant predictor of problem gambling severity in students, but not in student-athletes. This observation suggests that behavioural conditioning is a more common pathway to problem gambling among the student sample group as it draws them to gamble due to general arousal and excitement. Because this pathway tends to produce less severe problem gambling, it supports the finding that students would be less susceptive to more harmful traits that describe gambling disorder. Second, lacking premeditation or consideration of one's actions appears to be a valid predictor of problem gambling exclusively among student-athletes. This finding suggests that student-athletes may have increased biological vulnerabilities seen in the pathway three group and, therefore, present with higher problem gambling rates. Third, psychological distress was not a good predictor of gambling severity in either sample. In somewhat of a contrast to Blaszcynski and Nower's (2002) assertion that emotional vulnerability, as captured in part by increased mood and anxiety disturbances, increased problem

gambling rates, the current results did not observe such an effect between or within the student and student-athlete groups. Finally, sex, a robust finding in the literature for predicting problem gambling, was insignificant in predicting gambling severity among our sample when considering these other covariates. Blaszcynski and Nower's (2002) model did not include sex as part of their etiological pathways of problem gambling. Likely because their model captures sex-based differences in either behavioural conditioning, emotional traits, or biological vulnerabilities. Therefore, not finding sex as a significant predictor neither supports nor rejects their theoretical position. To elucidate these findings a bit more, I now discuss additional demographic information as it relates to the study's sample.

Overall Demographic Findings

The results of this study demonstrate that post-secondary students, both athletes and their non-athletic peers, actively gamble. Overall, 73.2% of the total sample engaged in some form of gambling within the past year. Comparatively, a large-scale study of gambling among the general population found 68% of participants gambled within the past year (LaPlante et al., 2009). Across the two sample groups, student-athletes (83%) reported more gambling in the past year than students (68%). Across the student sample, gambling was slightly more prevalent than the general population; however, as a unique group, student-athletes were notably more likely to gamble. This result is similar to previous American studies that reported elevated rates of student-athlete gambling compared to student peers (Weinstock et al., 2007). One possible reason for the increased gambling participation could be the attitude towards gambling. Specifically, student-athletes may present with more supportive attitudes towards risk-taking behaviours (Cross, Basten, Hendrick, Kristofic, & Schaffer, 1998) and therefore be drawn to gambling. Further, the Cross et al. (1998) suggested that risk-taking is the result of greater sensation-seeking traits in athletic populations. I explore this thought later in the discussion.

In addition to recreational gambling, problem gambling also exists within both groups. The current study found rates of problem gambling in my sample to be relatively more elevated than many studies presented in the student-gambling literature. The current research found 17% of the student sample reported problematic gambling, compared to 47.2% of student-athletes. That being said, it falls close to the wide range of published results. For instance, previously observed rates of problem gambling among students are upwards of 34% (Marmurek et al., 2014) and as low as 7.9% in seminal studies (Blinn-Pike et al., 2007).

Considering these rates of problem gambling are notably higher than those observed in the literature, it is plausible that recruitment methods unintendedly attracted students who have a greater interest in gambling, which could translate to increased problem gambling rates among the collected sample. Nevertheless, these results demonstrate that student-athletes in this sample engaged in gambling activities at a much higher rate than students.

The next section explores gambling preferences and auxiliary correlates to better understand how these groups differ.

Game type and gambling involvement. One compelling way to understand the differences between students and student-athletes is to look at the number of distinct types of games they play. As the research indicates, gambling involvement positively correlates with gambling severity (Williams et al., 2006). That is, individuals who demonstrate higher problematic gambling behaviours tend to play a wider variety of games, and those who play more games, tend to have greater problem gambling behaviours. In that same study, they found that students played an average of 1.70 games; the current study found similar results. Across the total sample, student and student-athletes classified in the problem gambling category participated in more than twice the number of games than their non-problem gambling peers, and there was a notable difference between gambling involvement of students and student-athletes.

Students who have gambled in the past year played 1.70 (SD = 1.12) types of games on average, compared to student-athletes who played 1.98 (SD = 1.39). Student-athletes, therefore, participate in a somewhat wider variety of games than students, a further indication that student-athletes may represent a group at greater risk for problem gambling. The next section compares game preferences across the groups.

Regarding gambling type, gambling behaviours spread across many different forms of games, with both groups playing a variety of common forms of gambling. For example, among students, the most popular forms were casino roulette and casino blackjack. As well as preferring casino blackjack, student-athletes also greatly preferred casino poker. In general, students and student-athletes have a high affinity for gambling in casino venues, a finding research suggests correlates with problematic gambling (Williams et al., 2006). This study sample's interests are somewhat divergent from previously reported studies. For instance, past studies have found that scratch tickets, lottery, and slots are popular forms of gambling in student populations (Marmurek et al., 2014), but this is not the case in the current sample. That being said, the results do support the notion that game preference may reflect associations with problem gambling behaviours. Indeed, individuals with gambling problems, much like the sample overall, are more likely to play casino table games than other gambling types (Currie et al., 2013).

Interestingly, sports betting or fantasy sports was not one of the most popular types of betting among student-athletes, which could be expected given their interest and proclivity towards sports. That being said, student-athletes who gambled problematically participated in more fantasy sports than both the student group and non-problem gambling student-athletes. Overall, there is not much support for the notion that differences in gambling severity between students and student-athletes stem from game preferences. Instead, it is the similarities between these groups, that is, preference for formal casino games, that may be associated with high rates

of gambling problems among the post-secondary cohort. Next, I discuss the limitations of my study.

Limitations

All research studies are flawed (Gelso, 1979), and this study is no exception. At least four limiting factors exist in the current study, including variable prevalence rates in problem gambling, sampling size and methodology, social desirability of problem gambling, and finally the use of the binary classification of non-problem and problem gambling. One of the most significant challenges with researching gambling is sampling (Gainsbury, Russell, & Blaszczynski, 2012). Across Canadian post-secondary students, prevalence rates of gambling disorder vary from 1.1% (Mihaylova et al., 2012) to upwards of 34% (Marmurek et al., 2014). This thirty-fold difference may reflect individual variations among recruited students, as well as institutional and provincial differences in gambling. With such a variation in reported rates of problem gambling, sampling a small group of students could result in outcomes that are artificially inflated or deflated depending on recruitment methods. In the current study, rates of problem gambling were higher than expected across both sample groups. Fortunately, recruiting both students and student-athletes from the same institution, with similar inclusion criteria, reduces the impacts of sampling error when comparing these groups.

A related limitation is a reliance on convenience samples. This sampling approach may be problematic because students interested in the study may represent systematic differences, such as those who are highly interested in gambling. Further, if study recruitment is not widespread, students from specific faculties may be overly represented in the sample. In previous work by Williams and colleagues (2006), university major predicted gambling participation. Specifically, Kinesiology, Physical Education and Management majors predicted problem gambling behaviours more than others, such as arts. Williams and colleagues (2006)

hypothesized these two majors draw students with more risk-taking propensities. They suggest that Kinesiology and Physical Education degrees, which are more commonly chosen by student-athletes, constitute a group known for higher risk-taking behaviours, including gambling (Engwall et al., 2004). To attain the sample, I utilized campus-wide recruitment methods, though I did not stratify the sample by post-secondary degree choice, sex, age or gambling proclivity.

Third, results are somewhat limited due to the uneven sampling of students and student-athletes. Post-secondary athletes represent a small segment of the total university population and thus were difficult to recruit for the study. Even with direct methods of recruitment such as the varsity listserv, student-athletes recruitment was notably lower than the general student population. One consequence would be the limited demographic variability found in this sample compared to the larger student group. Therefore, some meaningful differences within and between sample groups may not have been observed.

Fourth, asking questions about gambling and specifically harmful gambling practices, may elicit a social desirability effect among participants. It is possible that those who took part in the study may have adjusted their answers to appear more favourably. Social desirability could mean they downplayed the degree that their gambling is harmful or detrimental to their wellbeing. Another example of this would be if students or student-athletes participated in illegal or banned forms of gambling. For example, there is a zero-tolerance policy for student-athletes to engage in sports betting in the United States, which affects their responses. Though this is not a policy for Canadian varsity athletes, participants may have withheld certain seemingly negative disclosures.

Finally, a limitation of this study is a consequence of the binary problem and non-problem gambling cut-off score used when answering the first research question. The PGSI

includes a scale to classify gamblers across four categories including non-problem, low risk gambling, moderate risk gambling, and gambling disorder

Those that do not gamble, or score zero, qualify as non-problem gambling. A total score of 1-2 qualifies as low risk. A total score of 3-7 qualifies as a moderate risk. Finally, a total score of 8 or more qualifies as gambling disorder (Ferris & Wynne, 2001). To account for limited group sizes based off these classifications, an alternative classification scheme was adopted to account for non-problem gambling, which included non-problem and low risk gambling. Problem gambling included moderate risk and gambling disorder. These exclusive categories account for individual who do and do not experience significant consequences from increased gambling behaviours as justified by Orford et al. (2010). This methodological choice results in a higher rate of participants' gambling being classified as problem gambling compared to the literature. Though a useful category, results of this study are limited by direct prevalent-rate comparisons compared to other published studies.

Practical Implications for Counselling Psychologists and Post-Secondary Institutions

The results of this study have several meaningful implications for counselling psychologists, especially those working on post-secondary campuses. It is essential to acknowledge the distinction between GD and alcohol or substance use disorders, as different remediation methods are necessary and should be uniquely applied on post-secondary campuses. Problem gambling on campus appears to show little signs of abating. Students and, more so, student-athletes, are increasingly vulnerable to the consequences of problematic gambling, which, if not appropriately addressed, can result in long-term adverse outcomes for students and the post-secondary institution as a whole.

Regarding the remedial role of Counselling Psychology, there are several clinical implications found in this research. First, psychologists, and those who provide counselling

services on campuses, need to become aware of the prevalence of problem gambling among students. Students may attend counselling to help them through various emotional or distressing concerns while being unaware that their gambling behaviours may be causing or exacerbating their issues. Counsellors, including those outside of mental health, ought to regularly screen students for gambling problems. Knowing signs of problem gambling, such as chasing your losses or borrowing money, could help counsellors identify and begin providing specific supports. One such tool for quick screening is the Lie/Bet Questionnaire (Johnson et al., 1997). This measure is a two-item scale that reports high sensitivity (.99) and specificity (.91). The two questions are, "Have you ever had to lie to people important to you about how much you gambled?" and "Have you ever felt the need to bet more and more money?" Although Stinchfield et al. (2012) suggested that this measure is not a good measure for screening the general population, it may be suitable as an inexpensive initial screener for university students seeking counselling services.

Second, understanding the pathway model of gambling could help counsellors quickly identify treatment needs and provide effective interventions for clients. For instance, following the etiology of gambling of pathway one (i.e., behaviourally conditioned), counsellors could presume that social influences and cognitive distortions propagate harmful gambling practices (Allami, & Vitaro, 2015). Therefore, counsellors can employ cognitive and behavioural techniques to reduce maladaptive gambling behaviours. Similarly, students matching pathway two (i.e., emotionally vulnerable) characteristics would gamble, in part, as a maladaptive coping strategy to deal with internalized disturbances such as anxiety or depression (Allami, & Vitaro, 2015). A counsellor would be guided to use emotional regulation and processing strategies to address the needs of these students.

As a secondary area of interest, preventative strategies need to be utilized on campuses because many warning signs of gambling disorder can be quite ambiguous or hidden, especially compared to substance abuse, for example (McComb & Hanson, 2009). As such, individuals and those close to them may be unaware of gambling problems and the need for treatment. To address campus-wide awareness, various student affairs professionals need to lead the charge on creating strategies to garner recognition and promote available treatment options. These strategies could include displays, workshops, or campus presenters that can help spread awareness. Further, educational materials, brochures, or leaflets could be distributed to new students during orientation and focus on guidelines for responsible gambling, including warning signs and supportive services (Stinchfield et al., 2006).

In addition, policies and procedures need to be in place to educate university staff and faculty on the signs of problem gambling and buffer against the negative consequences and harm from such adverse behaviours. For instance, faculty could be aware of student tardiness and absences, declining grades, dishevelled appearance, and irritability. Financial aid staff could monitor irregular requests for monetary support. Finally, coaches could be wary of student-athlete lateness and declining athletic performance. Though these symptoms could reflect a plethora of other issues, the intention would be to help staff be aware of the possibility of problem gambling and know where to go when providing support for these individuals (Nowak, 2018). At a minimum, post-secondary staff should be aware of and able to inform students of the risks of excessive gambling.

Finally, post-secondary staff employed or involved in the delivery of campus health services (e.g., physicians, pharmacists, counsellors) should be educated on the importance of screening and treatment for problem gambling. Indeed, student mental health centres should include questions about gambling, along with alcohol and substance use, as a standard intake

procedure (Stinchfield et al., 2006). These professionals act as an essential line of defence against gambling disorder and the potential negative consequences. As well, student counselling staff should be able to competently administer brief interventions (i.e. single sessions) targeting gambling-related problems.

One suggestion following from this research would be to assess diminished premeditation tendencies in clients. If students show limited foresight regarding their actions, they may be at increased risk of problem gambling. Next, if their gambling is quite severe, further long-term therapy should be discussed and empirically supported services need to be available to address problem gambling among post-secondary students and student-athletes. Overall, the implications of this study are to promote awareness of post-secondary problem gambling, as well as lead to policy changes that increase the detection of possible problem gambling behaviours. Next services need to be available to intervene early and provide support to address the harm caused by such problematic behaviours.

Findings from this study also have implications for future research.

Recommendations and Future Research

The results of this study have several implications and contributions to the existing literature on problem gambling. Specifically, this dissertation filled gaps in current research by directly studying Canadian student-athletes while also applying a more complex multivariate analysis to uncover characteristics of problem gambling within this population; however, some gaps remain. Due to the scope of this research, other variables were not examined, including gambling-related cognitive distortions or substance use comorbidity. Nevertheless, the variables included in this study further explain and bolster our understanding of Canadian student and student-athlete gambling in light of Blaszczynski and Nower's (2002) integrative model of

problem gambling. Also, this study's conclusions suggest using their theoretical model in forthcoming studies.

Future research could explore gambling among various subpopulations of post-secondary students, capture qualitative experiences of student gamblers, and evaluate treatment programs on campuses. First, future research could extend the current paradigm to study different post-secondary student groups. Specifically, additional studies could compare the general student population against other groups, such as Greek fraternity or sorority members. For example, previous American research has demonstrated an association between fraternity membership and problem gambling. Rockey, Beason, Howington, Rockey, and Gilbert, (2005) found that male fraternity members had greater rates of gambling disorder compared to non-Greek members (12.3% versus 5.8%). By including further sample groups within the study design, researchers could more effectively identify additional predictor variables that explain student gambling variability and provide a more thorough conceptualization of gambling disorder among post-secondary students.

In addition, future research could collect data from multiple types of post-secondary institutions, such as technical schools (e.g., N.A.I.T) or smaller colleges (e.g., Concordia University of Edmonton). Again, by increasing sample variability, results could highlight further distinctions between students that are not captured in the current study. Future research could also study athletes who have already graduated, as they may be more willing to talk about their gambling histories and motivations.

Another recommendation for future research is to include qualitative methodology to richen the data and glean new information. As part of the data collection, participants could be interviewed regarding their experiences while gambling, including their feelings before, during, and after they play. Using a technique such as Thematic Analysis, researchers could explore

internal processes and contextual factors that precipitate or even protect against problem gambling behaviours (Braun, Clarke, Hayfield, & Terry, 2019). As summarized in the critical review of the literature presented earlier, qualitative methodology in gambling research is limited. Therefore, further research could explore and capture other significant information that can aid in the advancement of gambling knowledge.

A final recommendation for future research that extends past the current study is to investigate problem gambling interventions on post-secondary campuses. As demonstrated by the present research, problem gambling is a prevalent concern among post-secondary students. Therefore, there is a clear need to provide and advertise intervention services on post-secondary campuses. Subsequent studies could evaluate the efficacy of intervention programs for gambling treatment-seeking students. One underlying concern to respecting interventions on school campuses is knowledge of or accessibility to treatment. Specifically, even though problem gambling is associated with severe adverse consequences to the individual, their family, and their professional life, less than 10% of individuals with problem gambling seek treatment (Ladouceur, Lachance, & Fournier, 2009; Suurvali, Hodgins, Toneatto, & Cunningham, 2008). One reason may be due to the limited forms of treatment offered. A common treatment option for gamblers includes Gamblers Anonymous, a self-supporting group that offers spiritual guidance alongside their 12-step recovery program. Likely, this service does not fit everyone, especially young adults in post-secondary school. Typically, those who do receive treatment are acutely aware of their problematic gambling and have experienced high external pressures to enter treatment. This pattern suggests that gamblers abstain from treatment until the consequences accumulate and are severe enough to impact others. As an alternative to abstinence-based programs, gambling treatment programs based upon harm-reduction strategies should be developed and researched. For example, Conrod, O'Leary-Barrett, & Newton (2013)

designed and studied one such program for substance dependence among adolescents. This program assigns clients into different treatment groups based upon personality type and possible substance dependence etiology. For example, they have a group for anxiety-sensitive clients as well as hopeless clients. Further, groups contain clients high in impulsivity and sensation-seeking. Though their treatment involves psychoeducation, behavioural coping training, and cognitive coping training, they are applied differently in each group. Allami and Vitaro (2015) pondered whether such a program could be applied to problem gambling, with treatment groups based upon etiological pathways. To date, researchers have yet to study problem gambling treatment as it relates to gambling pathways.

In summary, future research could investigate how to increase awareness of problem gambling on campuses effectively, connect students with resources that help them before they experience devastating consequences of gambling, and expand current empirically-supported and theoretically driven treatment programs to apply to problem gambling.

Conclusion

Civilizations have been participating in various forms of gambling for thousands of years, evolving independently across worldwide cultural groups. It appears the desire to wager on events of chance is ingrained in human nature. Though forms of gambling have changed and progressed considerably from simple games involving bones to sophisticated electronic computing machines, the one thing that has not changed is that people enjoy gambling. The intention of this research is not to diminish gambling as a social activity or to discourage gambling across populations. Instead, the conclusions found in this study could serve as a bridge to new policies in support of students whose gambling behaviours have turned from harmless fun, thrill, and excitement, to pathological behaviours that lead to damaging consequences. In many respects, this study confirmed a fundamental assertion of the gambling industry, which is

that most people, including post-secondary students and student-athletes, gamble without experiencing direct harm or adverse consequences.

A review of the literature revealed that gambling is common among post-secondary students (Blinn-Pike et al., 2007), including an elevated prevalence of problem gambling (Adams et al., 2007; Engwall et al., 2004; Weinstock et al., 2007; Winters et al., 1998). Due to the nature of gambling at this age, students are susceptible to severe, long-lasting consequences resulting from problem gambling, such as financial hardship, decreased school performance or success, legal implications, diminished mental health, and suicidality (Engwall et al., 2004; Hodgins et al., 2015; Ledgerwood and Petry, 2004; Mihaylova et al., 2012). Similarly, the present study demonstrated that gambling among post-secondary populations does not come without risk. Problem gambling exists in this population and at a higher rate than seen in the general population. This current research of problem gambling highlighted several significant correlates related to increased risk, including being male, identifying as a student-athlete, as well as having higher gambling motivations, trait impulsivity, and mental health concerns (LaBrie, Shaffer, LaPlante, & Wechsler, 2003; Slutske et al., 2003; Winters et al., 1998).

In collaboration with the existing literature, this study demonstrated that the risk of problem gambling is not equal among students; several demographic characteristics are essential in understanding gambling behaviours. For example, men have increased rates of problem gambling compared to their female counterparts. More unique to this study, there are higher rates of problem gambling among Canadian student-athletes compared to their peers. This dissertation study is noteworthy because it extended existing research to suggest that Canadian student-athletes also experience higher rates of problem gambling compared to their non-athlete student peers. Therefore, the title of ultra-risk gamblers, a label that is associated with American varsity students, fits with Canadian student-athletes as well. Finally, this study found specific factors

within each sample group, including gambling motivation and impulsiveness, furthering the knowledge of problem gambling on campus. Undoubtedly, additional research is needed to explore other predictive differences between healthy and problem gambling among post-secondary student-athletes, but this study marks this population worthy of future consideration. In conclusion, this research, along with additional studies investigating problem gambling among Canadian students, could influence the development of effective policy and procedures that can be adopted by educational institutions to encourage safe gambling practices.

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Appendix A

Study Recruitment Posters

Gambling Behaviours Among Post-Secondary Students

Post-secondary students needed to complete an online survey about your gambling behaviours, including problem gambling.

Help us better understand the relationship between student gambling and various psychological correlates of gambling.

The survey will take approximately 15 minutes and can be completed on any computer or smart device.

Compensation

Every individual who complete the survey will receive a **$5.00 Amazon.ca ecode** that can be used at anytime.

How to get involved

If you are a full-time student at the University of Alberta, and interested in participating, please contact the primary research via the email listed below. From there, you will receive a link to the survey that can be completed at your earliest convince.

Participation in this research is entirely voluntary and you can withdraw from the study at any point.

This research is being conducted by Dustin Marcinkevics as part of his doctoral degree under the supervision of Dr. William Hanson

Scan this code with your phone camera to send an email directly to the researcher notifying them of your interest in participating.

Contact the researchers at
dmarcink@ualberta.ca

Student gambling study dmarcink@ualberta.ca
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Gambling Behaviours Among Post-Secondary Student-Athletes

Post-secondary students needed to complete an online survey about your gambling behaviours, including problem gambling.

Help us better understand the relationship between student gambling and various psychological correlates of gambling.

The survey will take approximately 15 minutes and can be completed on any computer or smart device.

Compensation

Every individual who complete the survey will receive a **$5.00 Amazon.ca ecode** that can be used at anytime.

How to get involved

If you are a full-time student-athlete at the University of Alberta, and interested in participating, please contact the primary research via the email listed below. From there, you will receive a link to the survey that can be completed at your earliest convince.

Participation in this research is entirely voluntary and you can withdraw from the study at any point.

This research is being conducted by Dustin Marcinkevics as part of his doctoral degree under the supervision of Dr. William Hanson

Scan this code with your phone camera to send an email directly to the researcher notifying them of your interest in participating.

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Appendix B

Campus-wide Television Study Advertisement

Appendix C

Social Media Recruitment Message

Hello everyone,

I am studying gambling and gambling behaviours among students and student-athletes.

I am looking for current U of A students and student-athletes interested in completing a 15 minute online survey.

In appreciation of your time, you will receive a **$5.00 Amazon.ca** ecode that will be awarded following completion of the study.

Participants will be asked to complete an anonymous online survey with questions regarding your gambling behaviours, personality characteristics, and current mental health. Since participants must include their University of Alberta email address to contact the researcher, their email address and likely their CCID will be identified. Any identifying information will not be connected to your data and not published in any form. You are welcome to share this message with other university students. Please remember, by sharing this, you may identify yourself as a participant in this study.

This research has been reviewed and approved by the University of Alberta Research Ethics Board.

To participate, send me an email stating your interest to dmarcink@ualberta.ca.

Thanks for your time.

Appendix D

Email Recruitment message

Hello,

My name is Dustin Marcinkevics. I am a doctoral student in Counselling Psychology at the University of Alberta in the Department of Education. I am conducting a study on students and student-athlete gambling behaviours and contacting you to see if you might be interested in participating in a research study.

This research is being done as part of my Ph.D. dissertation. The focus of the research is on gambling behaviours, prevalence, and gambling correlates among post-secondary student and student-athlete populations.

To participate, you need to be a full-time undergraduate student who is currently a member of a university varsity sports team.

If you agree to volunteer you will be asked to you will be asked complete an anonymous online survey with questions regarding your gambling behaviours, personality characteristics, and current mental health. You are welcome to share this email with other university athletes. Please remember, by sharing this email, you identify yourself as a participant in this study.

Your participation will involve a one-time survey that will take approximate 10-15 minutes to complete.

In appreciation of your time, you will receive a $5.00 Amazon.ca ecode that can be used at any time.

Your participation is completely voluntary, and if you choose not to participate, it will not affect your relationship with your current varsity team or the University of Alberta.

The research is approved by the University of Alberta Research Ethics Board.

If you are interested in more information about the study or would like to volunteer, please reply to this email at dmarcink@ualberta.ca.

Thanks for your time.

Appendix E

Canadian Problem gambling Inventory

We would like to ask some questions about activities you may participate in. People bet money and gamble on many different things including buying lottery tickets, playing bingo, or card games with their friends. I am going to list some activities that you might have bet money on.

THINKING ABOUT THE LAST 12 MONTHS...

1. How often did you bet or spend money on (list activity: daily, weekly, monthly, yearly)?

Scratch	daily	2-6 times/ week	about once/ week	2-3 times/ month	about once/ month	between 6-11 times/ year	between 1-5 times/ year	never in the past year
Lottery	daily	2-6 times/ week	about once/ week	2-3 times/ month	about once/ month	between 6-11 times/ year	between 1-5 times/ year	never in the past year
Slots	daily	2-6 times/ week	about once/ week	2-3 times/ month	about once/ month	between 6-11 times/ year	between 1-5 times/ year	never in the past year
Casino (table games)	daily	2-6 times/ week	about once/ week	2-3 times/ month	about once/ month	between 6-11 times/ year	between 1-5 times/ year	never in the past year

Cards (poker)	daily	2-6 times/ week	about once/ week	2-3 times/ month	about once/ month	between 6-11 times/ year	between 1-5 times/ year	never in the past year
Horses	daily	2-6 times/ week	about once/ week	2-3 times/ month	about once/ month	between 6-11 times/ year	between 1-5 times/ year	never in the past year
Bingo	daily	2-6 times/ week	about once/ week	2-3 times/ month	about once/ month	between 6-11 times/ year	between 1-5 times/ year	never in the past year
Internet	daily	2-6 times/ week	about once/ week	2-3 times/ month	about once/ month	between 6-11 times/ year	between 1-5 times/ year	never in the past year
e-sports	daily	2-6 times/ week	about once/ week	2-3 times/ month	about once/ month	between 6-11 times/ year	between 1-5 times/ year	never in the past year
Fantasy sports	daily	2-6 times/ week	about once/ week	2-3 times/ month	about once/ month	between 6-11 times/ year	between 1-5 times/ year	never in the past year

2. How much money, not including winnings, did you spend on (list

Scratch $_____
Lottery $_____
Slots $_____
Casino $_____
Cards $_____
Horses $_____
Bingo $_____
Internet $_____
E-sports $_____

Fantasy sports	$_____

3. What is the largest amount of money you ever spent on (list

Scratch	$_____
Lottery	$_____
Slots	$_____
Casino	$_____
Cards	$_____
Horses	$_____
Bingo	$_____
Internet	$_____
E-sports	$_____
Fantasy sports	$_____

What is your favorite type of gambling activity?

Some of the next questions may not apply to you, but please try to be as accurate as possible.
THINKING ABOUT THE LAST 12 MONTHS...

4*	**How** often have you bet more than you could really afford to lose?	Never	Sometimes	Most of the time	Almost always
5	How often have you bet or spent more money than you wanted to on gambling?	never	sometimes	most of the time	almost always
6*	**How** often have you needed to gamble with larger amounts of money to get the same feeling of excitement?	never	sometimes	most of the time	almost always
7*	**How** often have you gone back another day to try to win back the money you lost?	never	sometimes	most of the time	almost always
8*	**How** often have you borrowed money or sold anything to get money to gamble?	never	sometimes	most of the time	almost always
9	How often have you lied to family members or others to hide your gambling?	never	sometimes	most of the time	almost always
10*	**How** often have you felt that you might have a problem with gambling?	never	sometimes	most of the time	almost always

11	How often have you felt like you would like to stop betting money or gambling, but you didn't think you could?	never	sometimes	most of the time	almost always
12*	**How** often have people criticized your betting or told you that you had a gambling problem, regardless of whether or not you thought it was true?	never	sometimes	most of the time	almost always
13*	**How** often have you felt guilty about the way you gamble or what happens when you gamble?	never	sometimes	most of the time	almost always
14*	**How** often has gambling caused you any health problems, including stress or anxiety?	never	sometimes	most of the time	almost always
15*	**How** often has your gambling caused any financial problems for you or your household?	never	sometimes	most of the time	almost always
16	After losing many times in a row, you are more likely to win.	Strongly disagree	disagree	agree	Strongly agree
17	You could win more if you use a certain system or strategy.	Strongly disagree	disagree	agree	Strongly agree
18	Do you remember a big WIN when you first started gambling?		Yes	No	
19	Do you remember a big LOSS when you first started gambling?		Yes	No	
20	Has anyone in your family EVER had a gambling problem?		Yes	No	
21	Has anyone in your family EVER had an alcohol or drug problem?		Yes	No	
22	Have you used alcohol or drugs while gambling?		Yes	No	
23	Have you gambled while drunk or high?		Yes	No	
24	Have you felt you might have an alcohol or drug problem?		Yes	No	
25	If something painful happened in your life, did you have the urge to gamble?		Yes	No	
26	If something painful happened in your life, did you have the urge to have a drink?		Yes	No	

27	If something painful happened in your life did you have the urge to use drugs or medication?	Yes	No
28	Have you been under a Dr's care because of physical or emotional problems brought on by stress?	Yes	No
29	Was there ever a time when you felt depressed for two weeks or more in a row?	Yes	No

Questions marked with * are part of the Problem Gambling Severity Index

Appendix F

Five-Factor Gambling Motivation Questionnaire

Below are a number of statements that describe ways in which people act and think. For each statement, please indicate how much you agree or disagree with the statement. If you **Strongly Disagree** circle **1**, if you **Disagree** circle **2**, if you are **Neutral** circle **3**, and if you **Agree** circle **4**, and if you strongly agree circle 5. Be sure to indicate your agreement or disagreement with every statement below

	When I gamble, I…	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Enjoy the thrilling experience	1	2	3	4	5
2	Have fun in risk taking	1	2	3	4	5
3	Have fun in competing with	1	2	3	4	5
4	Enjoy intense feelings	1	2	3	4	5
5	Want to enjoy uncertainty	1	2	3	4	5
6	Have fun in guessing the results	1	2	3	4	5
7	Want to experience excitement	1	2	3	4	5
8	Want to feel triumph when	1	2	3	4	5
9	Want to win money easily	1	2	3	4	5
10	Want to win big money	1	2	3	4	5
11	Need money	1	2	3	4	5
12	Have financial difficulty	1	2	3	4	5
13	Feel troubled	1	2	3	4	5
14	Feel lonely	1	2	3	4	5
15	Feel depressed	1	2	3	4	5
16	Feel angry	1	2	3	4	5
17	Feel tense	1	2	3	4	5
18	Feel pressured	1	2	3	4	5
19	Forget about stressful reality	1	2	3	4	5
20	Socialize with others	1	2	3	4	5
21	Meet new people	1	2	3	4	5
22	Please my friends	1	2	3	4	5
23	Change my mood	1	2	3	4	5
24	Energize my life	1	2	3	4	5

25	Escape from routine	1	2	3	4	5
26	Enjoy my leisure time	1	2	3	4	5
27	Relieve stress	1	2	3	4	5

Appendix G

UPPS-P

Below are a number of statements that describe ways in which people act and think. For each statement, please indicate how much you agree or disagree with the statement. If you **Agree Strongly** circle **1**, if you **Agree Somewhat** circle **2**, if you **Disagree somewhat** circle **3**, and if you **Disagree Strongly** circle **4**. Be sure to indicate your agreement or disagreement for every statement below. Also, there are questions on the following pages.

	Agree Strongly	Agree Some	Disagree Some	Disagree Strongly
1. I have a reserved and cautious attitude toward life.	1	2	3	4
2. I have trouble controlling my impulses.	1	2	3	4
3. I generally seek new and exciting experiences and sensations.	1	2	3	4
4. I generally like to see things through to the end.	1	2	3	4
5. When I am very happy, I can't seem to stop myself from doing things that can have bad consequences.	1	2	3	4
6. My thinking is usually careful and purposeful.	1	2	3	4
7. I have trouble resisting my cravings (for food, cigarettes, etc.).	1	2	3	4
8. I'll try anything once.	1	2	3	4
9. I tend to give up easily.	1	2	3	4
10. When I am in great mood, I tend to get into situations that could cause me problems.	1	2	3	4
11. I am not one of those people who blurt out things without thinking.	1	2	3	4
12. I often get involved in things I later wish I could get out of.	1	2	3	4
13. I like sports and games in which you have to choose your next move very quickly.	1	2	3	4
14. Unfinished tasks really bother me.	1	2	3	4
15. When I am very happy, I tend to do things that may cause problems in my life.	1	2	3	4
16. I like to stop and think things over before I do them.	1	2	3	4
17. When I feel bad, I will often do things I later regret in order to make myself feel better now.	1	2	3	4
18. I would enjoy water skiing.	1	2	3	4
19. Once I get going on something I hate to stop.	1	2	3	4
20. I tend to lose control when I am in a great mood.	1	2	3	4
21. I don't like to start a project until I know exactly how to proceed.	1	2	3	4

Please go to the next page

	Agree Strongly	Agree Some	Disagree Some	Disagree Strongly
22. Sometimes when I feel bad, I can't seem to stop what I am doing even though it is making me feel worse.	1	2	3	4
23. I quite enjoy taking risks.	1	2	3	4
24. I concentrate easily.	1	2	3	4
25. When I am really ecstatic, I tend to get out of control.	1	2	3	4
26. I would enjoy parachute jumping.	1	2	3	4
27. I finish what I start.	1	2	3	4
28. I tend to value and follow a rational, "sensible" approach to things.	1	2	3	4
29. When I am upset, I often act without thinking.	1	2	3	4
30. Others would say I make bad choices when I am extremely happy about something.	1	2	3	4
31. I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional.	1	2	3	4
32. I am able to pace myself so as to get things done on time.	1	2	3	4
33. I usually make up my mind through careful reasoning.	1	2	3	4
34. When I feel rejected, I will often say things that I later regret.	1	2	3	4
35. Others are shocked or worried about the things I do when I am feeling very excited.	1	2	3	4
36. I would like to learn to fly an airplane.	1	2	3	4
37. I am a person who always gets the job done.	1	2	3	4
38. I am a cautious person.	1	2	3	4
39. It is hard for me to resist acting on my feelings.	1	2	3	4
40. When I get really happy about something, I tend to do things that can have bad consequences.	1	2	3	4
41. I sometimes like doing things that are a bit frightening.	1	2	3	4
42. I almost always finish projects that I start.	1	2	3	4
43. Before I get into a new situation, I like to find out what to expect from it.	1	2	3	4
44. I often make matters worse because I act without thinking when I am upset.	1	2	3	4
45. When overjoyed, I feel like I can't stop myself from going overboard.	1	2	3	4

	Agree Strongly	Agree Some	Disagree Some	Disagree Strongly
46. I would enjoy the sensation of skiing very fast down a high mountain slope.	1	2	3	4
47. Sometimes there are so many little things to be done that I just ignore them all.	1	2	3	4
48. I usually think carefully before doing anything.	1	2	3	4
49. When I am really excited, I tend not to think of the consequences of my actions.	1	2	3	4
50. In the heat of an argument, I will often say things that I later regret.	1	2	3	4
51. I would like to go scuba diving.	1	2	3	4
52. I tend to act without thinking when I am really excited.	1	2	3	4
53. I always keep my feelings under control.	1	2	3	4
54. When I am really happy, I often find myself in situations that I normally wouldn't be comfortable with.	1	2	3	4
55. Before making up my mind, I consider all the advantages and disadvantages.	1	2	3	4
56. I would enjoy fast driving.	1	2	3	4
57. When I am very happy, I feel like it is ok to give in to cravings or overindulge.	1	2	3	4
58. Sometimes I do impulsive things that I later regret.	1	2	3	4
59. I am surprised at the things I do while in a great mood.	1	2	3	4

Appendix H

Brief Symptom Inventory 18

Copyrighted instrument. Available upon request.

Appendix I

Email Response to First Contact

Hello,

Thank you for your interest in my research study. Please use the link **here** to be directed to the survey. Further information relating to the study purpose, consent and privacy will be provided before you begin the survey.

Once you complete the entire survey, a follow-up email will be sent by me which contains the Amazon.ca $5.00 ecode that can be entered on your Amazon.ca account. Please note, you will be required to enter your uAlberta email address during the survey in order to receive the $5.00 Amazon.ca incentive.

Appendix J

Informed Consent Form

CONSENT TO PARTICIPATE IN ONLINE SURVEY RESEARCH

We request your consent for participation in a study about gambling among post-secondary students. This consent form allows us to use the answers you provide to understand the topic better.

Participation is completely voluntary. If you decide not to participate, there will not be any negative consequences. Please be aware that if you choose to participate, you may stop at any time.

You will be required to complete a series of questionnaires that ask you for background information about yourself, specific gambling behaviours, gambling motivations, thoughts and beliefs about gambling, and how you typically respond to various situations. It takes approximately 1-hour to complete the online study. Please answer questions to the best of your ability.

The study is confidential and anonymous. All data will be collected under a participant number, and no identifying information is published. Student e-mails are used to ensure student status, as well as to prevent multiple responses by one participant. All data will be kept five years, per the University of Alberta's data retention policy. It will be destroyed after that time period.

By submitting this form, you are indicating you have read the description of the study, are over the age of 18, and agree to study terms as described.

If you have questions or would like a copy of this consent letter, please contact me at researche-mail@gmail.ca

Thank you in advance for your participation!

Dustin Marcinkevics

* 1. I agree to participate in the research study. I understand the purpose and nature of the study, and I am participating voluntarily. I understand I can withdraw at any time, without penalty or consequence.

Yes

No

Appendix K

Email Response Following Completion of Survey

Thank you for taking part in my dissertation research.

I hope the collected data will provide further insight into gambling and problem gambling on campus. You are welcome to share this email with other university athletes. Please remember, by sharing my email, you identify yourself as a participant in this study.

As indicated, you will receive a $5.00 Amazon.ca ecode that can be added to any Amazon.ca account. The code is provided below. If unsure how to add your ecode, please look here for support. Further, I have attached a document containing several supportive services for your use.

Appendix L

Post-Study Resource List

Campus Services

University of Alberta Counselling and Clinical Services

Phone: 780-492-5205

Location: 2-600 SUB, University of Alberta Webpage: www.mentalhealth.ualberta.ca

Provides high quality, accessible and compassionate psychological and psychiatric services to students to improve their personal, social, and academic well-being. Provides not only individual counselling, but couple, family, group therapy, and walk-in workshops.

Peer Support Centre

Phone: 780-492-HELP (4357) (Primary)

780-492-4268 (Administration line) Location: 2-707 SUB, University of Alberta Webpage: www.su.ualberta.ca/services/psc/

The Student Support Centre is operated by student volunteers who are all trained to provide telephone, appointment or drop-in crisis intervention, suicide prevention, and supportive listening.

University of Alberta, Department of Educational Psychology

Phone: 780-492-3746

Website: http://www.edpsychology.ualberta.ca/en/CentresAndInstitutes/ClinicalServices.aspx

Counselling and assessment services with professionally trained graduate students. Check website for hours and fees.

Other Services

Telephone/24 hour Services:

24/7 Crisis Diversion Team

Phone: 211

Connects individuals to a full range of essential services like basic needs, parenting support, health care, and others.

The Support Network- Crisis Support Centre (24/7)

Phone: 780-482-4357

Crisis Intervention and suicide support.

Addiction Helpline, Alberta Health Services

Phone: 1-866-332-2322 (24 hours), across Alberta

The Addiction Helpline is a toll free confidential service that provides alcohol, tobacco, other drugs, and problem gambling support, as well as information and referral to services. The Addiction Helpline operates 24 hour a day, seven days a week and is available to all Albertans. Interpreter Services are available in 180 languages.

Addiction Services - Adult Counseling

Phone: 780-427-2736

Webpage: www.albertahealthservices.ca

Alberta Health Services short-term adult outpatient treatment services include individual, family and group counselling for those with alcohol, other drug or gambling concerns (free and confidential).

Problem Gambling Resources Network Alberta

Phone: 780-461-1259

Webpage: www.problemgamblingalberta.ca

The PGRN is a leader in providing problem gambling awareness, education, prevention, advocacy and treatment referrals within the Edmonton region. The PGRN works closely with the

Alberta Health Services and other allied agencies throughout Alberta to ensure that quality, effective problem gambling services are available for all Albertans.

Gamblers Anonymous

Phone: 780-463-0892

Webpage: www.albertaga.net

Gamblers Anonymous is a fellowship of men and women who share their experience, strength and hope with each other that they may solve their common problem and help others to recover from a gambling problem.

Appendix M

Researcher Contact Information

Should you have any further questions about our study, please contact us at:

Primary Researcher: Dustin Marcinkevics, M.Ed.	dmarcink@ualberta.ca
Supervisor: William Hanson, Ph.D.	whanson@ualberta.ca

Appendix N

Linearity Assumption Test For Logistic Regression Analysis

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Athletic_Status(1)	1.192	.431	7.646	1	.006	3.293
	Sex(1)	1.507	.482	9.792	1	.002	4.515
	Age_Of_Gambling_Onset	-.183	1.076	.029	1	.865	.833
	Age_Of_Gambling_Onset by ln_age_of_onset	.052	.291	.031	1	.860	1.053
	Constant	-1.685	4.211	.160	1	.689	.185

a. Variable(s) entered on step 1: Athletic_Status, Sex, Age_Of_Gambling_Onset, Age_Of_Gambling_Onset * ln_age_of_onset .

Figure 1. Equation variable table including interaction term between age of gambling onset and its natural log.

Appendix O

Outlier Assumption Test

Casewise List[b]

Case	Selected Status[a]	Observed PGSI_Comparison_Category	Predicted	Predicted Group	Temporary Variable Resid	Temporary Variable ZResid
4	S	P**	.089	N	.911	3.202
5	S	P**	.088	N	.912	3.226
8	S	P**	.089	N	.911	3.202
13	S	P**	.088	N	.912	3.226

a. S = Selected, U = Unselected cases, and ** = Misclassified cases.

b. Cases with studentized residuals greater than 2.000 are listed.

Figure 2. Logistic regression casewise diagnostic table of total sample.

Appendix P

Independence of Observation Test of Residuals

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.472[a]	.223	.190	1.69786	1.837

a. Predictors: (Constant), BSI18_Total_Check, GM_Total_Check, Sex, UPPS_Total_Check

b. Dependent Variable: PGSI_Total

Figure 3. Model summary of student sample.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.634[a]	.402	.352	2.69751	2.013

a. Predictors: (Constant), BSI18_Total_Check, GM_Total_Check, Sex, UPPS_Total_Check

b. Dependent Variable: PGSI_Total

Figure 4. Model summary of student-athlete sample.

Appendix Q

Linearity Assumption Test Between Dependant Variable and all Independent variables

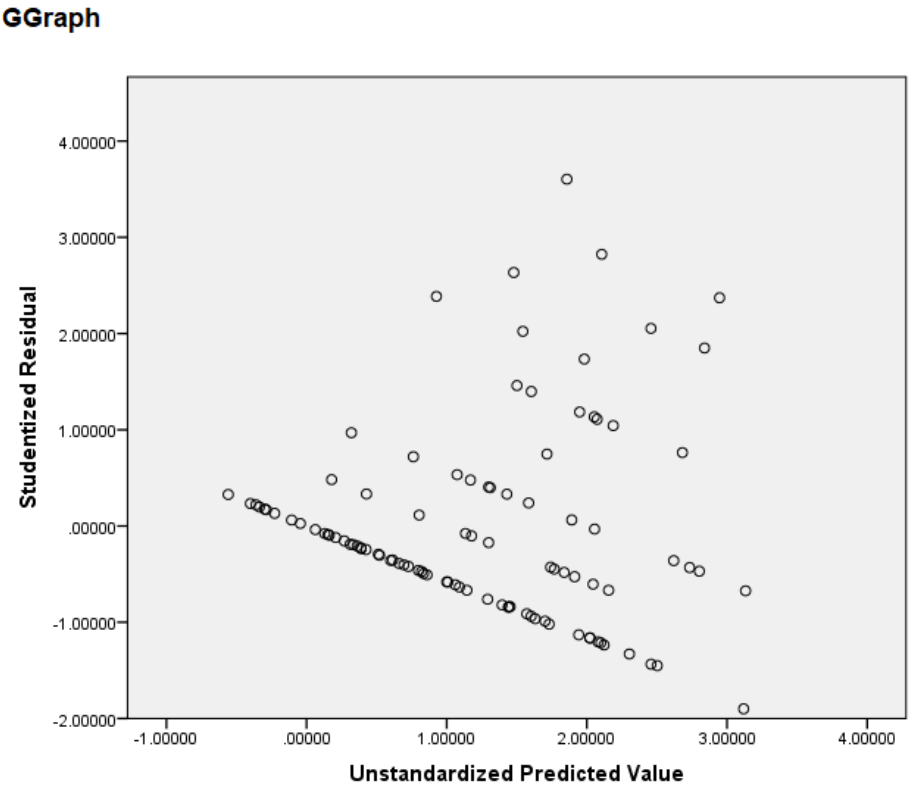

Figure 5. Scatter plot between the dependent variables against the independent variables collectively in the student sample.

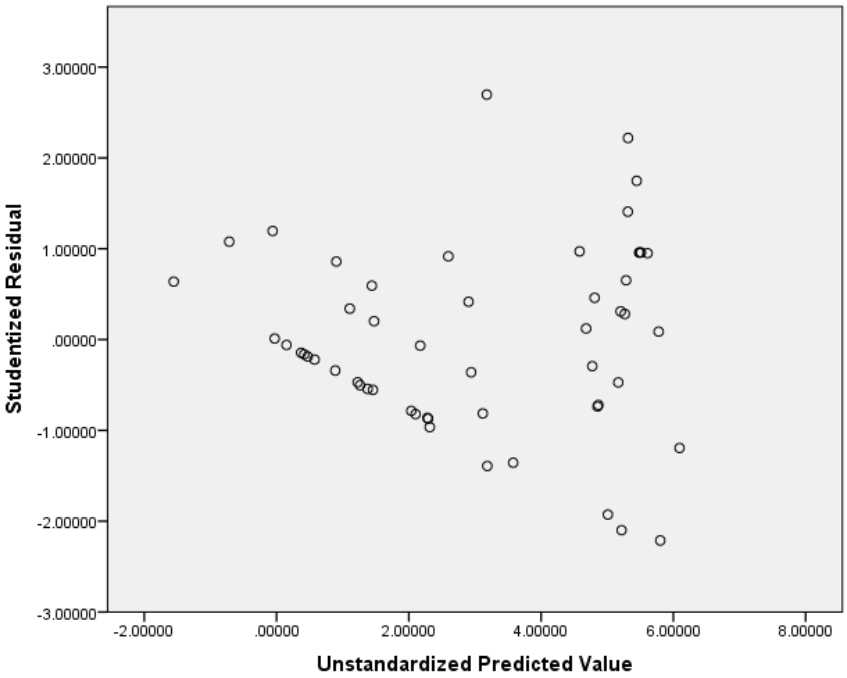

Figure 6. Scatter plot between the dependent variables against the independent variables collectively in the student-athlete sample.

Appendix R

Linearity Assumption Test Between Dependent Variable and Independent Variables

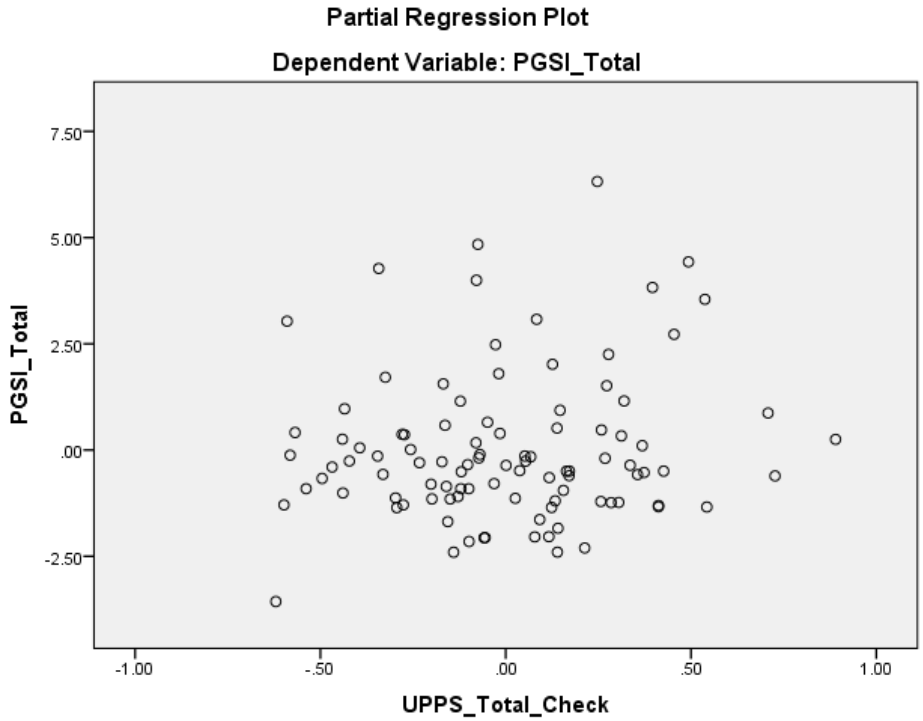

Figure 7. Scatter plot between the dependent variables against impulsivity in the student sample.

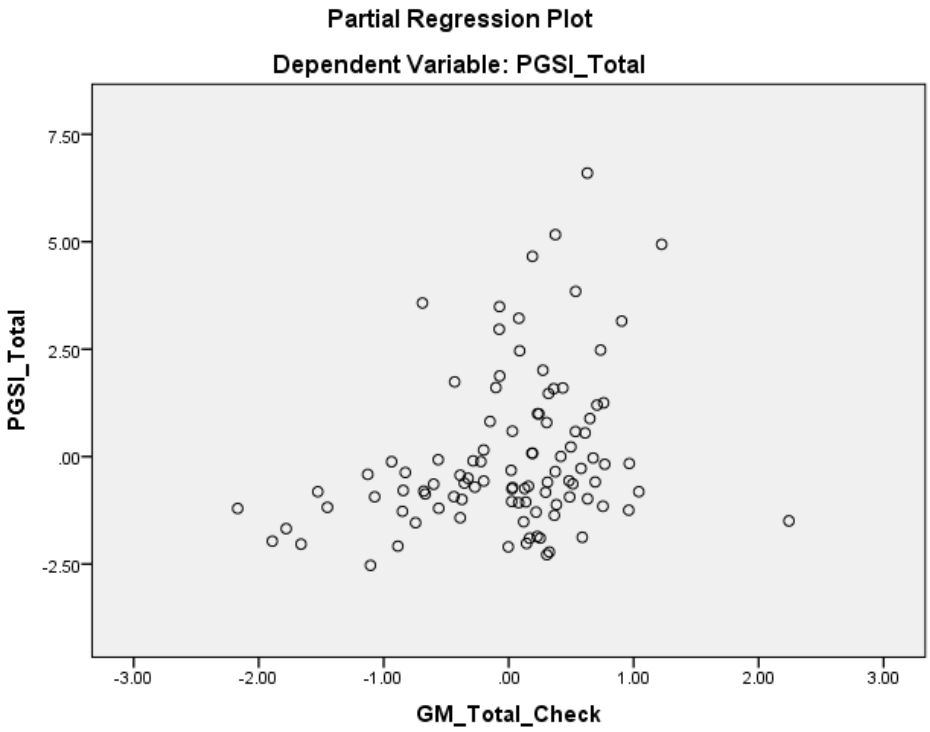

Figure 8. Scatter plot between the dependent variables against gambling motivation in the student sample.

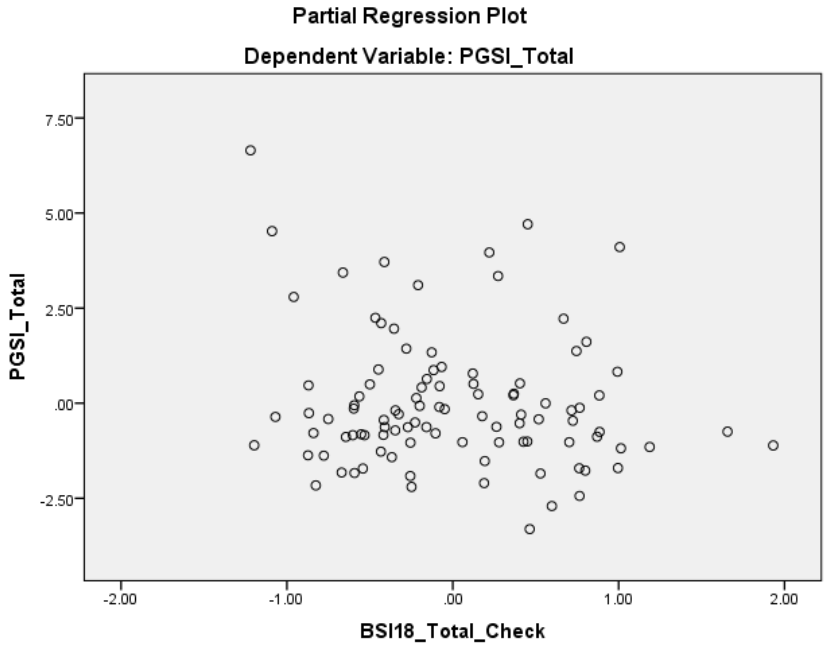

Figure 9. Scatter plot between the dependent variables against psychological distress in the student sample.

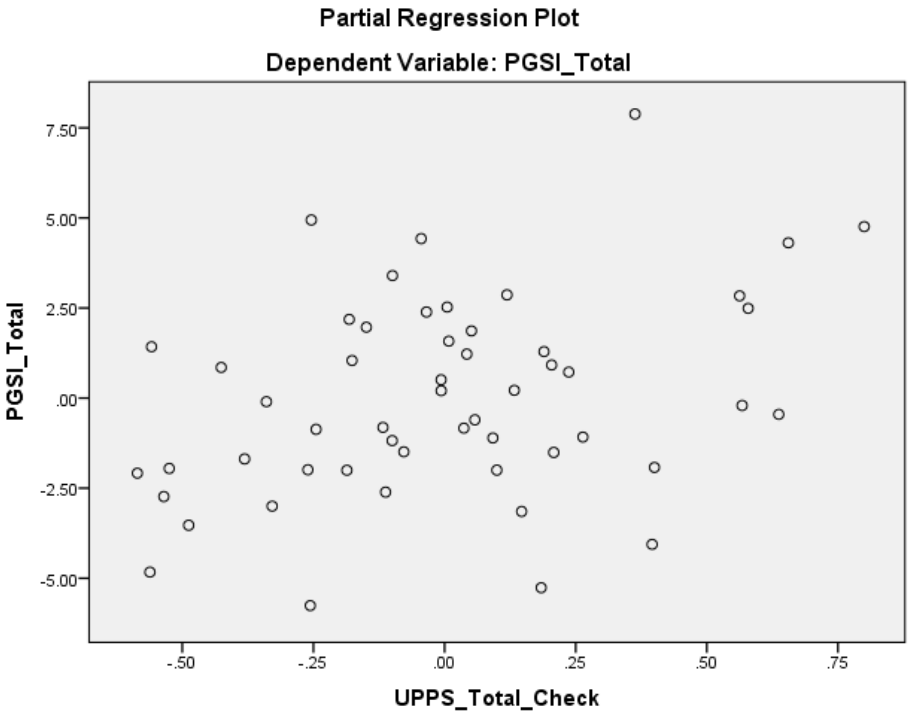

Figure 10. Scatter plot between the dependent variables against impulsivity in the student-athlete sample.

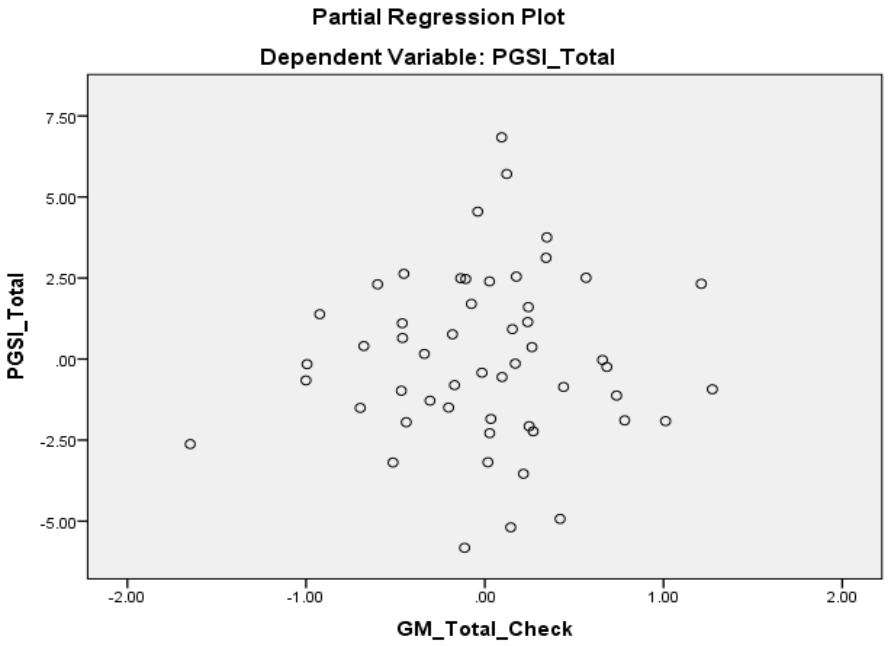

Figure 11. Scatter plot between the dependent variables against gambling motivation in the student-athlete Sample.

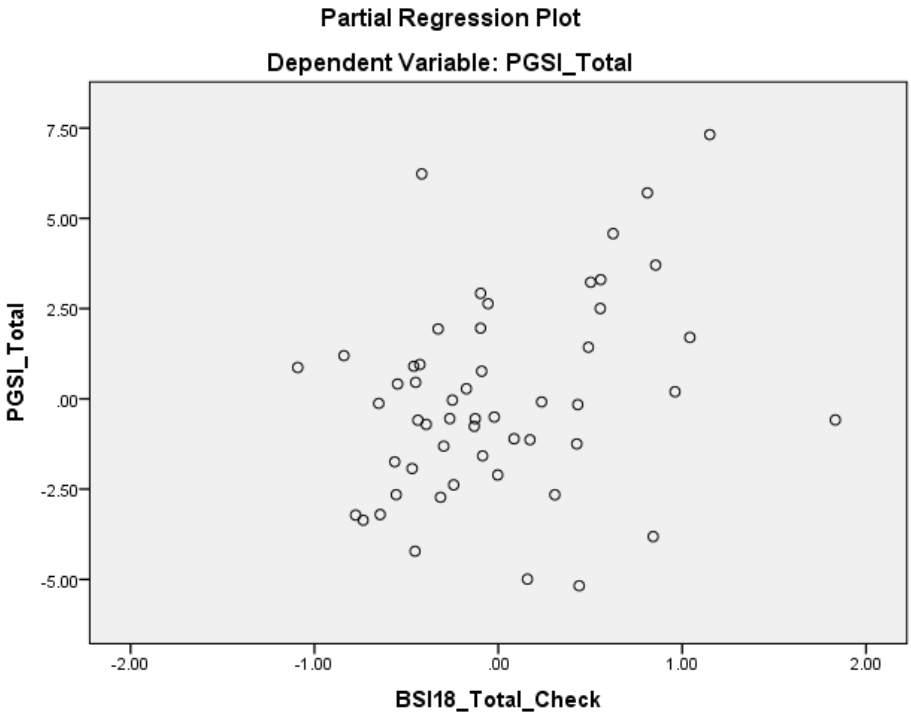

Figure 12. Scatter plot between the dependent variables against psychological distress in the student-athlete sample.

Appendix S

Homoscedasticity Assumption Test

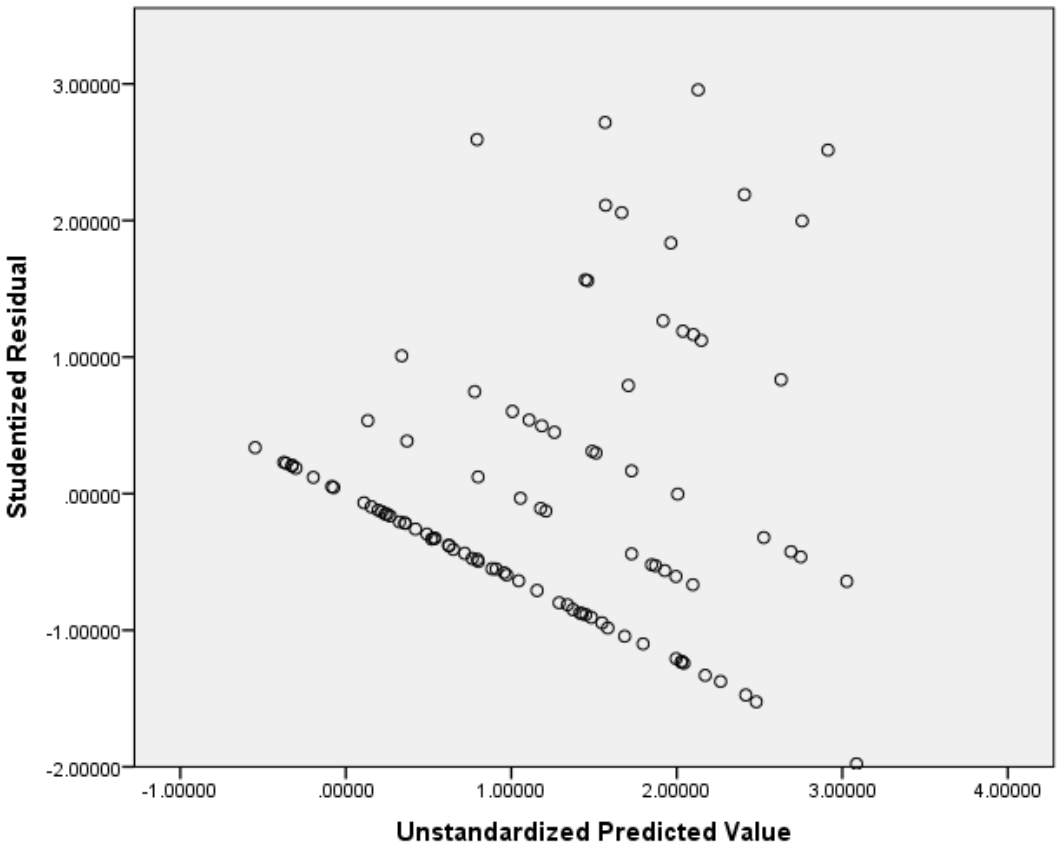

Figure 13. Scatter plot between the studentized residuals against the unstandardized predicted values in the student sample.

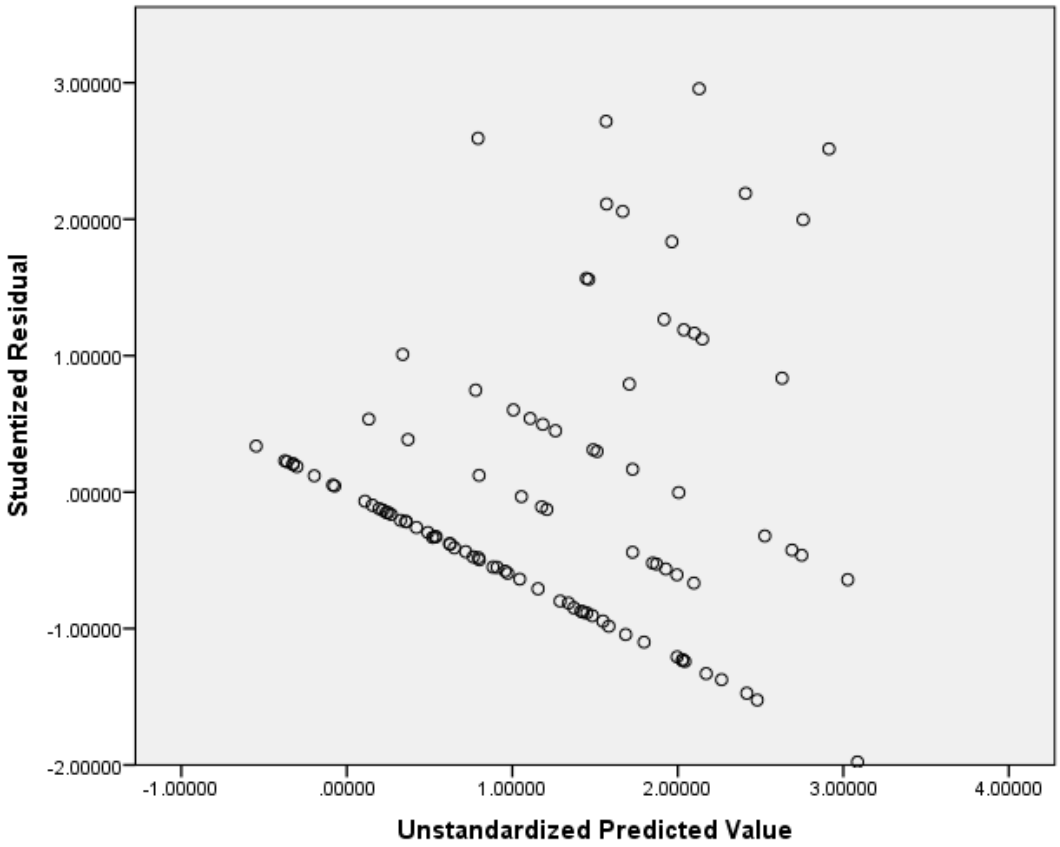

Figure 14. Scatter plot between the studentized residuals against the unstandardized predicted values in the student-athlete sample.

Appendix T

Multicollinearity Assumption Test

Correlations

		PGSI_Total	Sex	UPPS_Total_Check	GM_Total_Check	BSI18_Total_Check
Pearson Correlation	PGSI_Total	1.000	.297	.252	.367	-.094
	Sex	.297	1.000	.201	.172	-.200
	UPPS_Total_Check	.252	.201	1.000	.435	.372
	GM_Total_Check	.367	.172	.435	1.000	.149
	BSI18_Total_Check	-.094	-.200	.372	.149	1.000
Sig. (1-tailed)	PGSI_Total	.	.001	.006	.000	.175
	Sex	.001	.	.023	.044	.023
	UPPS_Total_Check	.006	.023	.	.000	.000
	GM_Total_Check	.000	.044	.000	.	.069
	BSI18_Total_Check	.175	.023	.000	.069	.
N	PGSI_Total	100	100	100	100	100
	Sex	100	100	100	100	100
	UPPS_Total_Check	100	100	100	100	100
	GM_Total_Check	100	100	100	100	100
	BSI18_Total_Check	100	100	100	100	100

Figure 15. Correlation matrix between study variables in the student sample.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-1.866	1.058		-1.764	.081	-3.966	.235					
	Sex	.728	.382	.187	1.907	.060	-.030	1.486	.297	.192	.173	.864	1.157
	UPPS_Total_Check	.720	.558	.143	1.291	.200	-.387	1.828	.252	.131	.117	.672	1.487
	GM_Total_Check	.723	.248	.296	2.917	.004	.231	1.216	.367	.287	.265	.803	1.245
	BSI18_Total_Check	-.414	.275	-.155	-1.504	.136	-.960	.132	-.094	-.153	-.137	.783	1.277

a. Dependent Variable: PGSI_Total

Figure 16. Coefficient table including VIF values in student sample.

Multicollinearity Assumption test in the student-athlete sample

Correlations

		PGSI_Total	Sex	UPPS_Total_Check	GM_Total_Check	BSI18_Total_Check
Pearson Correlation	PGSI_Total	1.000	.223	.556	.315	.424
	Sex	.223	1.000	.086	.131	-.145
	UPPS_Total_Check	.556	.086	1.000	.543	.427
	GM_Total_Check	.315	.131	.543	1.000	.119
	BSI18_Total_Check	.424	-.145	.427	.119	1.000
Sig. (1-tailed)	PGSI_Total	.	.054	.000	.011	.001
	Sex	.054	.	.270	.175	.151
	UPPS_Total_Check	.000	.270	.	.000	.001
	GM_Total_Check	.011	.175	.000	.	.199
	BSI18_Total_Check	.001	.151	.001	.199	.
N	PGSI_Total	53	53	53	53	53
	Sex	53	53	53	53	53
	UPPS_Total_Check	53	53	53	53	53
	GM_Total_Check	53	53	53	53	53
	BSI18_Total_Check	53	53	53	53	53

Figure 17. Correlation matrix between study variables in the student-athlete sample.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-7.961	2.066		-3.854	.000	-12.115	-3.807					
	Sex	1.790	.910	.226	1.967	.055	-.039	3.619	.223	.273	.220	.947	1.056
	UPPS_Total_Check	2.926	1.100	.395	2.660	.011	.714	5.137	.556	.358	.297	.566	1.767
	GM_Total_Check	.186	.671	.037	.277	.783	-1.164	1.536	.315	.040	.031	.686	1.458
	BSI18_Total_Check	1.420	.636	.284	2.233	.030	.142	2.699	.424	.307	.249	.771	1.297

a. Dependent Variable: PGSI_Total

Figure 18. Coefficient table including VIF values in student-athlete sample.

Appendix U

Normality of Residues Assumption Test

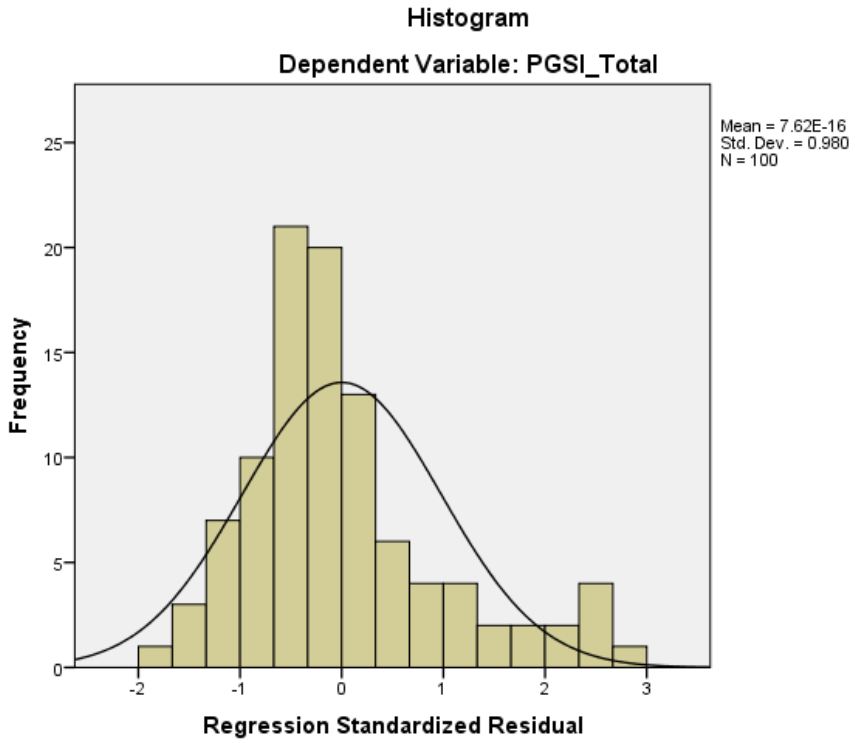

Figure 19. Frequency distribution of regression standardized residuals in the student sample.

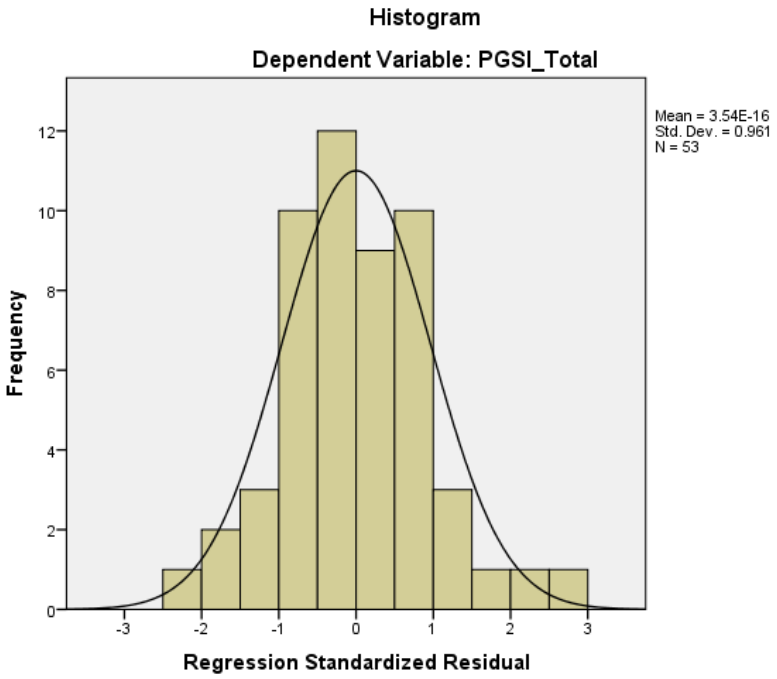

Figure 20. Frequency distribution of regression standardized residuals in the student-athlete sample.