

PROBLEM GAMBLING AMONG WOMEN IN CANADA

BY

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A Thesis submitted to the Faculty of Graduate Studies of

The University of Manitoba

in partial fulfillment of the requirements of the degree of

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Department of Community Health Sciences

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**A Thesis/Practicum submitted to the Faculty of Graduate Studies of The University of
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Of

Doctor of Philosophy

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Abstract

Background: Large-scale growth of the gambling industry was most notable in Canada in the 1990s. The expansion of gambling has been identified as an important public health concern.¹⁻³ Clinical data has indicated that large proportions of gambling help-seekers in Canada are women.⁴⁻⁶ To further our knowledge of women and problem gambling, a conceptual framework was developed for this research using a population health model.⁷

Methods: Data used for the analysis were from the nationally representative Canadian Community Health Survey Cycle 1.2 (CCHS 1.2; n = 20,211 women aged 15 years and older; data collected in 2002). The statistical analysis included logistic regression, multinomial regression, and linear regression models.

Results: The 12-month prevalence of at-risk gambling and problem gambling among women was 11.01% and 1.35%, respectively. Being aged 40 to 49 years, a household income of less than \$50,000, a high school education or less, being never-married, reporting life stress, and using negative coping skills were significantly associated with increased odds of problem gambling among women. Endorsement of higher levels of social support was associated with decreased odds of problem gambling. The types of gambling associated with the highest odds of problem gambling were VLTs outside a casino, VLTs inside a casino, and other casino games. In unadjusted models, problem gambling was associated with a significantly higher probability of lower self-perceived general health, suicidal ideation and attempts, decreased psychological well-being, distress, depression, mania, panic attacks, social phobia, agoraphobia, alcohol dependence, any psychiatric disorder, psychiatric comorbidity, chronic bronchitis, fibromyalgia, migraine headaches, help-seeking from a professional, attending a self-help

group, and calling a telephone help line. In models adjusting for covariates, only the relationships between problem gambling and distress, panic attacks, agoraphobia, any psychiatric disorder, fibromyalgia, and calling a telephone help line remained statistically significant.

Conclusions: Frequent VLT gambling outside and inside casinos is associated with the largest odds of problem gambling, which highlights an area of gambling in Canada that needs to be reassessed if problem gambling is to be prevented or reduced. Findings from the current research have important research and policy implications that could inform a whole population approach.

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Evan's and Stoddart's population health model.

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Chapter I: Introduction

Problem Gambling among Women in Canada

Background

In the past, many forms of gambling in Canada were considered illegal under the Canadian Criminal Code. More specifically, in 1892, the Criminal Code banned gambling with the exception of horse racing, and later the exemption of gambling at fair midways.⁸ In 1969, legalized gambling expanded due to an amendment to the Criminal Code authorizing provincial and federal run lotteries and licensed charitable gambling.⁸ However, the most notable growth of the gambling industry in Canada has been in the past two decades. In 1985, another amendment to the Criminal Code was made, which gave each province exclusive control over gambling and the authority to distribute electronic or computerized machine gambling within provinces.^{2, 8} Immense expansion of the gambling industry soon followed this pivotal legal decision.⁹ Accompanying the growth of gambling in Canada were longer hours of operation for gambling venues (seven days a week), increased maximum bets, and permission to serve alcohol and place automated teller machines (ATMs) in betting areas.¹⁰ The amendments to the Canadian Criminal Code have changed the gambling landscape in Canada through decriminalization of gambling, greater provincial authority over gambling, the expansion of gambling products and technology, and vested interest groups driving gambling growth.¹¹

In 1989, Manitoba was the first province to open a government casino.¹² In 1990, New Brunswick became the first province to introduce Video Lottery Terminals (VLTs)^a into the community.¹² By 2005, all provinces had permanent casinos, with the exception of Newfoundland and Labrador, Prince Edward Island and New Brunswick and all provinces had VLTs within the community, with the exception of Ontario and British Columbia.¹³ To date, gambling continues to be controlled and regulated at the provincial level. The availability of gambling varies by province with some provinces being quite similar. This rapid expansion of gambling in Canada has been identified as an important public health concern.¹⁻³ Specifically, it is feared that with the proliferation of gambling opportunities comes increased gambling behaviour and gambling-related problems for the individual, family, and society.

Historically, gambling was primarily thought of as a deviant male activity occurring in underground illegal venues. However, in 2002, 76% of Canadians aged 15 years and older endorsed gambling at least one time in the previous year and 5% of the adult population were at-risk for gambling problems or were already considered problem gamblers.^{14, 15} Problem gambling refers to gambling behaviour that has a negative impact on the gambler, others in his or her social network, or the community.¹⁶ The incidence of problem gambling or changes in gambling over time cannot be readily calculated, since longitudinal studies on problem gambling using general population samples do not exist. To date, only one prospective population gambling study estimating the incidence of problem gambling has been conducted using a small New Zealand community sample (n =143), which indicated that 6% of non-problem gamblers at baseline had gambling

^a Video Lottery Terminal (VLT) is a commonly used term for electronic gambling machines available in the community. Electronic gambling machines in casinos are either called slot machines or VLTs. For simplicity, the term VLTs is used in the current research and includes slots machines.

problems seven years later at follow-up.¹⁷ Similar prospective data does not exist in North America. However, a meta-analysis of gambling prevalence studies from Canada (n = 35) and the United States (n = 99) published before 1998 indicates that rates of problem gambling had significantly increased during the preceding 20 years.¹⁸ An updated meta-analysis of published and unpublished prevalence studies from Canada (n = 36) and the United States (n = 103) also confirms an increase in prevalence estimates among adults in the general population between 1975 and 1999.¹⁹ Some researchers conclude that this increase is linked to the greater availability of gambling.^{9, 13, 20-22}

Although the expansion of gambling has impacted the behaviour of men and women, the widespread legalization of gambling may have played an especially important role in gambling behaviour among women. Evidence indicates that women tend to participate in legal rather than illegal forms of gambling, suggesting that the greater availability of legal gambling increases the likeliness of women to gamble.²³ In fact, recent research indicates that women are just as likely to gamble as men.²⁴ As well, VLTs, a newly available form of gambling, is often reported as a preferred type of gambling among women.²⁵⁻²⁸

Women with gambling problems have also been increasingly found among help seeking samples, a population that had been almost exclusively male. Over a two year period between 1999-2001, 52 of the 109 individuals seeking help for problem gambling at an Ontario Addictions Centre were women.⁵ Similarly, data on gambling services clients from the Addictions Foundation of Manitoba (AFM) indicated that women accounted for 37.1% of all gambling clients in 1996-2000⁴ and 49.2% of all gambling clients in 2004-2005.⁶ Research using a community sample from the United States indicates that women account for approximately one third of problem gamblers.²⁹ These

changes in women's gambling activity and presence in help-seeking populations indicate that, relative to the past, gambling and gambling problems among women have increased. Since gambling among women is a relatively new and increasing activity, there has been a recognized and encouraged need in the literature to study women and problem gambling.^{1, 23, 30, 31}

Along with the expansion of gambling came strategies to market gambling as a socially acceptable form of entertainment. To encourage and support gambling as a suitable leisure activity, governments and the gambling industry use the term "gaming" as a euphemism for gambling.³² In addition, some marketing campaigns for casino promotion appear to specifically target women. For example, language such as "vibrant flowers bloom" and "sounds of tropical singing birds fill the air" is used to describe the Club Regent casino in Winnipeg, Manitoba.³³ The building and promotion of casinos as exciting venues for socially acceptable entertainment and placing VLTs throughout the community in bars and lounges has created physically and emotionally "suitable" gambling environments for women.

Overall, the purpose of the present research is to progress our currently stark knowledge of women and problem gambling in Canada with the goal of increasing our ability to identify, understand, and help women who experience problems. This research identifies correlates of problem gambling and important relationships between problem gambling and health and functioning, mental and physical health conditions, and help-seeking. More specifically, the research questions include: what is associated with at-risk gambling among women; what is associated with problem gambling among women; what types of gambling activities are associated with increased odds of problem gambling among women; is problem gambling among women associated with poor health and

functioning outcomes; is problem gambling among women associated with an increased likelihood of psychiatric disorders and chronic physical health conditions; and is problem gambling among women associated with increased perceived need for help and help-seeking?

Chapter II: Interviews with Service Providers and Frontline Clinicians at the Addictions Foundation of Manitoba (AFM)

To expand my background and understanding of problem gambling among women within the Canadian context, I formally met with several service providers and frontline clinicians from the Addictions Foundation of Manitoba (AFM), some of whom specialize in counseling women with gambling problems. The AFM is a crown agency that services the province of Manitoba and helps individuals and families who have difficulties with alcohol, drugs, and gambling through intervention, rehabilitation, prevention, education, and research efforts.³⁴ Organizations in other provinces in Canada, such as the Centre for Addiction and Mental Health (CAMH) in Ontario and the British Columbia Partnership for Responsible Gambling also provide comparable services to help individuals and families with gambling problems.

At the AFM, I met with Gerry Kolesar (supervisor of problem gambling services and the chair of the provincial planning team for Gambling), Susan Van Hull and Eva Golden (rehabilitation counselors specializing in women gambling clients and prevention education consultants), Susan Maxwell (family therapist specializing in family members affected by problem gambling), and Terry Lynn MacKay (gambling research analyst). Discussing problem gambling among women with service providers and frontline clinicians provides an enriched learning opportunity, which goes beyond what is available in the existing research literature on problem gambling.

In June 1993, after the initial expansion of gambling in Manitoba, the gambling unit at AFM opened and, since this time, increasing numbers of women have sought help for gambling problems using these services (G. Kolesar, personal communication, March 15, 2006). The AFM does not provide specialized counseling programs for women with

gambling problems, but women can request seeing a woman counselor (G. Kolesar, personal communication, March 15, 2006). The AFM has collected data on all gambling services clients. Data gathered from AFM in 2004-2005 indicates that 52.7% of women gambling clients were between 35 and 50 years of age, 68.7% had at least a high school education, and 51.1% were married or living common law.³⁵ In addition, consistent with the gambling literature, data from AFM indicates that women experiencing gambling problems also endorse problems with emotional or mental health issues, namely depression, and have suicidal thoughts.³⁵ Currently, research specifically focusing on women problem gambling is not being conducted at the AFM (T.L. MacKay, personal communication, March 16, 2006).

Past research has indicated that gambling may represent a relatively new form of addiction since many individuals in treatment for gambling problems do not report problems with alcohol.^{4, 36} AFM data on women with gambling problems supports this claim with 76.1% of women clients presenting with only gambling problems and no chemical addictions.³⁵ In this context, Susan Van Hull, an AFM counselor, indicated that many women report being surprised by their gambling problem. Since they do not have drinking problems and they are otherwise responsible individuals, they cannot understand why their gambling has become out of control. Based on her 20 years of experience as an AFM counselor, Susan commented that gambling is a new addiction (S. Van Hull, personal communication, March 21, 2006).

The unique perspectives of experienced problem gambling counselors can provide further insight into the relationship between problem gambling and the new, readily available gambling environments. Counselors at AFM indicated that many women state that they would not feel comfortable going into a bar or restaurant to drink alcohol or eat

alone. However, many women are comfortable going to a venue (bar, restaurant, or casino) unaccompanied to play VLTs because they are interacting with the machine and do not feel that they are sitting alone (E. Golden & S. Van Hull, personal communication, March 21, 2006). AFM data from 2004-2005 indicates that approximately 60% of women being treated for gambling problems gambled at a local casino and 92.4% endorsed gambling in a local hotel, bar, restaurant, or legion in the past year.³⁵ Furthermore, 57.7% of women being treated for gambling problems indicated gambling on VLTs as often as several times per week and an additional 14.4% endorsed daily VLT gambling.³⁵ The high prevalence of VLT gambling among women is consistent with past research that indicates that VLTs are a preferred form of gambling among women²⁶⁻²⁸ and provides further evidence that socially acceptable gambling environments have been created for women. The experiences of clinicians and service providers compliment the current research literature and provide further insight into problem gambling among women. The knowledge of these experienced professionals not only provides a necessary human element from which to approach the problem of gambling, but it also ensures the development of relevant and informative research objectives for the current dissertation research.

Chapter III: Theoretical Framework

A Population Health Model Developed by Evans and Stoddart (1990)

Korn and Shaffer were the first researchers to suggest that a public health approach should be applied to understand problem gambling.¹ To date, a large proportion of problem gambling research has used a medical perspective that has focused on diagnosing and treating individuals who meet Diagnostic Statistical Manual of Mental Disorders (DSM) criteria for the diagnosis of pathological gambling.³⁷ Although problem gambling is considered a public health issue and a population health approach is encouraged in the literature, it is underutilized as a conceptual framework in research. Indeed, a population health model has not yet been applied to understand problem gambling in Canada, particularly among women. A population health model could provide an informative conceptual framework for understanding problem gambling that moves beyond simply diagnosing and treating the most severe pathological gamblers and attempts to understand gambling and gambling-related problems in the general population.

Evans and Stoddart developed a highly cited and reprinted population health model in a 1990 publication titled: *Producing Health, Consuming Health Care*.⁷ The population health model is presented with permission in Figure 1. Evans and Stoddart explain that the basis for the development of the population health model was the acknowledgement that health is not merely the presence or absence of disease.⁷ A broader definition of health was necessary, which includes the concept of overall well-being. More specifically, to understand health of a population one must consider more than the disease status or the availability, and uses of resources put into health care systems. When developing a population health model that incorporated a broader understanding of health,

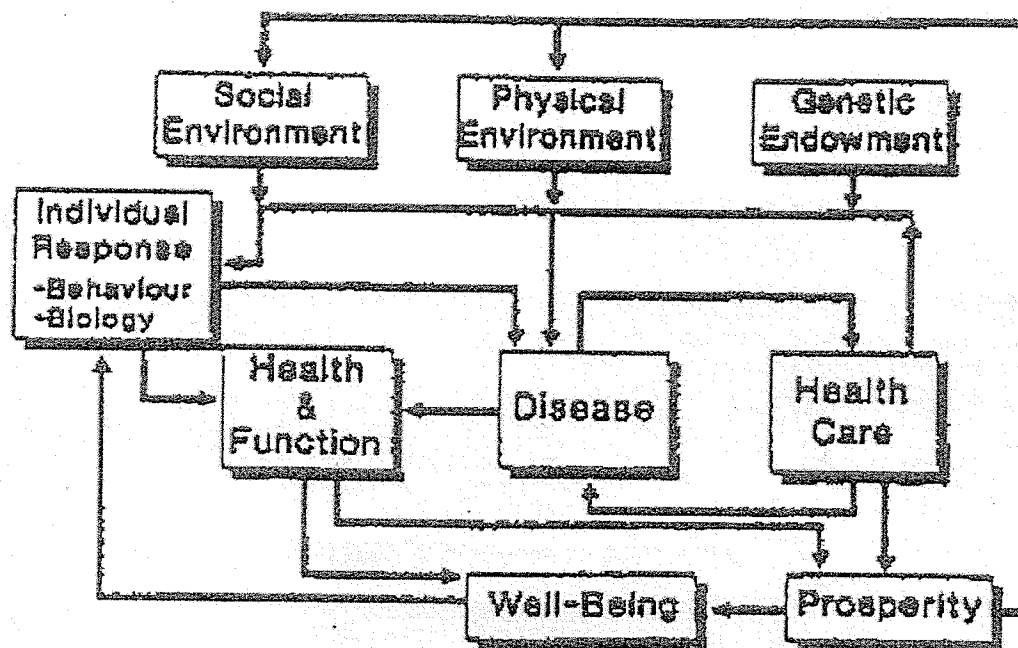


Figure 1: Evans and Stoddart's population health model

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Evans and Stoddart⁷ included important concepts discussed in the earlier Lalonde report.³⁸ The report titled: *A New Perspective on the Health of Canadians*,³⁸ commonly referred to as the Lalonde report, was a seminal piece. It restructured thinking about health through highlighting the importance of what determines health. Health determinants were categorized into human biology, environment, lifestyles, and health care organizations.³⁸

Evans and Stoddart⁷ expanded the concept of health determinants beyond those described in the Lalonde report³⁸ to include categories that can accommodate many factors associated with health outcomes. The model included genetic endowment, physical environment, social environment, individual response (behaviour and biological), health and functioning, disease, health care, prosperity, and well-being. Genetic endowment, similar to Lalonde's³⁸ human biology, is the genetic inheritance and biological make-up of an individual. Physical environments include important aspects of one's physical surroundings such as exposure to specific elements. Social environments are comprised of socioeconomic indicators, stress, social support, coping and any other aspects that characterize social surroundings. Physical and social environments and genetics all contribute to an individual's behavioural and biological response, which influences the individual's perception of health and functioning and whether the individual will be able to resist disease.

Evans and Stoddart indicate that disease and the health care system still have a role in understanding health, but are not the central focus of the framework.⁷ Disease is the definition of health status based on the judgments of professionals in the health care system, while health and functioning is an individual's definition of health. A person's own perception of illness may differ from that of health professionals. When individuals

perceive a need for medical care because of being hurt or sick, they may present themselves to the health care system. Once there, care will be provided depending on patient's needs and available treatment.⁷ Hence, the model recognizes that an individual's own perceptions not only determine well-being, but also initiate the health care process.

Also in the model is the concept of prosperity, which indicates that economic trade-offs may have an impact on well-being.⁷ When resources are invested in the health care system, other important health enhancing programs may suffer. Therefore, investing too much in health care and not enough in other programs and services may have a negative impact on well-being through prosperity. The main outcome in the model is not being free from disease, but rather the sense of life satisfaction or well-being.⁷ Therefore, health policy should then add to and improve the well-being of the population.

Evans and Stoddart described the model as a comprehensive and flexible framework through which correlates of health can be examined.^{7, 39} While the framework categorizes correlates of health, each category can be expanded to accommodate all the important variables relevant to a specific health issue. In 2003, Evans and Stoddart reflected on their population health model and concluded that, although knowledge has advanced since the model was first created, the model is still relevant and not in need of change.⁴⁰ However, they indicated that a greater knowledge of factors that determine or are correlated with health has become apparent since the origin of the model in 1990 and these factors should be incorporated into our thinking.⁴⁰ An example of this is the important relationship that the social environment and individual psychology has on health status.⁴⁰ Therefore, the model used for the current research has expanded the social environment domain to include psychosocial factors that may also have an impact on health.

Strengths and Limitations of the Population Health Model

The population health model developed by Evans and Stoddart⁷ is a useful model that can provide a conceptual framework for understanding many public health issues. A strength of the model is that it is parsimonious, yet comprehensive enough to include many important health correlates. As such, the model recognizes that many factors contribute to overall health or well-being and that it is important to consider these factors together. The framework is described as a set of categories for assembling data.^{7, 39, 40} The set of categories may include a collection of relevant variables, which allows the researcher to customize the framework through the inclusion of factors that are pertinent to a specific health issue. Therefore, the model is not a simple, linear system of relationships as depicted in the box and arrow diagram.⁴⁰ Rather, the population health model represents a set of categories useful for organizing data to conceptualize or test the relationships between health correlates and health outcomes.

However, Evans and Stoddart's model⁷ is not without limitations. First, the model does contain a network of directional relationships. Although the direction of each path is theoretically justified, directionality of some paths could be argued. Evans and Stoddart recognize that the direction of the arrows are debatable and suggest that it may be advisable to use the model as a conceptual framework of categories to organize data, rather than a system of linear relationships.^{7, 40} Another limitation of the population health model is that, although it is informative for providing the overall picture, it is not possible to operationally define and empirically test all the concepts described in the model. Therefore, the model may be theoretically applied, but must be revised if used as a conceptual framework in research.

Chapter IV: Literature Review

Developing a Conceptual Framework to Understand Problem Gambling

An Overview

Although the population health model has limitations, it still provides an informed framework to conceptualize problem gambling in the general population. Its utility for organizing data and highlighting important relationships can further our understanding of problem gambling and the newly emerging gambling problems among women. Table 1 provides a conceptual overview of how the population health model can be applied to organize important variables for studying problem gambling in the general population.

The conceptual framework can be used to understand problem gambling as follows. Genetic endowment (being female, familial gambling history), physical environment (exposure to gambling) and social environment (socioeconomic factors, social support, stress, and coping) function together to impact the occurrence and degree of gambling behaviour. Problem gambling is not the result of, for example, an individual's exposure to gambling alone, but results from several factors from the physical, social, and genetic domains. To truly understand gambling behaviour, factors from each domain and how they may be associated with gambling should be considered. Once gambling occurs, it may only be a means of recreation and gambling activities may not become problematic. However, if gambling behaviour becomes excessive to the level of problem gambling, it can have a negative impact on health and functioning and gambling-related problems could arise. Problem gambling may also deteriorate physical and mental health and lead to significant health conditions. As well, an individual who experiences gambling problems may perceive a need for help and seek treatment.

Table 1: Conceptual Overview for Studying Problem Gambling among Women in the General Population	
Population Health Model Domains (Application to Gambling)	Variables
Social Environment (Social/Psychosocial Environment)	Age Income Education Marital status Social support Stress Coping
Physical Environment (Exposure to Gambling)	Concentration of VLTs per 1000 population Presence permanent casino
Genetic Endowment (Family History of Problem Gambling)	Family history of problem gambling
Individual Behaviour (Gambling Behaviour)	Frequency and type of gambling Gambling-related problems
Health and Function	Perceived general health Psychological well-being Distress Suicidal ideation Suicide attempts
Disease (Health Conditions)	Comorbid psychiatric disorder Chronic physical health conditions
Health Care (Help-Seeking)	Perceived need for help Help-seeking

The conceptual framework can be applied specifically to women. Exposure to gambling through availability of legalized gambling in socially acceptable and safe venues may be especially inviting to women. Women may gamble as a means of recreation, to combat loneliness, or to cope with stresses such as daily responsibilities or mental health problems. Gambling may continue for women and become problematic because of the appeal of accessible and safe venues, unsupportive social networks, the hope of winning and improving social situations, or the distraction or temporary relief it may provide from stress and problems. Each dimension of the conceptual framework and how it is specifically applied to understand problem gambling among women will now be discussed.

Genetic Endowment: Family History of Gambling Problems

Genetic makeup plays an influential role in the likelihood of experiencing psychiatric disorders, such as mood and anxiety disorders.⁴¹ It is possible that genetic factors may also contribute to problem gambling behaviour. However, it has been suggested that a search for an abnormal gene may be premature since it is not clear if genetic predisposition exists for problem gambling.⁴² To illustrate, a meta-analysis of all genetic and gambling studies conducted between 1970 and 2000 (n = 19) indicated that genetic effects may be relatively weak, although not trivial, and that factors other than genetics are probably more important for understanding problem gambling.⁴² As well, 90% of individuals seeking treatment for gambling problems in a Manitoban clinical sample denied a family history of gambling.⁴

A lack of robust support for genetic predisposition may relate to the changing physical availability and social attitudes toward gambling. Current gamblers may be unlikely to demonstrate a family history of (problem) gambling because of a historically

low prevalence of gambling. This does not disprove a genetic association. As gambling increases in the population for any reason, opportunities to uncover genetic influences will increase. Nonetheless, support for a genetic influence on gambling does exist, as a recent clinical sample of women problem gamblers found elevated levels of problem gambling among their fathers (26.9%), mothers (25.6%), siblings (28.2%) and their own children (6.4%).²⁷ Another study found problem gambling was significantly more likely among first degree relatives of problem gamblers than in first degree relatives of the study control group.⁴³ A family history of gambling problems was also commonly reported among women from a convenience sample from Ontario.⁴⁴ Also, a longitudinal study of twin males found that 49% of the risk for at least one baseline gambling symptom was owing to genetic factors with no evidence of unique genetic contributions at the ten year follow-up.²² These studies indeed suggest that problem gambling may be a familial trait. Yet, familial traits can be passed, not only through shared genes, but also through shared environments and, therefore, can be transmitted familially, culturally as well as genetically.⁴⁵ Another challenge for genetic studies, then, is to distinguish between heredity and shared environment.⁴²

Finally, it is important to mention the concepts of sex and gender when considering genetic endowment and problem gambling. Gender (men and women) is a social construct, whereas sex (male and female) is a biological construct.⁴⁶ As mentioned, the gap between men and women with regard to gambling activity has narrowed, making gambling a new emerging problem among women. The experience of problem gambling is not the same for men and women. Women, relative to men, start gambling at an older age, but progress towards gambling problems at a much faster pace.^{27, 47-50} Therefore, women entering treatment may have only been gambling for a few years, while it might

be common for men in treatment to indicate gambling for 20 to 30 years.⁵¹ Research investigating the progression of gambling problems among treatment seekers confirms that gender is an important variable that accounts for a large proportion of gambling problem progression, but may only account for a small proportion of unique variance when other psychosocial factors are considered.⁵² The experience of problem gambling appears to be different for men and women, which is likely more of a reflection of the socio-cultural and psychosocial factors more so than the biological construct of being male or female. Nonetheless, the study of the social construct of gender is important and points to the need for further research on women and problem gambling.

Physical Environment: Exposure to Gambling

Research indicates that the prevalence of problem gambling has risen since the widespread legalization and increased availability of gambling.^{18-20, 53} A study of undergraduate students from the United States indicated that students perceived gambling to be more available than buying marijuana and alcohol and perceived frequent gambling involvement as less risky than using alcohol and cigarettes.⁵⁴ Elements found in the physical environment can have an impact on health outcomes.⁴⁵ The increase of casinos and VLTs in the physical environment is analogous to an environmental toxin that is associated with disease.⁵⁵ For instance, the exposure of gambling as measured using the high concentration of VLTs in the community and the presence of a permanent casino is associated with increased prevalence of gambling problems.¹³ As well, research has found that problem gambling is associated with living within 10 miles of a casino.⁵⁶ To further recognize the importance of exposure, casino employees have been shown to experience greater gambling problems than the general population.⁵⁷ These findings may reflect a type of dose-response relationship that underscores the importance of gambling

exposure in relation to gambling activity. Indeed, Korn has warned that the expansion of gambling within Canada has negative public health implications.²

From a public health perspective, exposure to gambling is associated with public health costs that need to be considered in the Canadian context. When discussing exposure to gambling in Canada, it is important to reflect on the role of advertising and marketing. Promotional advertising is another salient environmental factor and may itself trigger gambling behaviour. This advertising has the ability to increase the visibility of gambling and, also, to manipulate peoples perception of gambling as harmless, exciting and socially acceptable. The availability of gambling, via casinos and high concentration of VLTs in the community, the promotional advertising of gambling as an acceptable social activity, and attractive and exciting atmospheres are all components of the physical environment.

A qualitative study of women with gambling problems from Australia illustrates several of these points. Women from the study indicated that promotional gambling advertising was influential, “They’re making me do it” (p.65), environments were attractive, “I’m in love with the pink parrots on the machine” (p. 63), and locations accessible, “venues are all over the place” (p. 64).⁵⁸ Another qualitative study of women gamblers from northwestern Ontario indicated that the availability and attractiveness of venues were reasons to gamble.⁵ Using a community sample from New Zealand, researchers found that women with gambling problems compared to men with gambling problems were more likely to report easy access to gambling activities as a reason for continuing regular gambling practices.²⁵ These findings emphasize the importance of physical environment and the specific factors it accommodates: availability, atmosphere, and marketing. Special consideration should be paid to women and exposure to gambling

using representative samples, since legalization of gambling has resulted in varying degrees of availability to easily accessible new forms of gambling that especially appeal to women.

Social Environment: Social/Psychosocial Environment

Indicators of social status characterize the social environment. Such indicators may include socioeconomic factors, supportiveness or social relationships, stress and coping.⁷ The entities that define social or psychosocial environment have an influence on individual response and will impact the health and well-being of a population.

Considering the social/psychosocial environment is very important for understanding the likelihood of whether or not gambling problems will occur.

Socioeconomic factors

An interesting relationship exists between income and problem gambling. Research has indicated that higher levels of income have been associated with larger gambling expenditures.⁵⁹ Earning more money may indicate a greater degree of disposable income, resulting in more frequent and large wagers when gambling. However, to truly understand the relationship between income and problem gambling, it is important to consider the proportion of an individual's income that is wagered. MacDonald and colleagues found that individuals earning \$20,000 or less per year spent a mean of 2.0% of their income on gambling compared to a mean of 1.0% of earned income spent among those making \$20,000 to \$39,999 and a mean of 0.4% of earned income spent among those making \$80,000 or more.⁵⁹ Therefore, although higher earners may gamble with larger amounts of money, it may be the middle to low income brackets that are at the greatest risk for developing gambling problems. In addition, advertisements suggesting that large jackpots or instant fortunes would change one's life may have more

influence on individuals with low to middle income levels compared to those with higher income. Clinical findings from Manitoba indicate that problem gambling may have an impact on middle class populations. Results from the study indicated that clients being treated for gambling problems compared to those being treated for alcohol problems were more likely to have higher educational attainment, full-time employment, an income over \$50,000, and own a home.⁴

Research on marital status and problem gambling appears to be somewhat inconclusive. Some findings indicate that problem gambling is more common among those who are married,^{4, 60} while other research indicates that problem gambling is more likely to occur among individuals who are single.^{21, 61, 62} Inconclusive findings with regard to problem gambling and marital status may be reflective of the non-representative samples frequently used in gambling research. Further research on marital status and problem gambling is necessary.

Information on socioeconomic characteristics specific to women who gamble or have gambling problems is limited. One study using a random sample from two western Canadian cities found that 28% of women gamblers had completed high school, and 48% had at least some post secondary education.⁶³ These findings are informative, but are not representative of women with gambling problems within the Canadian context. To further our understanding of the relationship between socioeconomic factors and problem gambling among women, findings from clinical and convenience samples need to be extended to the Canadian community context using a representative sample of women problem gamblers.

Supportiveness and social relationships

Supportive networks play an important role in the characteristics of a social/psychosocial environment. Having supportive social relationships are associated with better health outcomes.⁶⁴ Likewise, problem gambling has been found to be more prevalent among individuals with poor social support networks.⁶⁵ Some argue, however, that a potential benefit of gambling is that it can provide a sense of social connectedness.^{1, 66, 67} A qualitative analysis from Ontario using a sample of seven women with low socioeconomic status determined that gambling was a part of their social life, with one women stating that gambling provided her with a sense of community.⁶⁸ Another study of older adults indicated that machine gambling provided an opportunity to make friends and socialize.⁶⁹ While individuals may indeed turn to gambling as a means of feeling a sense of belonging, gambling is often an isolated activity involving little social interaction and is likely only able to provide an artificial sense of connectedness. In addition, the identification of a gambling problem may be less likely without supportive networks to help recognize problems and encourage help-seeking.

Past research has suggested that home environments for women problem gamblers may be unstable, stressful, and unsupportive.⁴⁸ Gambling research has investigated perceptions of poor supportive networks through feelings of loneliness using a variety of samples. A clinical sample of women with gambling problems identified being sad and lonely as reasons for gambling.²⁷ Similarly, loneliness was the most commonly stated reason for gambling among a convenience sample of women gamblers from Australia.⁵⁸ Findings from another convenience sample of women from Australia reported that among women gamblers, severe problem gamblers had higher loneliness scores relative to non-problem gamblers and mild to moderate problem gamblers.⁷⁰ More specifically, when

assessing individual items from the loneliness scale, severe problem gamblers relative to other gamblers were more likely to report feeling like they were not part of a group of friends, did not feel close or connected to anyone, and that no one understood them. Although this study does provide new information regarding supportive networks of women problem gamblers, it is not without limitations. The most significant limitations that hinder the study were the non-representative convenience sample, small sample size ($n = 95$), and low response rate of 63.3%. Research investigating social supports among women with problem gambling is sparse and needs to be conducted in representative samples to fill our gaps of knowledge.

Stress and coping

Evans and Stoddart mention the potentially harmful impact of stress and the protective role of effective coping in determining health.⁷ Not surprisingly, problem gamblers have been found to report higher levels of life stress and stress related illness.⁷¹⁻⁷³ However, it has also been argued that people may gamble as a means of reducing stress.¹ In a convenience sample of women problem gamblers from Ontario, 53% of women reported gambling as a relief from stress.⁴⁴ A qualitative study from Ontario ($n = 7$) identified gambling as a temporary escape from real-life problems.⁶⁸ Coping abilities may have an impact on healthy versus unhealthy outcomes related to stressful events. Notably, it has been found that gambling problems are associated with poor coping skills.⁷⁴⁻⁷⁷ As well, the inability to cope with stressful situations has also been implicated in relapses of problem gambling behaviour.⁷⁸

Research using a convenience sample of women from Australia ($n = 163$) investigated the relationship between gambling problems and coping styles: emotional focused coping such as avoidance or escape versus problem focused coping such as active

problem solving behaviours.⁷⁵ Findings from the study indicated that women with low control over gambling relied on emotional focused coping styles. Another study of women gamblers and coping strategies indicated that some women gamble to escape from problems.²⁶ Individuals may gamble as a means of coping with painful events in their life⁷⁹ or negative mood, which over time may intensify leading to greater levels of gambling.⁷⁴ A qualitative study of men and women from the United Kingdom indicated that many respondents reported gambling as a means of escape-based coping, which facilitated the continuation of problem gambling.⁸⁰ However, since women compared to men are more likely to be depressed,^{81, 82} women may be more inclined to use gambling as a means of coping with depression. Findings from a study investigating motivating factors for casino gambling suggest that some women gamble as an escape mechanism and as a way of controlling emotions.⁶³

A study by Getty, Watson, and Frisch used a sample of men and women problem gamblers and non-problem matched controls to compare levels of depression and coping strategies.⁷⁴ Results from this study found that problem gamblers were more likely to report high scores of depression, suppressive coping (avoidance and lack of persistence) and reactive coping (impulsive and negatively emotional), but were less likely to use reflective coping (develop thoughtful solutions). When comparing men problem gamblers to women problem gamblers, it was determined that women were more likely to be depressed and had higher levels of reactive coping. When controlling for depression, women were no longer statistically different from men with regard to reactive coping, suggesting that the reactive coping of women is related to levels of depression. The study was limited because of the small clinical sample including only 10 women. These findings are not generalizable to the general population, indicating that additional

research specific to coping among women with gambling problems is required. In addition, research on stress among women with gambling problems is also necessary since to date, no research in this area has been conducted.

Individual Response: Gambling Behaviour

According to the population health model, genes, physical environment, and social environment function together and influence the response of the individual. When applying the population health model to problem gambling, individual response represents gambling behaviour with regard to types and frequency of gambling activities and amount of money spent on gambling. A large proportion of the adult population in Canada (76%) has reported at least one gambling activity in the past year, with frequencies among men (78%) and women (73%) being quite similar.^{14, 15} Researchers investigating at-risk levels of gambling activity have suggested that gambling activities should be limited to no more than two to three times per month.⁸³ This finding was replicated using three additional Canadian provincial samples.⁸⁴ With regard to specific types of gambling activities, VLTs are often reported as the preferred type of gambling among women.^{5, 26, 27, 31, 48, 58} Such information is important since VLTs have been considered to have very high addictive potential.⁸⁵ Research using a Canadian sample from PEI found that VLTs had the strongest association with gambling problems, which may be due to VLTs continuous and short playtime.⁸⁶ Researchers have suggested that to reduce the risk of harm related to gambling, no more than \$501 to \$1000 Canadian dollars per year or approximately 1% of gross household annual income should be spent on gambling activities.⁸³ These findings were also replicated using three additional Canadian provincial samples.⁸⁴

A wide range of negative consequences such as financial problems, work and employment difficulties, and damaged relationships can result if gambling behaviour becomes problematic. Commonly used tools to identify problem gambling include: DSM criteria ⁸⁷, the South Oaks Gambling Screen (SOGS) ⁸⁸ and the newly developed Canadian Problem Gambling Index (CPGI).^{16, 89} The CPGI is the most useful tool for a population health model because it was developed using general population samples, is sensitive to under-represented populations of non-traditional gamblers (such as women), and includes indicators of social and environmental factors related to gambling and gambling problems.^{16, 32, 89} Excessive gambling activity can have an impact on health and functioning and presence or absence of disease.

Health and Functioning

An individual's definition or interpretation of their own health and functioning may not always be the same as a health care provider's diagnosis.⁷ The perception of many aspects of health and functioning can be considered when assessing overall health. Aspects of health and functioning that have been studied in relation to problem gambling include general aspects of physical and mental health and suicidal behaviour.

General health

Research has indicated that problem gamblers compared to non-problem gamblers are more likely to perceive their general health as fair or poor or indicate lower health-related quality of life.^{14, 15, 90-93} Research on problem gambling and self perceived general health is limited, since many studies use convenience or selective samples and no research has examined perceived general health exclusively among women problem gamblers. With regard to general health, a study of older adults found that after adjusting for age, problem gamblers relative to non-problem gamblers had decreased vitality,

physical functioning, role functioning, general health, and social functioning as measured via the health related quality of life Short Form-36 (SF-36).⁹¹ Another study using a sample of urban adult primary care patients found that Short Form-12 (SF-12) physical and mental health component scores decreased as the severity of the gambling behaviour worsened from non-gamblers, recreational gamblers, problem gamblers and pathological gamblers.⁹⁴ Another, clinical sample found that Global Assessment of Function scores to be low among women with gambling problems.²⁷ One nationally representative study from New Zealand indicated that problem gamblers were more likely to have poor self-reported role physical, general health, vitality, role emotional, and mental health according to the SF-36 domains than non-problem gamblers.⁹³ In addition to general health, it would also be advantageous to further study psychological well-being and distress among women with gambling problems. To date, limited information is available on self-perceived general health, psychological well-being, and distress among women problem gamblers.

Suicidal ideation and attempts

Another indication of poor health and functioning is suicidal ideation, attempts, and completion. Challenges arise when trying to determine if problem gambling is the cause of completed suicides or how common suicide due to problem gambling is in society.⁶⁶ An investigation found that the introduction of new casinos in specified communities did not correspond with an increase in completed suicides.⁹⁵ Non-significant findings may be due to the short time frame of the study, inability to determine if death was the result of a suicide, or that the new casinos in the jurisdictions included in the investigation do not increase rates of suicide. However, research has indicated that problem gambling is associated with suicidal ideation and attempts.^{44, 47, 86, 96, 96-104} For

example, in a convenience sample of men and women with gambling problems, 39% reported only thinking about suicide, 33% reported attempting suicide, and of those attempting suicide 21% identified gambling as the reason for the attempt.¹⁰⁵ A study using a national sample from Canada found that the most severe level of problem gambling was associated with suicide attempts (odds ratio 3.43; 95% CI = 1.37 to 8.60) after adjusting for sociodemographic and mental health variables.¹⁰⁴ From a public health perspective, this study is somewhat limited since the most severe problem gamblers were compared to all other study respondents including those who never gambled in the past 12 months, non-problem gamblers, and moderate risk problem gamblers. As well, men and women were combined into one group while adjusting for the effects of gender rather than examining men and women separately.

A limited amount of research has investigated suicidal ideation or attempts specifically among women with gambling problems. A study of individuals calling a gambling helpline in the United States found that a significantly larger proportion of women relative to men reported making a suicide attempt due to gambling (5.5% versus 2.1%, respectively, $p < .05$).¹⁰¹ However, it should be noted that suicide attempts, in general, are more frequent in women than men. Statistics on women being treated for gambling problems at AFM in 2004-2005 indicated that 66.9% of women endorsed lifetime suicidal ideation and 6.7% had current thoughts of suicide.³⁵ No information was available regarding suicide attempts. A study investigating self-excluded casino problem gamblers from Missouri found that prevention of suicide was an important predictor of self-exclusion among women problem gamblers.¹⁰⁶ In addition, high prevalence of lifetime suicidal ideation (45%) and attempts (29%) were reported in a convenience

sample of women problem gamblers from Ontario.⁴⁴ Further research in this area using representative samples of women is required.

Disease: Health Conditions

When gambling becomes out of control, gamblers may be neglectful of their health. Health conditions or disease refers to a health care professional's identification or diagnosis of a condition.⁷ When applying the population health model to problem gambling, disease represents the assessment of physical and mental health conditions. Gambling problems can co-occur with physical health conditions and other psychiatric disorders. Comorbidity of other conditions would also be classified within the health conditions portion of the population health model.

Comorbidity of chronic physical health conditions

Volberg indicates that public health risks of problem gambling include stress-related illnesses such as hypertension and heart disease.⁷³ However, limited research has been conducted on physical health conditions and problem gambling. A study of physiological effects of machine gambling in women found increased levels of blood pressure, heart rate, respiratory rate, and skin temperature during gambling.¹⁰⁷ Studies using older adult samples have found relationships between problem gambling and having a chronic medical problem.^{91, 108, 109} Another study using a clinical sample of 60 problem gamblers from Quebec found that approximately two thirds of the sample reported a medical problem such as insomnia, headaches or stomach aches, at least once a week due to gambling.¹¹⁰ In a random community sample from PEI, problem gamblers were more likely than non-problem gamblers to report being diagnosed with a stress-related illness.⁸⁶

To date, the most comprehensive study on gambling and physical health conditions used nationally representative data from the United States (National Epidemiologic Survey on Alcohol and Related Conditions) and found significant relationships between lifetime gambling problems and past year self-reported physician diagnosed hypertension, tachycardia, angina, cirrhosis, other liver disease, and arthritis.¹¹¹ Although this study provided evidence for the relationship between gambling problems and physical health conditions, it was limited since the measurement timeframe of gambling problems (lifetime) and physical health conditions (past year) were different, which may reduce the substantive significance of the findings. Also, men and women were not studied separately, which is important since the prevalence of some health conditions differ among men and women and a combined sample eliminates the possibility of understanding the relationship between problem gambling among women and physical health.

Research in the area of chronic physical health conditions is especially limited with regard to women problem gamblers. Findings from a study using a convenience sample of women gamblers reported that 56% of the women indicated that gambling had negatively affected their health.⁵⁸ Unfortunately, research in this area is limited since few studies have been conducted, most studies used unrepresentative samples, and studies investigating specific chronic conditions are rare. Further research in the area of chronic physical health conditions and problem gambling is necessary.

Comorbidity of psychiatric disorders

An early review article found that pathological gambling was often comorbid with substance use disorders and likely comorbid with antisocial personality and mood disorders.¹¹² Comorbidity of problem gambling and psychiatric disorders has been found

to be highly prevalent among commonly used clinical samples. One study using a small clinical sample indicated that 90% of the problem gamblers had a comorbid psychiatric disorder.¹¹³ More specifically, clinical samples have found that problem gambling is often comorbid with mood, anxiety, and substance use disorders.¹¹⁴⁻¹¹⁷ A recent study from the United States using nationally representative data from the National Epidemiology Survey on Alcohol and Related Conditions (n = 43,093) found that among pathological gamblers, 73% had an alcohol use disorder, 38% had a drug use disorder, 60% had nicotine dependence, 50% had a mood disorder, 41% had an anxiety disorder, and 61% had a personality disorder.²⁹ Other studies using nationally representative data from Canada found that individuals with bipolar I disorder were 2.3 times more likely to be a problem gambler than those without bipolar I disorder¹¹⁸ and that those with a mood or anxiety disorder (Odds Ratio = 1.8; 95% CI = 1.3-2.4) and those with substance dependence or harmful alcohol use (Odds Ratio = 2.9; 95% CI = 2.3-3.8) were more likely to be a problem gambler compared to those without a psychiatric diagnosis.¹¹⁹

Internalizing disorders such as depression are more prevalent among women relative to men^{81, 82} and, therefore, it would seem that comorbidity of depression would be more likely among women problem gamblers compared to men problem gamblers. A study using a nationally representative sample from the United States found that women problem gamblers were more likely to experience lifetime mood and anxiety disorders than men problem gamblers.¹²⁰ Another study using the same data indicated that significantly stronger associations existed between past year mood and anxiety disorders and past year problem gambling in women compared to men.¹²¹ As well, research using clinical and community samples found that women problem gamblers are more likely to experience comorbid depression or mood disorders than men problem gamblers.^{29, 122} A

report on women clients of problem gambling services at AFM in 2004-2005 indicated that 33.6% ($n = 39$) of the women were also currently being treated for emotional or mental health concerns, with 86.8% identifying depression and 42.1% identifying anxiety as the nature of the problem.³⁵ Similarly, women problem gamblers from a convenience sample in Ontario reported high prevalence of treatment seeking for depression (63%), anxiety (53%), and panic (28%).⁴⁴ Another study found that alcohol use was associated with higher rates of mental health treatment among women recreational gamblers.¹²³ Research on problem gambling and comorbidity of psychiatric disorders or psychiatric problems among women has not been thoroughly investigated within the Canadian context. Further research on psychiatric comorbidity among representative samples of women with gambling problems needs to be conducted.

Psychiatric disorders may develop before, after or concurrently with gambling problems. Little information is available regarding the likely temporal association between gambling and the development of other psychiatric disorders.¹²⁴ One recent study attempted to understand the directionality of this relationship using age of onset data among a sample of recovering problem gamblers.¹¹⁵ Findings from the study indicated that depression was just as likely to occur before or after gambling problems suggesting that some individuals may use gambling as a poor coping mechanism to relieve dysphoric mood, while other individuals may become depressed because of their gambling problems. However, 74% of individuals experienced alcohol abuse/dependence and 84% experienced drug abuse/dependence before gambling problems. Another study using age of onset information from the National Comorbidity Survey Replication data indicated that DSM-IV pathological gambling occurred after several DSM-IV mental disorders including: anxiety, mood, impulse-control, and substance use disorders.¹²⁵

These studies are the first to shed light on the temporal relationship between problem gambling and comorbid psychiatric disorders. However, well-designed longitudinal prospective studies using representative samples are still needed to further clarify this relationship and investigate if the relationship holds true when exclusively studying women problem gamblers.

Health Care: Help-Seeking

Evans and Stoddart indicate that accessing the health care system depends on perceiving a need and seeking care and services that are available to a population.⁷ When considering problem gambling, this portion of the population health model should be expanded to include help-seeking from services such professional counseling, therapy, or rehabilitation services, telephone gambling help lines, and self-help groups. When gambling becomes problematic, an individual may perceive a need for help with gambling problems, emotions, or mental health problems. Problems with gambling may then initiate help-seeking behaviour. Important characteristics of professional treatment services that are essential to consider include: proximity, confidentiality, cost, language, and special consideration for specific populations such as women gamblers. One study from Montreal indicated that from 2000 to 2004 the number of psychiatric emergency services used by individuals with severe gambling problems increased by over 50%.¹²⁶ Women are often reluctant to seek help for gambling problems.¹²⁷ As well, women may be more likely to seek help for emotional problems and not reveal their gambling issues, which identifies a need to screen for gambling problems among women seeking help for emotional problems.²³

Prosperity and Well-being

Prosperity refers to the concept of investing in health, which may have a positive impact on a population through increasing capacity to work and produce wealth within society.⁷ However, more investment in the health care system leads to less investment in other programs, such as social programs. These programs may be of benefit to problem gamblers, in particular to women. As well, the ultimate goal of Evan and Stoddart's population health model is not being free from disease, but having a sense of life satisfaction.⁷ Prosperity is a relevant theoretical component of a population health model, but is a challenging dimension to measure.

A Summary of the Conceptual Model for Understanding Problem Gambling among Women

The application of the Evans and Stoddart⁷ population health model provides a novel way to conceptualize and understand problem gambling and, in particular, problem gambling among women. Family history of gambling, an individual's exposure to gambling (low, moderate, high, severe), and social/psychosocial variables (age, income, education, marital status, social support, stress, and coping) are all important aspects for determining gambling behaviour. Excessive or out of control gambling behaviour can result in problem gambling and problem gambling may have an impact on health and functioning. The stress of problem gambling can deteriorate physical health and may induce stress related or comorbid illness. As well, problem gambling may be comorbid with other psychiatric disorders. The recognition of problem gambling may lead to perceived need for help and help-seeking behaviour. The strength of the conceptual framework is that it provides an overall understanding of problem gambling through the organization of important concepts and relationships. The application of the conceptual

framework helps to fill in knowledge gaps that currently exist in our understanding of problem gambling and problem gambling among women in the Canadian context. A detailed conceptual framework for understanding problem gambling based on the application of the population health model is presented in Figure 2.

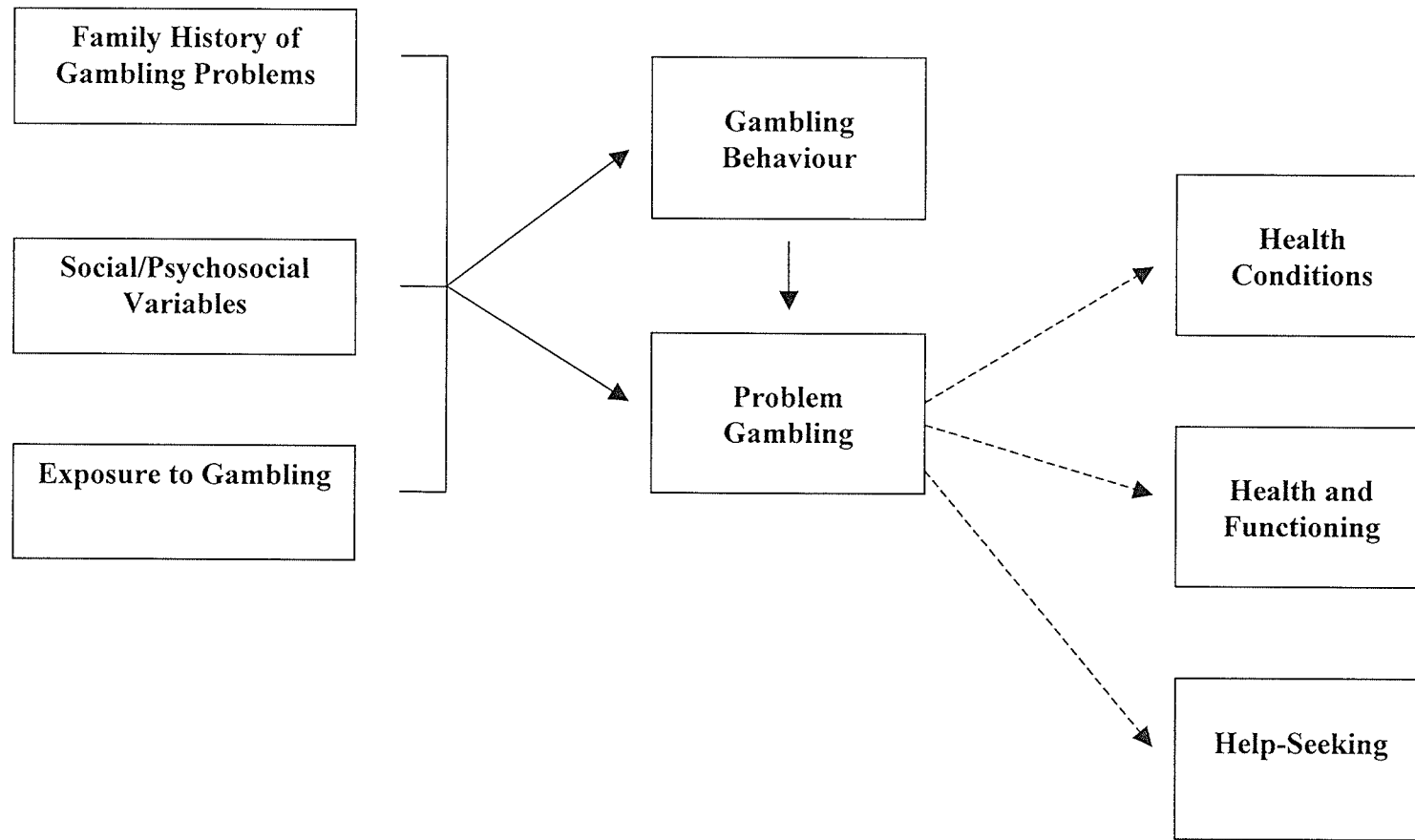


Figure 2: A conceptual framework for understanding problem gambling based on works by Evans and Stoddart (1990, 2003)

Research Objectives and Hypotheses

The overall objective of the current research is to identify correlates of problem gambling and important relationships between problem gambling and health and functioning, mental and physical health conditions, and help-seeking. The application of the population health model helps to identify and describe important variables (age, income, marital status, education, social support, stress, coping, exposure to gambling, and family history of problem gambling) (research objective 1, hypothesis 1) and how these variables are associated with at-risk gambling behaviour (research objective 2, hypothesis 2) and problem gambling among women (research objective 3, hypothesis 3). In addition, it is of interest to investigate how certain types of gambling activities are related to problem gambling among women in Canada (research objective 4, hypothesis 4). The next major part of the conceptual framework investigates correlates of problem gambling. In particular, what is the relationship between problem gambling and poor health and functioning (research objective 5, hypothesis 5), psychiatric disorders (research objective 6, hypothesis 6), physical health conditions (research objective 7, hypothesis 7), and perceived need for help and help-seeking (research objective 8, hypothesis 8)?

More specifically, the objectives of the current research were as follows:

- (1) To describe women problem gamblers and women non-problem gamblers in Canada with regard to social/psychosocial variables (income, education, age, marital status, social support, stress, and coping), an individual's exposure to gambling (low, moderate, high, and severe), family history of gambling, and gambling-related problems;

- (2) To understand the relationship between the social/psychosocial variables, an individual's exposure to gambling, and family history of gambling with at-risk gambling behaviour relative to no at-risk gambling behaviour among women in Canada;
- (3) To understand the relationship between the social/psychosocial variables, an individual's exposure to gambling, and family history of gambling with problem gambling relative to non-problem gambling among Canadian women;
- (4) To understand the relationship between types of gambling activities and gambling problems among women;
- (5) To understand the relationship between problem gambling among women and health and functioning outcomes;
- (6) To understand the relationship between problem gambling among women and occurrence of psychiatric disorders;
- (7) To understand the relationship between problem gambling among women and occurrence of chronic physical health conditions; and
- (8) To understand the relationship between problem gambling and the likelihood of perceived need for help and help-seeking among women in Canada.

Accordingly, it was hypothesized that:

- (1) Women problem gamblers would be different from women non-problem gamblers with regard to age, income, education, marital status, social support, coping, family history of gambling, exposure to gambling, and gambling-related problems;
- (2) Poor social/psychosocial variables, greater exposure to gambling, and family history of gambling would have statistically significant positive associations (i.e.

odds ratios above 1) with at-risk gambling behaviour (greater time and money spent on gambling) relative to no at-risk gambling behaviour (less time and money spent on gambling);

(3) Poor social/psychosocial variables, greater exposure to gambling, and family history of gambling would have statistically significant positive associations (i.e. odds ratios above 1) among women problem gamblers compared to women non-problem gamblers;

(4) Frequent play of all types of gambling would be associated with significantly increased odds of problem gambling relative to non-problem gambling among women;

(5) Problem gambling relative to non-problem gambling would be associated with significantly increased odds of poor health and functioning;

(6) Problem gambling relative to non-problem gambling among women would be associated with increased odds of psychiatric disorders;

(7) Problem gambling relative to non-problem gambling among women would be associated with significantly increased odds of chronic physical health conditions; and

(8) Problem gambling relative to non-problem gambling among women would be associated with significantly increased odds of perceived need for help and help-seeking.

A summary of the analytic strategy for understanding problem gambling among women in the Canadian context is presented in Table 2 and Figure 3. Equations for all statistical models are presented in Table 3.

Table 2: An Overview of the Current Analysis		
Phase 1: Descriptive statistics [Research objective 1 and hypothesis 1]		
<i>(a) Descriptive Statistics</i>	Calculate prevalence, mean and SE of social/psychosocial variables, exposure to gambling, family history of gambling problem, and gambling-related problems.	
Phase 2: Logistic regression analyses to understand at-risk gambling behaviour [Research objective 2 and hypothesis 2]		
<i>(a) Adjusted Models</i>	<i>Independent Variables</i>	<i>Dependent Variable</i>
	Income, education, age, marital status, social support, stress, coping, and exposure to gambling	At-risk gambling behaviour (Yes or No)
<i>(b) Calculate likelihood ratio χ^2 tests for the full model and partial models to identify the most concise model</i>		
Phase 3: Logistic regression analyses to understand problem gambling [Research objective 3 and hypothesis 3]		
<i>(a) Adjusted Models</i>	<i>Independent Variables</i>	<i>Dependent Variable</i>
	Income, education, age, marital status, social support, stress, coping, and exposure to gambling.	Problem gambling (Yes or No)
<i>(b) Calculate likelihood ratio χ^2 tests for the full model and partial models to identify the most concise model</i>		
Phase 4: Logistic regression analyses to understand gambling type and problem gambling [Research objective 4 and hypothesis 4]		
<i>(a) Adjusted Models</i>	<i>Independent Variables</i>	<i>Dependent Variable</i>
	Gambling type while adjusting for all significant independent variables from Phase 3a	Problem gambling (Yes or No)

Table 2 Continued: An Overview of the Current Analysis

Phase 5: Logistic or linear regression analysis to understand health and functioning, health conditions, and help-seeking domains*[Research objectives 5,6,7 & 8 and hypotheses 5,6,7 & 8]*

<i>(a) Unadjusted and Adjusted Models</i>	<i>Independent Variables</i>	<i>Dependent Variables (Health and Functioning)^a</i>
	Problem gambling (yes or no) Covariates in adjusted models include all significant independent variables from Phase 3a	(1) perceived general health (dichotomous) (2) psychological well-being (continuous scale) (3) distress (continuous scale) (4) suicidal ideation (dichotomous) (5) suicide attempts (dichotomous)
<i>(b) Unadjusted and Adjusted Models</i>	<i>Independent Variables</i>	<i>Dependent Variables (Health Conditions)^a</i>
	Problem gambling (yes or no) Covariates in adjusted models include all significant independent variables from Phase 3a	(1) each psychiatric disorder (dichotomous) (2) any psychiatric disorder (dichotomous) (3) >1 psychiatric disorder (dichotomous) (4) each physical condition (dichotomous) (5) any physical condition (dichotomous) (6) >1 physical condition (dichotomous)
<i>(c) Unadjusted and Adjusted Models</i>	<i>Independent Variables</i>	<i>Dependent Variable (Help-Seeking)^a</i>
	Problem gambling (yes or no) Covariates in adjusted models include all significant independent variables from Phase 3a	(1) perceived need for help (dichotomous) (2) professional help-seeking (dichotomous) (3) self-help meetings (dichotomous) (4) telephone help lines (dichotomous)

^aA separate regression was conducted for each dependent variable listed.

<p><u>Analysis phase one:</u> descriptive statistics of social/psychosocial variables, exposure to gambling, family history of gambling, and gambling-related problems</p>	<p><u>Analysis phase two:</u> logistic regression models <u>Independent variables</u> social/psychosocial variables, exposure to gambling, and family history of gambling <u>Dependent variable</u> At-risk gambling behaviour</p>	<p><u>Analysis phase three:</u> logistic regression models <u>Independent variables</u> social/psychosocial variables, exposure to gambling, and family history of gambling <u>Dependent variable</u> Problem gambling</p>	<p><u>Analysis phase four:</u> logistic regression models <u>Independent variables</u> gambling type and significant covariates from analysis phase three <u>Dependent variable</u> Problem gambling</p>	<p><u>Analysis phase five:</u> multinomial/logistic/linear regression models <u>Independent variables</u> problem gambling and significant covariates from analysis phase three <u>Dependent variables</u> From health and functioning, health conditions, and help-seeking domains.</p>
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Figure 3: An analytic strategy for understanding problem gambling

Table 3: Equations for the Current Analysis

Dependent Variable	Equations
Analysis Phase Two: Logistic Regression	$\hat{Y}_i = e^{A + B1X1 + B2X2 + \dots + BkXk} / 1 + e^{A + B1X1 + B2X2 + \dots + BkXk}$
At-Risk Gambling Behaviour	$\text{Prob(at-risk beh)} = \hat{Y}_i = e^{A + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Bcp (COPP) + Bcn (COPN) + Bexps1 (EXPOS1) + Bexps2 (EXPOS2) + Bexps3 (EXPOS3)} /$ $1 + e^{A + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Bcp (COPP) + Bcn (COPN) + Bexps1 (EXPOS1) + Bexps2 (EXPOS2) + Bexps3 (EXPOS3)}$
Analysis Phase Three: Logistic Regression	$\hat{Y}_i = e^{A + B1X1 + B2X2 + \dots + BkXk} / 1 + e^{A + B1X1 + B2X2 + \dots + BkXk}$
Problem Gambling	$\text{Prob(ProbGam)} = \hat{Y}_i = e^{A + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Bcp (COPP) + Bcn (COPN) + Bexps1 (EXPOS1) + Bexps2 (EXPOS2) + Bexps3 (EXPOS3)} /$ $1 + e^{A + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Bcp (COPP) + Bcn (COPN) + Bexps1 (EXPOS1) + Bexps2 (EXPOS2) + Bexps3 (EXPOS3)}$
Analysis Phase Four: Logistic Regression	$\hat{Y}_i = e^{A + B1X1 + B2X2 + \dots + BkXk} / 1 + e^{A + B1X1 + B2X2 + \dots + BkXk}$
Problem Gambling	$\text{Prob(ProbGam)} = \hat{Y}_i = e^{A + Bgamtyp (GAMTYPE) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Bcn (COPN)} /$ $1 + e^{A + Bgamtyp (GAMTYPE) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Bcn (COPN)}$

Table 3 Continued: Equations for the Current Analysis	
Dependent Variable	Equations
Analysis Phase Five (a): Logistic Regressions	$\hat{Y}_i = e^{A + B1X1 + B2X2 + \dots + BkXk} / 1 + e^{A + B1X1 + B2X2 + \dots + BkXk}$
Perceived General Health	$\text{Prob (PGenHth)} = \hat{Y}_i = e^{A + Bpg (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Bcn (COPN)} /$ $1 + e^{A + Bpg (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Bcn (COPN)}$
Suicidal Ideation	$\text{Prob (SI)} = \hat{Y}_i = e^{A + Bpg (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Bcn (COPN)} /$ $1 + e^{A + Bpg (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Bcn (COPN)}$
Suicide Attempts	$\text{Prob (SA)} = \hat{Y}_i = e^{A + Bpg (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Bcn (COPN)} /$ $1 + e^{A + Bpg (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Bcn (COPN)}$
Analysis Phase Five (a): Linear Regressions	$Y' = A + B_1X_1 + B_2X_2 + \dots + B_kX_k$
Psychological Well-Being	$(PSYWB)' = A + B_{PG} (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Bcn (COPN)$
Distress	$(DISTRESS)' = A + B_{PG} (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Bcn (COPN)$

Table 3 Continued: Equations for the Current Analysis

Dependent Variable	Equations
Analysis Phase Five (b): Logistic Regressions	$\hat{Y}_i = e^{A + B1X1 + B2X2 + \dots + BkXk} / 1 + e^{A + B1X1 + B2X2 + \dots + BkXk}$
Psychiatric Disorder	$\text{Prob (Psydx)} = \hat{Y}_i = e^{A + Bpg (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Ben (COPN)}$ $1 + e^{A + Bpg (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Ben (COPN)}$
Psychiatric Comorbidity	$\text{Prob (PsyCom)} = \hat{Y}_i = e^{A + Bpg (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Ben (COPN)}$ $1 + e^{A + Bpg (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Ben (COPN)}$
Physical Condition	$\text{Prob (PhyCon)} = \hat{Y}_i = e^{A + Bpg (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Ben (COPN)}$ $1 + e^{A + Bpg (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Ben (COPN)}$
Comorbid Physical Conditions	$\text{Prob (PhyCom)} = \hat{Y}_i = e^{A + Bpg (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Ben (COPN)}$ $1 + e^{A + Bpg (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Ben (COPN)}$

Table 3 Continued: Equations for the Current Analysis

Dependent Variable	Equations
Analysis Phase Five (c): Logistic Regressions	$\hat{Y}_i = e^{A + B1X1 + B2X2 + \dots + BkXk} / 1 + e^{A + B1X1 + B2X2 + \dots + BkXk}$
Perceived need for help	$\text{Prob (PN)} = \hat{Y}_i = e^{A + Bpg (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Bcn (COPN)} /$ $1 + e^{A + Bpg (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Bcn (COPN)}$
Professional Help-Seeking	$\text{Prob (PrHS)} = \hat{Y}_i = e^{A + Bpg (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Bcn (COPN)} /$ $1 + e^{A + Bpg (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Bcn (COPN)}$
Self-Help Groups	$\text{Prob (SHG)} = \hat{Y}_i = e^{A + Bpg (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Bcn (COPN)} /$ $1 + e^{A + Bpg (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Bcn (COPN)}$
Telephone Help Lines	$\text{Prob (THL)} = \hat{Y}_i = e^{A + Bpg (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Bcn (COPN)} /$ $1 + e^{A + Bpg (PROBGAM) + Ba1 (AGE1) + Ba2 (AGE2) + Ba3 (AGE3) + Ba4 (AGE4) + Ba5 (AGE5) + Ba6 (AGE6) + Bi1 (INCOME1) + Bi2 (INCOME2) + Bi3 (INCOME3) + Bi4 (INCOME4) + Be1 (EDUCA1) + Be2 (EDUCA2) + Be3 (EDUCA3) + Be3 (EDUCA4) + Bms1 (MARST1) + Bms2 (MARST2) + Bms3 (MARST3) + Bms4 (MARST4) + Bms5 (MARST5) + Bssi (SSINDEX) + Blst1 (LSTRS1) + Blst2 (LSTRS2) + Blst3 (LSTRS3) + Blst4 (LSTRS4) + Bcn (COPN)}$

Chapter V: Method

Data: The Canadian Community Health Survey Cycle 1.2 (CCHS 1.2)

The Canadian Community Health Survey (CCHS) is a national Statistics Canada survey that assessed the health and well-being of Canadians. The first cycle of the CCHS, conducted in 2000, was a survey of general health (CCHS 1.1).^{14, 15} Due to a recognized need to study mental health and well-being in Canada, the second cycle of the survey, the CCHS 1.2, had a mental health and well-being focus.¹²⁸ Data for the CCHS 1.2 were collected in 2002, using a random, multistage stratified cluster design to select private dwelling Canadian residents aged 15 years and older from 10 provinces.¹²⁹ Statistics Canada interviewers received additional training to increase their sensitivity to mental health issues and provide respondents information about local help services if requested.¹²⁸ Participants were informed about privacy, confidentiality, security, and the voluntary nature of the survey, and 94% agreed that the information they provided could be shared for research purposes.¹³⁰ Ethical approval for the current research was also obtained from the Health Research Ethics Board at the Bannatyne Campus at the University of Manitoba. The CCHS 1.2 master data file was used for the current analysis. Data were accessed at the British Columbia Inter-University Research Data Centre at the University of British Columbia in Vancouver.

Advantages of the CCHS 1.2 Data for the Current Research

The main advantages of using the CCHS 1.2 dataset for studying problem gambling among women in Canada are the representative survey design, large sample size, inclusion of the Canadian Problem Gambling Index (CPGI) as the measure of gambling, and the inclusion of several important health and functioning correlates.

Survey Design

There are numerous benefits of utilizing the CCHS 1.2 to study problem gambling among women. To begin, the CCHS 1.2 contains reliable comprehensive national data on mental health and well-being representative at the provincial level in Canada.¹²⁸ Before the CCHS 1.2, representative data on problem gambling in Canada did not exist. Therefore, the CCHS 1.2 provides the first opportunity to study problem gambling and specifically problem gambling among women in Canada. As well, the data were collected in 2002, following the large-scale expansion of gambling in Canada, making the data contemporary and highly relevant to today's Canadian society.

Another major benefit of using the CCHS 1.2 data for studying problem gambling among women is the large sample size ($n = 36,984$; women = 20,211), which is important for several reasons. First, Cox et al.¹³ indicated that 2.0% of Canadians experienced moderate to severe gambling problems. Although problem gambling has been identified as an important public health concern,^{1, 2} the prevalence of problem gambling is relatively low. Therefore, the large sample size of the CCHS 1.2 is necessary to conduct a meaningful quantitative analysis on women problem gamblers using advanced statistical techniques. Also, the data allows for the first comprehensive nationally representative investigation of problem gambling among women in Canada.

Measurement of Variables in the CCHS 1.2

Problem gambling

Another advantage of using the CCHS 1.2 data for studying problem gambling among women is the inclusion of the Canadian Problem Gambling Index (CPGI) for measuring gambling and gambling-related problems. The CPGI was developed to create a new assessment tool that would include indicators of social and environmental

factors of gambling and gambling problems.¹⁶ The CPGI operationally defines problem gambling as “gambling behaviour that creates negative consequences for the gambler, others in his or her social network, or for the community” (p.18).¹⁶ The CPGI is useful not only for identifying individuals with the most severe levels of gambling problems, but, also, to further our understanding of moderate levels of gambling problems in the community. The CPGI includes three main sections: gambling involvement, problem gambling assessment, and gambling-related problems.⁸⁹ As well, in an effort to evaluate non-traditional gamblers such as women, items assessing social environment were carefully developed and included as part of the index to capture typically under-represented populations.^{16, 89} Therefore, the CPGI contains 31 items, nine of these items are used to understand prevalence and have been through psychometric testing, while the remaining 22 items assess the social and environmental context and correlates of gambling.¹⁶

When studying problem gambling in a Canadian community sample, the CPGI is a superior tool relative to other instruments for assessing gambling problems, such as the Diagnostic Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) criteria⁸⁷ or South Oaks Gambling Screen (SOGS).⁸⁸ The DSM criteria and SOGS were both designed to identify problem gambling in clinical samples, while the CPGI was developed to assess problem gambling in a general Canadian population. It has been stated that the CPGI relative to the SOGS, provides a more holistic view of problem gambling.¹³¹ However, the CPGI was still found to be highly comparable with the DSM-IV criteria and the SOGS.¹⁶ The CPGI allows the researcher to investigate gambling from a broader perspective without placing sole focus on problem gambling

behaviour. The broader focus of the CPGI corresponds with a needed public health approach for conducting gambling research.

Correlates of problem gambling

Another significant advantage of using the CCHS 1.2 data is the inclusion of important correlates that are especially relevant for studying problem gambling among women. Several DSM-IV diagnoses were included in the CCHS 1.2.¹²⁸ Since internalizing disorder are more prevalent than externalizing disorders among women,¹³² the inclusion of multiple mood and anxiety disorder in the CCHS 1.2 is distinctly relevant to a sample of women. As well, there is a paucity of research on the health and functioning of women problem gambling. For example, very little information is available on the relationship between problem gambling among women and important health variables such as perceived general health, psychological well-being, distress, suicidal ideation and attempts, chronic physical health conditions, and help-seeking. The inclusion of these variables in the CCHS 1.2 has allowed for the investigation of these relationships for the first time using a representative Canadian sample.

Limitations of the CCHS 1.2 Data for the Current Research

Although the CCHS 1.2 provides a unique opportunity to study problem gambling among women in Canada for the first time, there are some limitations of the data. The limitations of using the CCHS 1.2 include the cross-sectional nature of the data, the use of already collected data, the exclusion of people living in First Nations communities, measuring gambling behaviour using self-reports, the inability to compare prevalence of gambling problems to other countries, and the exclusion of some psychiatric disorders.

Cross-Sectional Data

The CCHS 1.2 data are cross-sectional. With cross-sectional surveys, data are collected from respondents at one point in time.¹³³ With regard to the CCHS 1.2, all data were collected in 2002. There are some drawbacks to using cross-sectional data. First, with cross-sectional designs, causal relationships cannot be determined because information on the independent and dependent variable are collected from the same individual concurrently.⁴⁵ This indicates that a temporal sequence of events cannot be established. Therefore, it is not accurate to conclude that problem gambling causes an outcome even though significant relationships may be found. It can only be stated that an association between problem gambling and the outcome variable exists. Second, since cross-sectional surveys only collect data at one time point, changes or trends over time cannot be studied. Therefore, it is not possible to determine if problem gambling among women has improved, worsened, or remained the same since the widespread expansion of gambling in Canada. Finally, as with all cross-sectional studies, the current investigation is only able to calculate the prevalence and not the incidence of problem gambling.

Analysis of Already Collected Data

Another limitation of using the CCHS 1.2 is that Statistics Canada previously collected the data in 2002. This means that the statistical analysis was limited to the information already in the data, which provided no flexibility to ask the respondents different questions or in anyway change how questions were asked. Likewise, who was included, or perhaps more importantly, who was excluded from the study sample, was also predetermined and could not be modified. However, it should be noted that data on

gambling in the CCHS 1.2 were collected for the purpose of furthering our understanding of problem gambling within the Canadian context.

The Exclusion of People Living in First Nations Communities

First Nations individuals not living within First Nations communities are included in the CCHS 1.2. However, a limitation with the CCHS 1.2 and most Statistics Canada surveys is the exclusion of individuals living in First Nations communities. It is important to recognize this drawback in the data since many individuals live in First Nations communities, especially in certain provinces such as Manitoba.

Self-Reported Gambling Behaviour

A possible limitation of the CCHS 1.2 survey is that the respondents provided information on their gambling behaviour through self reports. Although gambling research depends on the self-reported techniques of measuring gambling behaviour, it may be questioned if problem gamblers can be trusted to accurately report their gambling activities. A study using three clinical samples of problem gamblers investigated the reliability and validity of self-reported gambling behaviour.¹³⁴ Results from the study determined that days gambled and money spent on gambling over a six month timeframe were reliable and good agreement of gambling behaviour was found between problem gamblers self-reported behaviour and a secondary respondent. The authors of the study conclude that self-reported gambling among problem gamblers is a reliable and valid research technique.

The Inability to Compare Prevalence of Gambling Problems to Other Countries

Although, the CPGI is an informative tool for studying problem gambling among women in Canada, the use of the tool does have one important limitation. The CPGI is a new tool and to date has only been used in a few research studies, all of

which used small Canadian samples. Studies from other countries have mostly used DSM criteria or SOGS as a tool for understanding prevalence of gambling problems. The use of different tools for measuring problem gambling introduces the inability to readily compare prevalence of gambling problems across studies and between countries. However, even though DSM criteria and SOGS have been widely used in the gambling literature, it seems that they are not the best tools for studying problem gambling in general population surveys because they were developed using clinical samples and have been validated only in clinical samples.³² Unlike DSM criteria and SOGS, the CPGI was developed and validated using several general Canadian population samples.⁸⁹ Noteworthy, however, is that items from the DSM criteria and SOGS were used to guide the development of the CPGI. The CPGI was determined to be highly correlated with the DSM-IV criteria and the SOGS at 0.83.¹⁶ Furthermore, in a recent study, the current mean prevalence of gambling problems was calculated from epidemiologic studies published worldwide between 2000 and 2005 and determined the three instruments produced very similar estimates of gambling problems (SOGS = 3.0%; DSM-IV criteria = 3.1%; CPGI = 3.3%).¹³⁵

The CPGI may limit comparability with other studies using DSM criteria and SOGS, but it is important to remember that the current investigation is the first study from any country to examine problem gambling exclusively among women using a nationally representative sample. Therefore, to date, no studies on problem gambling study among women exists that could be readily compared to the current investigation of problem gambling among women using the CCHS 1.2 and the CPGI.

Exclusion of Several Psychiatric Disorders

Although the CCHS 1.2 does include several psychiatric disorders, some important psychiatric disorders such as general anxiety disorder (GAD), obsessive-compulsive disorder (OCD), and post-traumatic stress disorder (PTSD) were not assessed. Such disorders have been found to be prevalent among women.¹³⁶⁻¹³⁸ In addition, past research has found important associations between gambling and GAD,⁹⁸ OCD,⁹⁷ and PTSD.¹³⁹ Finally, due to an error in data collection, the CCHS 1.2 was only able to assess alcohol dependence and not alcohol abuse.¹⁴⁰ Future Canadian surveys should include a broader coverage of psychiatric disorders.

Sample Used for the Current Analysis

The total sample size of the CCHS 1.2 was 36,984 with a response rate of 77%.¹²⁸ The response rate for the CCHS 1.1 data was 84.7%.¹²⁸ It may be speculated that the response rate was lower for the CCHS 1.2 due to the more sensitive nature of the data, which included the focus on mental health and well-being. However, the response rate of the CCHS 1.2 is still considered to be successful. To account for the potential bias of persons who could not be contacted or those refusing to participate in the survey, Statistics Canada applied an adjustment to the weight variable for study participants to compensate for those who did not respond.¹⁴¹ Statistics Canada has indicated that the item non-response for the CCHS 1.2 was low with often less than 0.1% of missing data noted.¹⁴² CCHS 1.2 data were representative of the general population of Canada at the provincial level.¹²⁸ Women participants aged 15 years and older (n = 20,211) were selected from the CCHS 1.2 for the current analysis. The number of women from each province is presented in Table 4.

Table 4: Number of Women Aged 15 Years and Older From Each Province	
Province	Unweighted n ^a
Newfoundland	886
Prince Edward Island	541
Nova Scotia	1,626
New Brunswick	989
Quebec	2,901
Ontario	7,137
Manitoba	1,232
Saskatchewan	1,068
Alberta	1,760
British Columbia	2,071
Total	20,211

^aUnweighted n based on public use microdata file.

Measures Used for the Current Analysis

An Overview of Analytic and Measurement Strategy

With regard to the level of measurement of the variables in the CCHS 1.2, continuous level measurement was retained whenever possible. If the distributions of the continuous level variables were highly skewed, appropriate transformations of the variable were performed and the distribution of the variable was re-inspected to ensure the transformation resulted in an improved distribution. It should be noted that when transformations are performed on variables the original meaning of the metric scale is lost and the interpretation of the result is then based on the transformed metric. The disadvantage of transforming variables is that the interpretation of the result may become difficult to understand.¹⁴³

For variables in the CCHS 1.2 with pre-determined categories, to avoid loss of information, the largest numbers of categories were retained whenever possible. However, when expected frequencies were too small it was necessary to collapse categories for variable with more than two levels.¹⁴³ This is a recommended statistical strategy for collapsing categorical variables.¹⁴³ Each measurement decision was made on a variable by variable basis and is discussed in detail below. All cell counts strictly adhered to Statistics Canada's minimum cell count requirements.

Social/Psychosocial Variables

Income

Household income was measured in Canadian dollars in several categories. Due to small cell counts, income levels were collapsed into the following five categories: (1) zero to \$14,999; (2) \$15,000 to \$29,999; (3) \$30,000 to \$49,999; (4) \$50,000 to \$79,999; and (5) \$80,000 or more.

Education

Educational attainment was measured in several categories. However, due to small cell counts, the following five education categories were created: (1) less than high school; (2) high school graduate; (3) some post secondary; (4) trade, college, university diploma or certificate; and (5) university degree.

Age

Age was measured in 14 categories based on five year intervals starting from 15 to 19 years and ending with 80 years or more. Due to small cell counts age was collapsed into seven categories including: (1) 15 to 19 years, (2) 20 to 29 years, (3) 30 to 39 years, (4) 40 to 49 years, (5) 50 to 59 years, (6) 60 to 69 years, and (7) 70 years or older.

Marital status

Marital status was measured in six categories: (1) married, (2) common law, (3) widowed, (4) separated, (5) divorced, and (6) never-married.

Social support

The four measures of social support included in the CCHS 1.2 were from the Medical Outcomes Study (MOS) and include indicators of: emotional or informational support (availability of advice, guidance, feedback, and empathy), tangible support (provision of material aid or behavioural assistance), positive social interaction (availability of fun social relationships), and affection (availability of loving and affectionate relationships).^{140, 144} The social support scales were measured at a continuous level. Scores for emotional or information support, tangible support, positive social interaction, and affection ranged from zero to 32, zero to 16, zero to 16, and zero to 12, respectively.

Stress

Stress was measured in the CCHS 1.2 with an item asking the respondents to assess the amount of daily stress in their lives using an ordinal scale including the following response categories: (1) not at all stressful, (2) not very stressful, (3) a bit stressful, (4) quite a bit stressful, and (5) extremely stressful.

Coping

Fourteen variables were used in the CCHS 1.2 to understand the respondents coping strategies. The respondents were asked the frequency (often, sometimes, rarely, never) at which they used the coping strategy to deal with a stressful situation. The coping strategies included: problem solving, talking to others, jogging or exercising, praying or seeking spiritual help, doing something enjoyable to relax, looking on the bright side, avoiding being with other people, sleeping more than usual, eating more or less than usual, smoking more cigarettes than usual, drinking alcohol, using drugs or medications, blaming oneself, and wishing the problem would go away. A factor analysis was conducted on the 14 coping variables to determine if these variables could be reduced to a smaller number of factors. Tabachnick and Fidell's instructions for reducing a larger number of variables to a smaller number of factors were used as a guide for the analysis.¹⁴³

First, a Principal components extraction with varimax rotation was used to estimate the number of factors from the eigenvalues. The number of eigenvalues above one specifies the maximum number of possible factors in the solution. The first five initial eigenvalues were: 2.26, 1.83, 1.19, .99, and .98, respectively. The first three eigenvalues were above one indicating that three factors would be the maximum number of possible factors. The first two eigenvalues were close to two, while the third

eigenvalue dropped to just above one. An assessment of the eigenvalues suggested that there were probably two, but maybe three factors in the data. Although, selecting all eigenvalues greater than one would likely result in an overestimation of factors. The scree plot visually indicated a change in slope between the second and third factor suggesting that the solution may contain two factors. When investigating the factor loadings, two variables (alcohol use and jogging or exercising) were considered to be complex since they loaded on more than one factor. In addition, only two variables loaded on the third factor. The two variables loading on the third factor were smoking more than usual and praying or seeking spiritual advice. Conceptually it does not seem likely that these two variables would load on the same factor. Tabachnick and Fidell indicate that factors that have only one or two variables loading on them may not be reliable and interpretation of these variables could be hazardous.¹⁴³ To test if this third factor was reliable, the correlation between smoking more than usual and praying or seeking spiritual advice would need to be high. The correlation between these two variable proved to be very low ($r = -0.1$), indicating that the third factor is likely unreliable and a two factor model may be a better solution for the data.

Second, Principal factors extraction specifying two factors with varimax rotation was preformed on the 14 coping variables. The Principal factors extraction was conducted to verify if a two factor solution was the best number of factors. Again, the eigenvalues for the first two factors after rotation were 2.23 and 1.83, respectively. With a minimum cutoff value of .32 for inclusion of a variable in the interpretation of a factor,¹⁴³ only one of the 14 coping variables did not load on either factor. All other variables were pure variables that clearly loaded on only one factor, supporting the two factor extraction. More specifically, eight of the 14 items clearly loaded on factor one

with the factor loadings ranging from .33 to .61. The underlying construct of this factor was negative coping strategies as defined through the following variables: avoiding people, sleeping more than usual, eating more or less than usual, blaming oneself, wishing the problem would go away, smoking more than usual, drinking alcohol, and using drugs or medication. Five of the 14 items clearly loaded on factor two with the factor loadings ranging from .47 to .66. The underlying construct of this factor was positive coping strategies as defined through the following variables: problem solving, talking to others, jogging or exercising, doing something enjoyable to relax, and looking on the bright side. Praying or seeking spiritual advice was the only variable that had factor loadings below the recommended minimum cut point of .32 (factor loading of 0.04 on factor one and factor loading of 0.29 on factor two) and, therefore, did not load on either factor.

Finally, a parallel analysis was also conducted to confirm the accuracy in the number of factors that should be retained.¹⁴⁵ The parallel analysis using mean and 95th percentile eigenvalues¹⁴⁶ confirmed a two factor solution for the 14 coping variables. Table 5 provides the factor loadings of variables on the two factors organized using the size of factor loadings for each factor. The underlying constructs of the two factors were labeled as negative coping strategies and positive coping strategies.

Before the negative and positive coping strategies variables were computed, all 13 coping variables were recoded so that a response of never was equal to zero, rarely equal to one, sometimes equal to two, and often equal to three. Since praying or seeking spiritual advice did not load on either factor, it was not used in the compute of the coping strategies variables. With these recodes, the range of scores for the negative coping strategies variable and the positive coping strategies variable were zero to 24

and zero to 15, respectively. High scores for the negative coping strategies variable reflect unhealthy coping, while high scores for the positive coping strategies variable correspond to healthier coping skills. To compute the negative and positive coping strategies variables the appropriate variables as identified through the factor analysis were added together. The distribution of the two newly computed continuous level variables were inspected and were found to have a normal distribution.

Exposure to Gambling

Exposure to gambling was assessed based on the availability of gambling in the Canadian context when the CCHS 1.2 data were collected. Exposure to gambling was based on two criteria, the concentration of VLTs outside of casinos (high concentration, low concentration, or no VLTs available outside of casinos) and the presence or absence of a permanent casino in the individual's province of residence. Many provinces had similar levels of availability of gambling (e.g. Manitoba, Saskatchewan, and Nova Scotia). However, it is not the specific province that is of interest in the current research. Theoretically, what is of interest is an individual's exposure to gambling based on the concentration of VLTs outside of casinos and the presence or absence of a permanent casino. An individual's exposure to gambling and the province of residence will be related, but they are not simply equivalent measures. Exposure to gambling was measured using an ordinal scale with increasing severity of exposure (i.e. the more readily available gambling is for the individual the higher the rating of the individual's exposure). An individual's exposure to gambling is assessed as low (presence of permanent casinos only), moderate (low concentration of VLTs outside casinos and the presence of a permanent casino), high (high concentrations of VLTs

Table 5: Factor Loadings for Principal Factors Extraction and Varimax Rotation of the Coping Variables among Women Problem and Non-Problem Gamblers in the CCHS 1.2		
Variable	Factor 1 (Negative Coping Strategies)	Factor 2 (Positive Coping Strategies)
Avoiding others	.61	-.14
Sleeping more than usual	.60	-.02
Blaming oneself	.60	.09
Eating more or less than usual	.57	.04
Drinking alcohol	.47	.09
Wishing problems away	.46	.10
Using drugs or medications	.40	-.05
Smoking more than usual	.33	-.06
Doing something enjoyable	-.03	.66
Looking on the bright side	.28	.61
Problem solving	-.02	.59
Talking to others	-.01	.56
Jogging or exercising	.18	.47
Praying	.04	.29

Bold font indicates on which factor the variable loaded.

Italicized font indicates no loading on either factor.

outside casinos only), or severe (high concentration of VLTs outside casinos and the presence of a permanent casino).^b

Family History of Gambling Problems

Family history of gambling was measured in the CCHS 1.2 with an item asking the respondents if anyone in their family has *ever* had a gambling problem.

Gambling Behaviour

The Canadian Problem Gambling Index (CPGI) was used in the CCHS 1.2 to measure gambling and gambling-related problems in the past 12 months. The measure includes nine items used to determine level of gambling problems, as well as additional items that inquire about the frequency of specific gambling activities, amount of money spent on gambling, and gambling-related problems such as lying to friends and family about gambling. The additional items are used for descriptive information and are not calculated into the CPGI gambling score. These additional items are used in the current research to understand gambling activity and gambling-related problems. A description of the additional CPGI items is provided first, followed by a description of the scored CPGI items used to calculate problem gambling.

^b Ordinal, categorical, and dummy coding were all considered, but the same conclusions were found regardless of how the variable was coded. Ordinal coding was retained because it was in keeping with theory that indicates that increased exposure to gambling corresponds with increased problem gambling. Ordinal variables are quite often entered into regression equations as if they were effectively continuous variables. In effect, this approach is implying that the steps along the ordinal scale are consistent and equal. This is likely a reasonable approximation of the truth, but certainly not in the sense of a continuous scale where you are absolutely certain of equal linear increases.

Frequency and type of gambling activities

The frequencies of 13 different gambling activities in the past 12 months were assessed in the CCHS 1.2. The 13 gambling activities included: (1) instant win, scratch tickets, or daily lotteries, (2) lottery tickets, (3) bingo, (4) cards or board games played with family or friends, (5) VLTs outside of the casino, (6) coin slots or VLTs inside the casino, (7) casino games other than VLTs, (8) internet or arcade gambling, (9) horse racing, (10) sport lotteries, (11) stock market, (12) games of skill such as golf or pool, and (13) other gambling such as dog racing. Respondents were asked how often they participated in each gambling activity: daily, two to six times per week, once a week, two to three times per month, once a month, six to 11 times per year, one to five times per year, or never. Due to low cell counts, the response categories for all types of gambling needed to be collapsed into fewer categories. However, it should be noted that the largest number of categories were retained for all variables. Instant win tickets, lotteries tickets and bingo were collapsed into six categories including: (1) never, (2) one to five times per year, (3) six to 11 times per year, (4) one to three times per month, (5) once a week, and (6) several times per week to daily. Cards or board games, VLTs outside of a casino, and VLTs inside a casino were collapsed into five categories including: (1) never, (2) one to five times per year, (3) six to 11 times per year, (4) one to three times per month, and (5) weekly or more. Casino games other than VLTs was collapsed into three categories: (1) never, (2) one to 11 times per year, and (3) once a month or more. Finally, due to low frequency of play among women, past 12 month participation in internet gambling, horse racing, sport lotteries, stock market betting, games of skill, and other gambling were all dichotomized into either yes or no categories.

In addition to investigating each type of gambling activity measured using an ordinal scale; an additional variable was created to assess the frequency of any type of gambling activity. Based on harm reduction research attempting to develop working guidelines for responsible gambling, it was suggested that gambling should not exceed two to three times per month.^{83, 84} Therefore, a high frequency of any type of gambling activity variable was computed to indicate gambling once a week or more on any gambling activity with the exception of the highly common activity of buying weekly lottery tickets and instant win tickets.

Amount of money spent of gambling

Respondents were asked to indicate how much money (excluding winnings) they spent on gambling activities in the past 12 months based on six categorical responses including: (1) \$1 to \$50, (2) \$51 to \$100, (3) \$101 to \$250, (4) \$251 to \$500, (5) \$501 to \$1000, and (6) more than \$1000. Based on empirical findings, it has been suggested that responsible gambling guidelines requires spending no more \$501 to \$1000 per year on gambling and/or no more than 1% of total gross annual household income.^{83, 84} Although the actual dollar amounts spent on gambling were not assessed in the CCHS 1.2, an estimate of the percent of gross annual household income spent on gambling can be calculated using the mid-points of all six categories of dollars spent on gambling in the past 12 months divided by gross annual household income. Spending more than \$1000 per year and/or spending more than approximately 1% of total gross annual household income was considered at-risk spending on gambling activities.

At-risk gambling behaviour

An overall at-risk gambling behaviour variable was computed based on frequency of gambling and amount of money spent annually on gambling.^{83, 84}

Individuals indicating gambling once a week or more on any type of gambling activity (excluding lottery and instant win tickets) and/or spending more than \$1000 per year or more than an estimated 1% of their total gross annual household income were considered having at-risk gambling behaviour.

Gambling-related problems

In addition to the gambling items asked to assess level of gambling problems (discussed below), several other questions were also asked to understand gambling-related problems. The gambling-related problems that were not scored as part of the CPGI score included: (1) spent more than you wanted to on gambling, (2) lied to family or others or hid gambling, (3) wanted to stop gambling but didn't think you could, (4) unable to cut down or quit gambling, (5) gambled to forget about problems or deal with depressed feelings, and (6) gambling has caused problems with relationship with family and friends. Respondents indicated whether gambling-related problems did or did not occur in the past 12 months.

Problem Gambling

The valid and reliable Canadian Problem Gambling Index (CPGI) was used to assess past 12 month prevalence of problem gambling in the CCHS 1.2. The CPGI is a well-developed tool that was created specifically for assessing problem gambling in general population samples in Canada and has been through extensive psychometric testing during its developmental phases.^{16, 89} The first development phase included a thorough review of the literature and consultations with experts in the gambling field to determine how gambling should be conceptualized, defined, and measured.¹⁶ The second phase of development included validity and reliability testing using a pilot test of 143 Canadians, a general population survey of 3,120 Canadians, a re-test sample of

417 respondents from the general population survey, and clinical validation interviews of 143 respondents from the general population survey.¹⁶

To confirm the internal consistency of CPGI (a measure of the reliability of the nine CPGI items), the Cronbach's alpha was computed ($\alpha = 0.84$) and was determined to have good reliability.⁸⁹ Reliability of the CPGI was also measured using test-retest method, which confirmed high correlation of CPGI scores when the respondent repeated the test three to four weeks after the original assessment ($r = 0.78$).⁸⁹ Validity of the CPGI was measured using an assessment of content validity (confirmation that the CPGI items reflected problem gambling according to gambling experts), criterion-related (concurrent) validity, and construct validity.⁸⁹ The criterion-related validity determined that the CPGI was highly correlated with DSM-IV criteria ($r = 0.81$) and with SOGS ($r = 0.80$), which indicates that the CPGI classification of respondents is consistent with classification using other scales.⁸⁹ Finally, construct validity, a indicator of how well the measure corresponds with theory¹³³ (i.e. higher CPGI scores correspond with greater time and money spent on gambling), was confirmed using CPGI scores and several indicators of gambling behaviour.⁸⁹

The CPGI uses the following nine items to assess level of gambling problems: (1) wagered larger amounts to get the same feeling of excitement, (2) tried to win back losses, (3) borrowed money or sold something to get money for gambling, (4) felt you might have a problem with gambling, (5) gambling caused health problems including stress and anxiety, (6) been criticized for your betting or told that you have a problem, (7) gambling has caused financial problems, (8) felt guilty about gambling, and (9) bet more than you could afford to lose. The respondent was asked to indicate how frequent each of the above behaviours or problems occurred in the past 12 months: never,

sometimes, most of the time, or almost always. Statistics Canada calculated the CPGI scores. The conventional use of the CPGI in the gambling literature is to examine problem gambling using the cutoff points in CPGI rather than using the continuous level of measurement. Based on extensive psychometric testing of the CPGI, break points have been identified and used to divide individuals into four gambling categories: non-problem gambler (score of zero), low risk gambler (score of one to two), moderate risk gambler (score of three to seven), and severe risk gambler (score of eight or more).⁸⁹ The developers of the CPGI indicate that scores of three to seven reflect significant risk, that may or may not already be accompanied by adverse consequences related to gambling and scores of eight or higher identify individuals with the most severe gambling problems who are experiencing adverse consequences of gambling and may have already lost control of their behaviour.¹⁶ The cutoff points for problem gambling for the CPGI have proven to have good sensitivity (78% based on clinical interviews and 83% based on DSM-IV criteria) and specificity (100% based on clinical interviews and DSM-IV criteria).⁸⁹

The conventional approach of epidemiologic researchers is to compare the two most extreme gambling groups (moderate risk and severe risk) versus all other gamblers (non-problem and low risk gamblers).^{13, 16, 83, 118, 147-149} This approach in gambling research is considered advantageous since it has been stated that although clinical cases of pathological gambling are important (severe risk), problem gambling within the community has a broader impact on society and knowledge of problem gambling within Canada is limited.¹⁶ From a public health perspective it is appropriate to the study problem (moderate risk) and probable pathological gamblers (severe risk)

as one group and distinction between groups is only necessary for detailed clinical investigations.¹³⁵

As well, Ferris and Wynne note in the CPGI user manual that the CPGI produces a very skewed distribution indicating that a divide between non-problem gamblers and problem gamblers can be relatively easy to capture in the data.⁸⁹ When two distinct groups can be detected in the data, dichotomizing the distribution is considered a justified methodological approach.¹⁵⁰ In addition, from a statistical standpoint, it may be necessary to use the conventional dichotomous problem gambling variable since experts have indicated that when using highly skewed variables, it is often the case that no transformation will improve the skewness and the best option then is to dichotomize the variable.^{143, 151} The CPGI scores among women were investigated in the CCHS 1.2 and confirmed that the continuous level variable had extreme skewness (9.12; SE = 0.001) and kurtosis (106.04; SE = 0.002) values far from zero. Numerous transformations were applied to the CPGI score, but no transformation was able to correct for the highly non-normal skewed and peaked distribution confirming that dichotomization of this variable is the best statistical approach.

Furthermore, from a public health perspective, measuring problem gambling based on dichotomous cutoff points has important implications for policy through facilitating the translation of important findings. Statistics Canada and policy makers use the terms problem gambling and non-problem gambling based on the CPGI cutoff points and are interested in the problem gambling cutoff level rather than the amount of variance that can be accounted for with each one point increase in CPGI scores. Therefore, the conventional approach of investigating problem gamblers (CPGI score of three or greater) versus non-problem gamblers (CPGI score of zero to two) based on

CPGI cutoff points is an informative and best strategy for studying problem gambling among women in the current research.

It is also important to note that from a public health perspective, understanding differences between women with gambling problems versus women who gamble but do not develop problems is essential to inform healthy public policy. For this reason, when examining problem gambling in the current research women problem gamblers (scoring three or greater on the CPGI) were compared to women non-problem gamblers (scoring zero to two on the CPGI) and women who did not participate in gambling activities in the past 12 months were excluded from these analyses. This approach of removing non-gamblers has been used in other epidemiological research on problem gambling.^{119, 152} However, this approach will result in lower effect sizes since the potentially healthiest women (i.e. women who do not gamble at all) are not included in the non-problem gambling group.

Health and Functioning

Perceived general health

Perceived general health was measured in the CCHS 1.2 as an ordinal variable which asked the respondents in general how they would rate their health: excellent, very good, good, fair, or poor. Due to small cell counts the responses of fair and poor were collapsed into one response category.

Psychological well-being

Past month psychological well-being was measured in the CCHS 1.2 using the Raymond Masse's Psychological Well-Being Manifestation Scale (WBMMS).^{140, 153} A psychological well-being score was calculated based on 25 items measuring self-confidence, satisfaction with accomplishments, emotional balance, ambitions,

participation in fun activities, feeling loved and appreciated, life enjoyment, ability to solve problems, positive peer friendships, feeling healthy, and having a good morale. The psychological well-being manifestation scale scores ranged from four to 100, with higher scores indicating better psychological well-being.¹⁴⁰

The distribution of this variable was found to have a somewhat non-normal negatively skewed distribution (skewness = $-.901$, $SE = 0.001$; kurtosis = 0.801 , $SE = 0.001$). For the best results, negatively distributed variables require a transformation involving a reflect. To perform a reflect on a variable a constant value equal to the largest score plus one is subtracted from the respondents scores.¹⁴³ It should be noted that when a reflect is performed the interpretation of high and low scores are reversed. A reflect and square root and a reflect and logarithm transformations were performed on the psychological well-being manifestation scale. An investigation of the transformed variables including the use of normality plots determined that the reflect and square root transformation provided the best transformation of the psychological well-being variable, which produced a relatively normal distribution (skewness = 0.032 , $SE = 0.001$; kurtosis = $-.624$, $SE = 0.001$). The newly transformed reflect and square root psychological well-being manifestation scale had scores ranging from one to 9.85 with higher scores indicating poorer psychological well-being.

Distress

Past month distress was measured in the CCHS 1.2 using the K10 distress scale.¹⁵⁴ Statistics Canada generated a distress score based of responses to 10 items inquiring about the respondent's levels of nervousness, hopelessness, restlessness, sadness, and worthlessness. The distress scores ranged from zero to 40 with higher scores indicating greater distress. The K10 distress scale had a positively skewed non-

normal distribution (skewness = 1.72, SE = 0.001; kurtosis = 3.86, SE = 0.001). Two transformations, a square root and logarithm, were performed on the distress variable. An investigation of the transformed variables including the use of normality plots determined that the square root transformation produced the most normal distribution (skewness = 0.184, SE = 0.001; kurtosis = -0.165, SE = 0.001). The scores of the newly transformed square root distress variable had a range of zero to 6.32 with higher values still indicating greater levels of distress.

Suicidal ideation and attempts

Past year suicidal ideation and attempts were measured using two separate dichotomous variables asking if the respondent (1) seriously thought about committing suicide or taking one's own life and (2) asking if the respondent did attempt suicide or try to take one's own life (yes or no).

Health Conditions

Psychiatric disorders

Past 12 month prevalence of DSM-IV psychiatric disorders⁸⁷ were assessed using the highly valid and reliable Composite International Diagnostic Interview (CIDI).^{155, 156} The psychiatric disorders assessed include: major depression, mania, panic attacks, social phobia, agoraphobia, alcohol dependence, and drug dependence. However, it should be noted that alcohol dependence was based on the CIDI short form scale and DSM-III-R criteria.¹⁴⁰ A dichotomous variable indicating having any disorder was computed. In addition, psychiatric comorbidity was also measured using a dichotomous variable indicating the presence or absence of having two or more of the aforementioned psychiatric disorders.

Chronic physical health conditions

All participants of the CCHS 1.2 were asked if they had been given a diagnosis from a health care professional for several specified chronic physical conditions. A few conditions were excluded because they were not asked of all the study respondents (i.e. cataracts) or because the number of women endorsing the disorder was too small for statistical analysis (i.e. epilepsy). In total, 17 chronic physical health conditions were assessed (food allergies, asthma, chronic bronchitis, fibromyalgia, arthritis or rheumatism, back problems, chronic fatigue syndrome, heart disease, high blood pressure, stroke, migraine, diabetes, thyroid, bowel disorder, stomach or intestinal ulcers, cancer, and multiple chemical sensitivities). To be considered a chronic health condition, the condition had to be expected to last or already lasted at least six months. Two additional dichotomous variables indicating having any physical health condition (yes or no) and having comorbidity of chronic physical health conditions (two or more conditions) were also computed.

Perceived Need for Help and Help-Seeking

Perceived need for help without help-seeking

Perceived need for help without help-seeking was assessed using an item that asked respondents if during the past 12 months they felt they needed help for emotions, mental health, or use of alcohol or drugs, but did not receive it. Endorsing this question in addition to not seeking help through the use of self-help groups or calling telephone help lines identified individuals who perceived a need for help without help-seeking (yes or no).

Help-seeking

Respondents were asked if they had in the past 12 months seen a professional (a psychiatrist, family doctor, general practitioner, other medical doctor, psychologist, nurse, social worker or counselor, or religious advisor) regarding their emotions, mental health, or use of alcohol or drugs. Those indicating that they had sought help from any professional were considered help-seekers for mental health problems. Past 12 month help-seeking was also measured using two variables that inquired about the use of self-help groups and telephone help lines. The use of self-help groups was assessed using a question asking if the respondents had gone to self-help meetings for help with emotions, mental health or drug and alcohol use in the past 12 months. The use of telephone help lines was assessed using a question asking if the respondents had, in the past 12 months, used a telephone help line for help with the same problems.

An Overview of the Statistical Analyses

All statistical analyses were based on two-tailed tests and were considered significant at $p < .05$.

Analysis Phase One (Research Objective 1, Hypothesis 1)

In phase one of the current analysis, descriptive statistics were calculated to describe the distribution of social/psychosocial variables, an individuals' exposure to gambling, family history of gambling problems, and gambling-related problems among women problem and non-problem gamblers. The prevalence, means, and standard errors (SE) were calculated along with chi-square tests and t tests to understand the distribution of the variables.

Analysis Phase Two: At-Risk Gambling Behaviour (Research Objective 2, Hypothesis 2)

Phase two of the current analysis used logistic regression to test the relationships between the social/psychosocial variables and an individual's exposure to gambling with at-risk gambling behaviour (at-risk behaviour versus not at-risk behaviour) among women. Logistic regression was an appropriate statistical test because the dependent variable was dichotomous. The logistic regression analyses were conducted based on the proposed theory. The independent variables in the analysis included all social/psychosocial variables (age, income, education, marital status, social support, stress, and coping), and exposure to gambling. It was not possible to include family history of gambling problems in the models since the survey design did not allow for non-problem gamblers to report on family history of gambling. More specifically, only problem gamblers were asked about a family history of gambling problems. Therefore, it was not possible to include family history of gambling in any of the statistical models. This is considered another limitation of the CCHS 1.2 data. The dependent variable in the analysis was at-risk gambling behaviour (yes or no) defined using the suggested responsible gambling guidelines (high frequency of gambling and/or large amounts of money spent on gambling annually).^{83, 84} All independent variables were entered simultaneously into a multiple logistic regression model to determine which independent variables were significantly related to at-risk gambling behaviour after adjusting for the effects of the other independent variables. Odds ratios (ORs) and 95% confidence intervals (95% CIs) were calculated for all logistic regression models. All assumptions of logistic regression were verified before proceeding with the analysis.

Second, models were compared to find a parsimonious and good-fitting model.¹⁵⁷ Independent variables that did not have a significant empirical relationship with the dependent variable were removed from the model. Model comparison techniques includes a process of comparing the full model (including all independent variables) to a partial model (removing independent variables that are not significantly related to the outcome) in an effort to derive a concise and informative model to describe the relationship between the independent and dependent variables.¹⁵⁷ Likelihood ratio chi-square (χ^2) tests for the full model (including all independent variables) and partial models (including only significant independent variables) were conducted to determine if the full model was a statistical improvement over the partial model. Adjusting for the impact of significant variables is in keeping with theory that indicates that social/psychosocial variables, an individual's exposure to gambling, and family history of gambling problems function together to determine gambling behaviour.

Analysis Phase Three: Problem Gambling (Research Objective 3, Hypothesis 3)

Phase three of the current analysis used logistic regression to understand the relationships between the social/psychosocial variables and an individual's exposure to gambling with problem gambling among women in Canada. The independent variables in the analysis included all social/psychosocial variables (age, income, education, marital status, social support, stress, and coping) and exposure to gambling. The dependent variable in the analysis was problem gambling versus non-problem gambling. The assumptions of logistic regression were verified before proceeding with the analysis. All independent variables were entered simultaneously into a multiple logistic regression model to determine which independent variables were significantly

related to problem gambling after adjusting for the effects of the other independent variables.

Next, as in analysis phase two, non-significant independent variables in the multiple logistic regression were removed and full and partial models were compared in an effort to derive the most informative yet concise model. Likelihood ratio χ^2 tests between the full and partial models were calculated to determine if statistical differences existed between the full model and the more simplistic partial model. The significant independent variables identified in this analysis were used as covariates in all subsequent adjusted models.

Analysis Phase Four: Type of Gambling (Research Objective 4, Hypothesis 4)

Phase four of the current analysis used logistic regression models to understand the relationship between 13 types of gambling activities and problem gambling among women in Canada. Each type of gambling activity was individually examined in adjusted logistic regression models. The independent variables in the model included the gambling type and all significant independent variables identified from analysis phase three. The gambling type was measured using an ordinal or dichotomous level variable that assessed the frequency with which the respondent participated in each type of gambling. Statistical differences in each increasing level of participation were also examined. The dependent dichotomous variable in the model was women problem gambling versus women non-problem gambling. All assumptions of logistic regression were verified before proceeding with the analysis.

*Analysis Phase Five: Health and Functioning, Health Conditions, and Help-Seeking
(Research Objectives 5, 6, 7, & 8; Hypotheses 5, 6, 7, & 8)*

Phase five of the current analysis used logistic, multinomial, or linear regression analyses to understand the relationship between problem gambling and health and functioning, health conditions, and help-seeking domains. The measurement of the dependent variable determined which type of regression model was conducted. The main independent variable for all models was women problem gambling versus women non-problem gambling. Adjusted models included all the significant independent variables identified in analysis phase three as covariates. The dependent variables were variables from the health and functioning, health conditions, and help-seeking domains. Separate regressions analyses were run for each dependent variable.

First, regression models were run to determine the relationship between problem gambling and decreased health and functioning among women. Health and functioning was assessed using measures of perceived general health, psychological well-being, distress, suicidal ideation, and suicide attempts. Perceived general health was an ordinal level dependent variable, which meant a multinomial logistic regression model was used after the assumptions of multinomial logistic regression were verified. The models were first conducted unadjusted (without inclusion of covariates) and then adjusted for all significant covariates identified in analysis phase three. Psychological well-being and distress were continuous level dependent variables and, therefore, linear regressions were conducted after all assumptions of linear regression were verified. The models were first conducted unadjusted (without inclusion of covariates) and then adjusted for all significant covariates identified in analysis phase three. For the suicidal ideation and attempts models, logistic regression analyses were conducted because of

the dichotomous measurement of the dependent suicide variables. All assumptions of logistic regression were verified before proceeding with the analysis. The models were first conducted unadjusted (without inclusion of covariates) and then adjusted for all significant covariates identified in analysis phase three.

Second, the odds ratios for experiencing each health condition (psychiatric disorders and chronic physical health conditions) among women problem gamblers relative to women non-problem gamblers were calculated using logistic regression models. Significant findings in unadjusted models (models without control variables) were then re-run adjusting for all significant independent variables identified from analysis phase three. In addition, the odds ratios for experiencing any psychiatric disorder, more than one psychiatric disorder, any physical health condition, and more than one physical health condition were also calculated in logistic regression models.

Finally, the odds of perceived need for help without help-seeking and help-seeking behaviour (seeking help from a professional, attending a self-help meeting, and calling a telephone help line) among women problem gamblers relative to women non-problem gamblers were calculated in logistic regression models. All assumptions of logistic regression were verified before proceeding with the analysis. Unadjusted models (models without control variables) were conducted first and significant findings in unadjusted models were then re-run adjusting for all significant independent variables identified from analysis phase three.

Statistical Weights

The appropriate statistical weights were applied in all analyses to ensure that the sample was representative of the Canadian population at the provincial level. In addition, to adjust for the complex random, multistage, stratified, cluster sampling

design of the CCHS 1.2, bootstrapping, a variance estimation technique, was used to produce standard errors (SEs) and 95% CIs using the SAS callable version of SUDAAN software.¹⁵⁸ A variance estimation technique provides a more conservative test of significance and is Statistics Canada's recommended method of variance estimation when using data with complex multistage sampling design such as the CCHS 1.2. As well, bootstrapping is one of the procedures recommended in the SAS/Stat 9.1 user's guide to address the potential problem of multiple testing through the calculation of an adjusted p value using re-sampling with replacement.¹⁵⁹ The bootstrapping method widens confidence intervals making it more difficult to reach statistical significance at $p < .05$.

Chapter VI: Results

The total number of women surveyed in the CCHS 1.2 was 20,211. Of the 20,211 women in the survey, 10,106 (50.53%, SE = 0.60%) did not endorse any type of gambling activity in the past 12 months or voluntarily stated that they were not a gambler, 9,736 (48.11%, SE = 0.59%) were non-problem gamblers (scoring zero to two on the CPGI), and 320 (1.35%, SE = 0.10%) were problem gamblers (scoring three to more on the CPGI). The remaining 49 women had incomplete gambling data resulting in the inability to calculate a CPGI score and, therefore, were excluded from the analysis. The past 12 month prevalence of at-risk gambling behaviour (gambling weekly or more excluding lottery and instant win tickets and/or spending more than \$1000 per year or more than 1% of annual household income) among all women in the survey was 11.01% (SE = 0.32%). The past 12 month prevalence of problem gambling among all women in the survey was 1.35% (SE = 0.10%). The prevalence of problem gambling among all women who endorsed gambling at least once in the past 12 months was 2.74% (SE = 0.21%).

Results from Analysis Phase One: Descriptive Statistics

Results from analysis phase one are presented in Table 6 through Table 8. The purpose of analysis phase one was to describe the sample. It was hypothesized (hypothesis one) that women problem gamblers would be different from women non-problem gamblers with regard to age, income, education, marital status, social support, stress, coping, family history of gambling problems, gambling exposure, and gambling-related problems. The descriptive statistics were largely supportive of hypothesis one.

Descriptive statistics for sociodemographic variables are presented in Table 6. With regard to sociodemographic variables, the results indicated that approximately

Table 6: Descriptive Statistics of Sociodemographic Variables for Women Non-Problem Gamblers and Women Problem Gamblers

		Non-problem gamblers (n = 9736)	Problem gamblers (n = 320)
Sociodemographic Variables		% (SE%)	% (SE%)
Age	15 to 19 years	5.86 (0.33)	4.54 (1.46)
	20 to 29 years	15.98 (0.54)	14.75 (3.21)
	30 to 39 years	19.64 (0.53)	22.70 (3.24)
	40 to 49 years	21.34 (0.64)	27.76 (3.56)
	50 to 59 years	16.41 (0.52)	16.93 (2.77)
	60 to 69 years	10.56 (0.39)	9.39 (2.31)
	70 years or more	10.21 (0.34)	3.92 (1.32)
Income	\$80,000 or more	25.80 (0.81)	13.07 (2.59)
	\$50,000-\$79,999	28.18 (0.70)	25.62 (3.61)
	\$30,000-\$49,999	22.14 (0.61)	28.17 (3.58)
	\$15,000-\$29,999	15.89 (0.52)	17.28 (2.58)
	0 to \$14,999	7.99 (0.33)	15.86 (3.18)
Education	University Degree	16.66 (0.62)	4.75 (1.97)
	Trade/college/university diploma or certificate	31.85 (0.71)	27.50 (3.43)
	Some post secondary	9.12 (0.41)	10.13 (3.04)
	High school	20.59 (0.67)	28.74 (3.69)
	Less than high school	21.78 (0.56)	28.89 (3.53)
Marital status	Married	52.14 (0.69)	40.15 (3.75)
	Common-Law	10.57 (0.51)	14.05 (2.42)
	Widowed	7.59 (0.27)	4.37 (1.41)
	Separated	2.85 (0.23)	3.51 (0.90)
	Divorced	5.70 (0.32)	9.47 (2.44)
	Never-Married	21.16 (0.53)	28.46 (3.53)

Percents based on weighted data

$p < .001$ for all crosstabulations except for age ($p = 0.003$) and marital status ($p = 0.01$) (two-tailed tests)

50% of women problem gamblers were aged 30 to 49 years old and only approximately 4% were 70 years of age or older. Almost 16% of women problem gamblers reported an annual household income of less than \$15,000 dollars compared to 8% of women non-problem gamblers. Almost 60% of women problem gamblers reported the highest educational attainment as being high school or less compared to approximately 40% of women non-problem gamblers. With regard to marital status, many women problem gamblers reported being married (40.15%; SE = 3.75%) followed by never-married (28.46%; SE = 3.53%). Almost 10% of women problem gamblers were divorced compared to almost 6% of women non-problem gamblers.

Descriptive statistics for other social/psychosocial variables, exposure to gambling, and family history of gambling problems are presented in Table 7. Almost 10% of women problem gamblers perceived their life stress as extremely stressful and only approximately 4% of women problem gamblers perceived their life as not at all stressful. As previously mentioned, due to the design of the survey, family history of gambling problems was only asked of individuals with problem gambling and was not asked of non-problem gamblers. Therefore, it was not possible to report family history of gambling among women non-problem gamblers, nor could this variable be used in subsequent analyses that compared women problem gamblers to women non-problem gamblers. This is considered a limitation of the current research. However, 20.66% (SE = 2.94%) of women problem gamblers indicated having a family history of gambling problems. Women problem gamblers compared to women non-problem gamblers were found to report significantly different levels of social support scores (i.e. reported less social support), positive coping scores (i.e. reported fewer positive coping skills), and negative coping skills (i.e. reported more negative coping skills).

Table 7: Descriptive Statistics of Stress, Family History, Exposure to Gambling, Social Support, and Coping Variables for Women Non-Problem Gamblers and Women Problem Gamblers

		Non-problem gamblers (n = 9736)	Problem gamblers (n = 320)
Variables		% (SE%)	% (SE%)
Stress	Not at all stressful	10.36 (0.43)	3.62 (1.14)
	Not very stressful	21.82 (0.61)	20.77 (3.53)
	A bit stressful	43.17 (0.71)	44.34 (3.75)
	Quite a bit stressful	21.38 (0.57)	22.09 (3.07)
	Extremely stressful	3.26 (0.26)	9.18 (2.17)
Family History	No	N/A	79.34 (2.94)
	Yes	N/A	20.66 (2.94)
Gambling exposure	Low	52.13 (0.60)	50.48 (3.89)
	Moderate	33.54 (0.61)	30.23 (4.10)
	High	4.18 (0.13)	5.26 (1.03)
	Severe	10.14 (0.23)	14.03 (1.91)
		Mean (SE mean)	Mean (SE mean)
Social Support	Index	65.12 (0.19)	59.83 (1.25)
Coping	Positive coping	11.21 (0.03)	10.67 (0.16)
	Negative coping	7.52 (0.06)	9.88 (0.28)

Percents based on weighted data

$p < .001$ except for gambling exposure (not significant) (two-tailed tests)

Statistically significant differences in mean scores (t tests) were found for social support index and negative coping at $p < .001$ and for positive coping at $p = 0.001$ (two-tailed tests).

Descriptive statistics for gambling-related problem are presented in Table 8.

Women problem gamblers compared to women non-problem gamblers were more likely to report gambling-related problems. Very few women non-problem gamblers endorsed the occurrence of gambling-related problems. The most commonly reported gambling-related problem reported among women was spending more money than intended (problem gamblers 86.47%; SE = 3.00% versus non-problem gamblers 14.43%; SE = 0.71% $\chi^2 = 155.89$, df = 1, $p < .001$) and gambling to forget about problems or deal with depressed feelings (problem gamblers 43.33%; SE = 3.92% versus non-problem gamblers 2.77%; SE 0.35% $\chi^2 = 71.63$, df = 1, $p < .001$).

In a supplementary analysis, descriptive statistics were calculated for gambling-related problems which compared men problem gamblers to women problems gamblers. The gender comparison indicated that the only gambling-related problem that was statistically different among men problem gamblers versus women problem gamblers was gambling to forget about problems or deal with depressed feelings (men problem gamblers 24.80%; SE = 2.66% versus women problem gamblers 43.33%; SE 3.92%; $\chi^2 = 16.18$, df = 1, $p < .001$). All other gambling-related problems were reported equally among men and women problem gamblers.

Results from Analysis Phase Two: At-Risk Gambling Behaviour among Women

Verifying the Assumptions of Analysis Phase Two

First, data were explored to determine that the assumptions of logistic regression analysis were met. The assumptions of logistic regression include lack of multicollinearity, linearity of the logit, and absence of outliers in the solution.^{143, 157} To assess multicollinearity, correlation matrices of all the independent variables were

Table 8: Descriptive Statistics of Gambling-Related Problems for Women Non-Problem Gamblers and Women Problem Gamblers

		Non- problem gamblers	Problem gamblers
		% (SE%)	% (SE%)
Gambling-Related Problems			
Spent more than intended	Yes	14.43 (0.71)	86.47 (3.00)
Lied or hid gambling from friends/family	Yes	0.44 (0.13)	34.05 (4.03)
Didn't think could stop gambling	Yes	0.64 (0.17)	36.02 (4.31)
Unable to cut down/quit gambling	Yes	0.79 (0.14)	37.58 (3.97)
Gambled b/c of problems/depressed feelings	Yes	2.77 (0.35)	43.33 (3.92)
Gambling caused problems with family/friends	Yes	0.61 (0.17)	24.30 (3.83)

Percents based on weighted data

p <.001 for all crosstabulations (two-tailed tests)

produced using either Pearson product-moment correlations (for continuous level variables) or Spearman rank correlations (for ordinal level variables) depending on the distribution of the data. High correlations between independent variables were evidence of multicollinearity. Tabachnick and Fidell indicate that statistical problems may arise with bivariate correlations of approximately 0.7 or higher and suggest that a variable be omitted or a composite index created from the highly correlated variables to remedy this problem.¹⁴³ In the current research, when investigating the correlations between all independent variables, high correlations were noted between the four social support scales at approximately $r = 0.8$. The social support scales in the CCHS 1.2 were from the Medical Outcomes Study (MOS). Research on the development of the social supports scales from the MOS indicates that the four individual social support scales (emotional or informational support, tangible support, positive social interaction, and affection) can be used or an overall social support index can be computed from the original 19 social support items with higher scores of the overall social support index reflecting higher levels of social support.¹⁴⁴ Since the individual social support scales were found to have relatively high bivariate correlations, it was decided that the use of an overall social support index would be as superior alternative. The use of the one overall social support scale is a desirable option since it would solve the problem of potential multicollinearity and create a more parsimonious model, while still making use of all 19 social support variables in the dataset. Therefore, the social support index was computed and used for all analyses in the current research.

The assumption of linearity of the logit indicates that a linear relationship exists between continuous level independent variables and the log odds of the dependent variable.¹⁴⁵ To test the assumption of linearity of the logit, logistic regression models

were run with all non-continuous independent variables, main effects of continuous level variables, and interaction terms computed using each continuous independent variable multiplied by its natural logarithm.¹⁴³ The assumption of linearity of the logit is met if all interaction terms are not statistically significant. Interaction terms were computed for social support, positive coping, and negative coping variables and placed in the logistic regression models with the main effects and all other non-continuous independent variables. None of the interactions terms were statistically significant confirming the assumption of linearity of the logit had been verified.

To assess outliers in the solution, standardized residuals were inspected. Scatterplots were produced using the standardized residuals and all independent variables. When inspecting scatterplots, no apparent patterns were noted in any scatterplots. In addition, frequency distributions of the standardized residuals were run to assess the data for the presence of outliers or extreme observations. It is generally suggested that standardized residual values greater than ± 3.3 may be potential outliers, although some outlying values are expected when conducting an analysis with a large sample.^{143, 160} The standardized residuals were inspected and no outliers were detected. The assumptions of logistic regression models in analysis phase two were all satisfactorily met.

At-Risk Gambling Behaviour Logistic Regression Models

Results from analysis phase two are presented in Table 9 through Table 10. It was hypothesized (hypothesis two) that poor social/psychosocial variables, greater exposure to gambling, and family history of gambling would have statistically significant positive associations (odds ratios above one) with at-risk gambling behaviour (greater time and money spent on gambling) relative to no at-risk gambling

Table 9: Logistic Regression Analysis for At-Risk Gambling Behaviour Versus Not At-Risk Gambling Behaviour among Women FULL MODEL		
Independent Variables		Dependent Variable At-Risk Gambling Behaviour Versus No At-Risk Gambling Behaviour AOR (95% CIs)
Age	15 to 19 years	1.00 (-----)
	20 to 29 years	2.25 (1.46-3.48)
	30 to 39 years	4.03 (2.53-6.42)
	40 to 49 years	5.30 (3.31-8.50)
	50 to 59 years	6.19 (3.91-9.80)
	60 to 69 years	6.88 (4.27-11.09)
	70 years or more	5.77 (3.51-9.49)
Income	\$80,000 or more	1.00 (-----)
	\$50,000-\$79, 999	1.43 (1.09-1.88)
	\$30,000-\$49,999	1.65 (1.26-2.16)
	\$15,000-\$29,999	1.69 (1.27-2.24)
	0 to \$14,999	3.05 (2.22-4.18)
Education	University Degree	1.00 (-----)
	Trade/college/university diploma or certificate	2.16 (1.55-3.02)
	Some post secondary	3.01 (2.06-4.39)
	High school	2.95 (2.09-4.17)
	Less than high school	3.46 (2.46-4.88)
Marital Status	Married	1.00 (-----)
	Common-Law	1.57 (1.23-1.99)
	Widowed	1.04 (0.84-1.30) NS
	Separated	1.22 (0.84-1.79) NS
	Divorced	0.91 (0.70-1.19) NS
	Never-Married	1.06 (0.83-1.35) NS
Social Support	Overall Index	1.008 (1.003-1.013)
Stress		
	Life stress	
	Not at all stressful	1.00 (-----)
	Not very stressful	1.12 (0.89-1.41) NS
	A bit stressful	1.09 (0.88-1.36) NS
	Quite a bit stressful	0.98 (0.77-1.26) NS
	Extremely Stressful	1.19 (0.79-1.80) NS

Table 9 Continued: Logistic Regression Analysis for At-Risk Gambling Behaviour Versus Not At-Risk Gambling Behaviour among Women FULL MODEL		
Independent Variables		Dependent Variable At-Risk Gambling Behaviour Versus No At-Risk Gambling Behaviour AOR (95% CIs)
Coping	Positive coping	0.97 (0.94-0.995)
	Negative coping	1.04 (1.02-1.07)
Gambling Exposure	Low	1.00 (-----)
	Moderate	1.03 (0.87-1.22) NS
	High	1.41 (1.18-1.68)
	Severe	1.29 (1.08-1.54)

AOR = Adjusted Odds Ratios. All independent variables were added to the model simultaneously; 95% CI = 95% Confidence Interval; NS = Not Significant

behaviour (less time and money spent on gambling).^c Results from the logistic regression models supported hypothesis two.

Table 9 contains the results for the full model for at-risk gambling behaviour with all independent variables. All independent variables were significantly related to at-risk gambling behaviour with the exception of self-perceived life stress. In an effort to build the most parsimonious model, life stress was removed and the full and partial models were compared. The X^2 difference between the full and partial models was not statistically significant (X^2 for full model = 838.93 at 29 degree of freedom; X^2 for reduced model = 833.95 at 25 degrees of freedom; X^2 model difference = 4.98 at 4 degrees of freedom) confirming that the addition of the self-perceived life stress variable did not improve the model.

The results from the reduced model are presented in Table 10. The odds of having at-risk gambling behaviour among women were significantly increased among all age categories relative to the youngest age category. Lower levels of income were associated with a significantly higher probability of at-risk gambling behaviour. Relative to the highest income category, the greatest odds of at-risk gambling behaviour (adjusted odds ratio = 3.04; 95% CI = 2.22-4.18) was found among women reporting the lowest category of an annual household income of \$14,999 or less. Similarly, lower levels of educational attainment were associated with a significantly higher probability of at-risk gambling behaviour. Relative to the reference category of highest educational attainment (a university degree), the greatest odds of at-risk gambling behaviour (adjusted odds ratio = 3.48; 95% CI = 2.47-4.90) was found among women

^c As previously noted, the presence of family history of gambling problems was only asked among problem gamblers and, therefore, it was not possible to include this variable in analysis phase two or any other subsequent analyses. The inability to assess family history of gambling problems is considered a limitation of this research.

Table 10: Logistic Regression Analysis for At-Risk Gambling Behaviour Versus Not At-Risk Gambling Behaviour among Women REDUCED MODEL

Independent Variables		Dependent Variable At-Risk Gambling Behaviour Versus No At-Risk Gambling Behaviour
		AOR (95% CIs)
Age	15 to 19 years	1.00 (-----)
	20 to 29 years	2.24 (1.45-3.46)
	30 to 39 years	4.01 (2.52-6.37)
	40 to 49 years	5.26 (3.29-8.40)
	50 to 59 years	6.13 (3.88-9.69)
	60 to 69 years	6.83 (4.24-11.01)
	70 years or more	5.70 (3.47-9.38)
Income	\$80,000 or more	1.00 (-----)
	\$50,000-\$79, 999	1.43 (1.09-1.88)
	\$30,000-\$49,999	1.64 (1.25-2.15)
	\$15,000-\$29,999	1.68 (1.27-2.23)
	0 to \$14,999	3.04 (2.22-4.18)
Education	University Degree	1.00 (-----)
	Trade/college/university diploma or certificate	2.17 (1.56-3.03)
	Some post secondary	3.03 (2.08-4.43)
	High school	2.97 (2.10-4.19)
	Less than high school	3.48 (2.47-4.90)
Marital Status	Married	1.00 (-----)
	Common-Law	1.56 (1.23-1.99)
	Widowed	1.04 (0.84-1.29) NS
	Separated	1.22 (0.84-1.78) NS
	Divorced	0.91 (0.70-1.20) NS
	Never Married	1.06 (0.83-1.35) NS
Social Support	Overall Index	1.008 (1.003-1.013)
Coping	Positive coping	0.97 (0.94-0.995)
	Negative coping	1.04 (1.02-1.06)
Gambling Exposure	Low	1.00 (-----)
	Moderate	1.03 (0.87-1.22) NS
	High	1.41 (1.18-1.68)
	Severe	1.29 (1.09-1.54)

AOR = Adjusted Odds Ratios. All independent variables were added to the model simultaneously. 95% CI = 95% Confidence Interval; NS = Not Significant

reporting less than a high school diploma. With regard to marital status, compared to married women, the probability of at-risk gambling behaviour was significantly greater among women living common-law, but no statistically significant differences were found between married women and women who were separated, widowed, divorced, or never-married.

Each point one increase in social support scores (i.e. greater social support) was associated with a 1.008 (95% CI = 1.003-1.013) increased odds of having at-risk gambling behaviour. Likewise, each one point increase in negative coping scores (i.e. unhealthy coping abilities) was associated with a 1.04 (95% CI = 1.02-1.06) increased odds of having at-risk gambling behaviour. However, every one point increase in positive coping scores (i.e. healthier coping abilities) was associated with a decrease in odds (adjusted odds ratio = 0.97; 95% CI = 0.94-0.995) of having at-risk gambling behaviour. Finally, compared to women with low gambling exposure, the probability of at-risk gambling behaviour was significantly greater among those exposed to high levels of gambling (adjusted odds ratio = 1.41; 95% CI = 1.18-1.68) and among those exposed to severe levels of gambling (adjusted odds ratio = 1.29; 95% CI = 1.09-1.54). Statistically significant differences were not noted between low and moderate levels of gambling exposure with regard to at-risk gambling behaviour among women.

Results from Analysis Phase Three: Problem Gambling among Women

Verifying the Assumptions of Analysis Phase Three

The data were examined to ensure the assumptions for logistic regression were verified for the models in analysis phase three. The assumptions of linearity of the logit and absence of multicollinearity were satisfied. When investigating the standardized residuals, the largest value noted was 3.37. Although this value is slightly higher than

the guideline of ± 3.3 , it is not considered an outlier in the solution since the residual is not much larger than the guideline. Also, some residuals greater than the guideline values are to be expected when using a large sample size. Therefore, all assumptions of logistic regression were satisfied for analysis phase three.

Problem Gambling Logistic Regression Models

Results from analysis phase three are presented in Table 11 through Table 12. It was hypothesized (hypothesis three) that poor social/psychosocial variables, greater exposure to gambling, and family history of gambling would have statistically significant positive associations (odds ratios above one) with problem gambling among women. Results from the logistic regression models were largely supportive of hypothesis three.

Table 11 contains the results for the full model for problem gambling among women with and all independent variables included. All independent variables were significantly related to problem gambling among women with the exception of positive coping and gambling exposure. In an effort to build the most parsimonious model, the non-significant variables were removed and the full and partial models were compared. The χ^2 difference between the full and partial models was not statistically significant (χ^2 for full model = 224.85 at 29 degree of freedom; χ^2 for reduced model = 221.97 at 25 degrees of freedom; χ^2 model difference = 2.88 at 4 degrees of freedom) confirming that the addition of positive coping and gambling exposure did not improve the model.

The results from the reduced model are presented in Table 12. Compared to the youngest age category, the probability of problem gambling was significantly greater

Table 11: Logistic Regression Analysis for Problem Gambling Versus Non-Problem Gambling among Women FULL MODEL		
Independent Variables		Dependent Variable Problem Gambling Versus Non- Problem Gambling AOR (95% CIs)
Age	15 to 19 years	1.00 (-----)
	20 to 29 years	1.42 (0.57-3.51) NS
	30 to 39 years	2.33 (0.90-6.01) NS
	40 to 49 years	2.72 (1.17-6.36)
	50 to 59 years	2.28 (0.93-5.61) NS
	60 to 69 years	1.73 (0.58-5.17) NS
	70 years or more	0.87 (0.27-2.85) NS
Income	\$80,000 or more	1.00 (-----)
	\$50,000-\$79, 999	1.76 (0.96-3.21) NS
	\$30,000-\$49,999	2.54 (1.35-4.78)
	\$15,000-\$29,999	1.86 (0.99-3.53) NS
	0 to \$14,999	2.74 (1.27-5.94)
Education	University Degree	1.00 (-----)
	Trade/college/university diploma or certificate	2.38 (0.85-6.71) NS
	Some post secondary	2.90 (0.83-10.19) NS
	High school	3.94 (1.35-11.48)
	Less than high school	4.69 (1.56-14.10)
Marital Status	Married	1.00 (-----)
	Common-Law	1.51 (0.90-2.54) NS
	Widowed	0.92 (0.42-2.02) NS
	Separated	0.82 (0.41-1.66) NS
	Divorced	1.19 (0.56-2.51) NS
	Never-Married	1.75 (1.04-2.94)
Social Support	Overall Index	0.99 (0.98-1.00)
Stress	Not at all stressful	1.00 (-----)
	Not very stressful	2.56 (1.02-6.42)
	A bit stressful	2.12 (0.91-4.95) NS
	Quite a bit stressful	1.75 (0.70-4.37) NS
	Extremely Stressful	3.66 (1.38-9.72)

Table 11 Continued: Logistic Regression Analysis for Problem Gambling Versus Non-Problem Gambling among Women FULL MODEL		
Independent Variables		Dependent Variable Problem Gambling Versus Non- Problem Gambling
		AOR (95% CIs)
Coping	Positive coping	0.95 (0.88-1.03) NS
	Negative coping	1.13 (1.08-1.18)
Gambling Exposure	Low	1.00 (-----)
	Moderate	0.99 (0.64-1.52) NS
	High	1.18 (0.69-2.00) NS
	Severe	1.28 (0.85-1.94) NS

AOR = Adjusted Odds Ratios. All independent variables were added to the model simultaneously. 95% CI = 95% Confidence Interval; NS = Not Significant

Table 12: Logistic Regression Analysis for Problem Gambling Versus Non-Problem Gambling among Women REDUCED MODEL

Independent Variables		Dependent Variable Problem Gambling Versus Non- Problem Gambling AOR (95% CIs)
Age	15 to 19 years	1.00 (-----)
	20 to 29 years	1.40 (0.57-3.47) NS
	30 to 39 years	2.29 (0.89-5.86) NS
	40 to 49 years	2.66 (1.15-6.16)
	50 to 59 years	2.23 (0.91-5.46) NS
	60 to 69 years	1.69 (0.57-4.97) NS
	70 years or more	0.87 (0.27-2.82) NS
Income	\$80,000 or more	1.00 (-----)
	\$50,000-\$79, 999	1.80 (0.99-3.27) NS
	\$30,000-\$49,999	2.62 (1.40-4.91)
	\$15,000-\$29,999	1.94 (1.02-3.67)
	0 to \$14,999	2.91 (1.35-6.26)
Education	University Degree	1.00 (-----)
	Trade/college/university diploma or certificate	2.40 (0.88-6.53) NS
	Some post secondary	2.93 (0.86-9.99) NS
	High school	4.06 (1.46-11.29)
	Less than high school	4.90 (1.72-14.00)
Marital Status	Married	1.00 (-----)
	Common-Law	1.48 (0.89-2.49) NS
	Widowed	0.91 (0.42-2.00) NS
	Separated	0.79 (0.40-1.58) NS
	Divorced	1.13 (0.54-2.36) NS
	Never-Married	1.69 (1.01-2.84)
Social Support	Overall Index	0.99 (0.98-0.999)
Stress		
Life stress	Not at all stressful	1.00 (-----)
	Not very stressful	2.55 (1.02-6.35)
	A bit stressful	2.13 (0.91-4.96) NS
	Quite a bit stressful	1.73 (0.69-4.33) NS
	Extremely Stressful	3.66 (1.38-9.69)
Coping	Negative coping	1.13 (1.09-1.18)

AOR = Adjusted Odds Ratios. All independent variables were added to the model simultaneously. 95% CI = 95% Confidence Interval; NS = Not Significant

among women aged 40 to 49 years (adjusted odds ratio = 2.66; 95% CI = 1.15-6.16). Relative to the highest annual household income category (\$80,000 or more), women reporting middle to low levels of annual household income (\$49,999 or less) had significantly increased odds of problem gambling. Statistically significant differences between the highest income category (\$80,000 or more) and the second highest income category (\$50,000 to \$79,999) were not found. Compared to women with a university degree, the probability of problem gambling was significantly greater among women with a high school diploma (adjusted odds ratio = 4.06; 95% CI 1.46-11.29) and among women with less than a high school diploma (adjusted odds ratio = 4.90; 95% CI 1.72-14.00). With regard to marital status, only never-married women had increased odds of problem gambling compared to married women. Compared to married women, statistically significant differences in odds of problem gambling were not found among women who were living common-law, widowed, separated, or divorced.

Each one point increase in social support scores (i.e. greater social support) was associated with decreased odds (adjusted odds ratio = 0.99; 95% CI = 0.98-0.999) of problem gambling among women. Compared to women reporting daily life stress as not at all stressful, the probability of problem gambling was significantly greater among women reporting daily life stress as not very stressful (adjusted odds ratio = 2.55; 95% CI = 1.02-6.35), and women reporting daily life stress as extremely stressful (adjusted odds ratio = 3.66; 95% CI = 1.38-9.69). However, the odds ratios for those reporting daily stress as a bit stressful and quite a bit stressful were also elevated (2.12 and 1.75, respectively), but these odds ratios did not reach statistical significance likely due to wide confidence intervals and underpowered models. Finally, each one point increase

in negative coping scores (i.e. unhealthy coping) was associated with a 1.13 (95% CI = 1.09-1.18) increased odds of problem gambling among women.

Since exposure to gambling was associated with at-risk gambling behaviour but not problem gambling in the multiple logistic regression analysis that simultaneously controlled for all covariates, a supplementary analysis was included to further understand the relationship between level of gambling exposure and problem gambling. An additional unadjusted logistic regression model that did not include covariates was conducted to clarify the important role exposure to gambling plays with regards to problem gambling behaviour among women. The results from the unadjusted logistic regression model (i.e. no covariates included in the model) indicated that compared to women exposed to low levels of gambling, the probability of problem gambling was significantly greater among women exposed to severe levels of gambling (odds ratio = 1.43; 95% CI = 1.02-2.00). However, moderate and high levels of gambling exposure were not associated with problem gambling compared to low levels of gambling exposure. As well, the population attributable risk associated with severe exposure to gambling was calculated. The population attributable risk estimates the proportion of the outcome in the population that would be reduced if the exposure were eliminated.¹³³ The population attributable risk estimates that approximately 5.7% of the proportion of problem gambling among women is attributable to severe gambling exposure, as measured in the current research.

Results from Analysis Phase Four: Types and Frequency of Gambling Activity

Verifying the Assumptions of Analysis Phase Four

The data were examined to ensure the assumptions for logistic regression were verified for the models in analysis phase four. The assumptions of linearity of the logit

and absence of multicollinearity were satisfied. When investigating the standardized residuals, the largest value noted was 3.68. Again, as previously mentioned, although this value is slightly higher than the guideline of ± 3.3 , based on the large sample size, some larger values are expected and the value of 3.68 is not great enough to be cause for concern. Therefore, all assumptions of logistic regression were satisfied for analysis phase four.

Type and Frequency of Gambling Activity Logistic Regression Models

Results from analysis phase four are presented in Table 13. It was hypothesized (hypothesis four) that frequent play of all types of gambling would be associated with increased odds of problem gambling relative to non-problem gambling among women. Results from the logistic regression models were largely supportive of hypothesis four.

With the exception of internet gambling and games of skill, all types of gambling were associated with increased odds of problem gambling relative to non-problem gambling among women after adjusting for age, income, marital status, education, stress, social support, and negative coping. The highest odds of problem gambling was associated with gambling on VLTs outside a casino (weekly or more relative to never in the past 12 months), VLTs inside a casino (weekly or more relative to never in the past 12 months), and other casino games (once a month or more relative to never in the past 12 months). The general trend noted in the results was that the probability of problem gambling increased with greater frequency of types of gambling measured using an ordinal scale. More specifically, the odds of problem gambling among women generally increased with increasing frequency of gambling on VLTs outside a casino, VLTs inside a casino, and other casino games, bingo, instant win tickets, lottery tickets, and cards or board games. Any gambling on horse races, sports

Table 13: Logistic Regression analysis for Type and Frequency of Gambling among Women					
Independent Variables Gambling Type and Frequency		Dependent Variable Problem Gambling Versus Non-Problem Gambling			
		Non Problem Gambler % (SE%)	Problem Gambler %(SE%)	AOR (95% CIs)	Differences in AOR
Instant win tickets	Never ^a	48.69 (0.78)	23.97 (3.17)	1.00 (-----)	a=b<c=d=e <f
	1-5 times per year ^b	26.37 (0.63)	8.42 (2.07)	0.62 (0.31-1.24) NS	b<c
	6-11 times per year ^c	4.48 (0.26)	9.27 (2.19)	3.45 (1.76-6.75)	c=d
	1-3 times per month ^d	11.09 (0.46)	19.34 (3.09)	2.62 (1.55-4.44)	d=e
	Once a week ^e	5.80 (0.32)	14.62 (2.86)	4.52 (2.51-8.14)	e<f
	Several times per week to daily ^f	3.57 (0.31)	24.38 (3.45)	12.02 (6.78-21.31)	a<f
Lottery tickets	Never ^a	18.28 (0.58)	11.82 (2.30)	1.00 (-----)	a=b<c=d<e <f
	1-5 times per year ^b	40.23 (0.78)	15.08 (2.88)	0.66 (0.33-1.31) NS	b<c
	6-11 times per year ^c	6.42 (0.35)	9.69 (2.25)	2.31 (1.07-4.96)	c=d
	1-3 times per month ^d	15.04 (0.56)	15.80 (2.62)	1.45 (0.72-2.89) NS	d<e
	Once a week ^e	12.54 (0.44)	21.69 (3.77)	2.79 (1.31-5.97)	e<f
	Several times per week to daily ^f	7.50 (0.42)	25.92 (3.49)	5.21 (2.55-10.65)	a<f
Bingo	Never ^a	84.21 (0.58)	47.80 (3.96)	1.00 (-----)	a<b<c=d=e =f
	1-5 times per year ^b	9.32 (0.48)	15.67 (2.98)	2.38 (1.38-4.10)	b<c
	6-11 times per year ^c	0.69 (0.10)	5.11 (1.65)	8.58 (2.99-24.57)	c=d
	1-3 times per month ^d	2.27 (0.19)	10.46 (2.11)	4.90 (2.70-8.89)	d=e
	Once a week ^e	2.20 (0.22)	10.75 (2.20)	7.90 (3.99-15.64)	e=f
	Several times per week to daily ^f	1.32 (0.14)	10.22 (2.08)	16.24 (8.18-32.26)	a<f
Cards/ board games	Never ^a	86.65 (0.50)	70.65 (3.78)	1.00 (-----)	a<b=c=d=e
	1-5 times per year ^b	8.78 (0.43)	12.31 (2.70)	1.78 (1.03-3.06)	b=c
	6-11 times per year ^c	1.10 (0.15)	4.25 (2.52)	4.80 (0.84-27.38) NS	c=d
	1-3 times per month ^d	2.00 (0.19)	7.80 (2.31)	4.29 (1.99-9.29)	d=e
	Weekly or more ^e	1.47 (0.15)	5.00 (1.65)	4.76 (1.74-13.00)	a<e

Table 13 CONTINUED: Logistic Regression analysis for Type and Frequency of Gambling among Women					
Independent Variables Gambling Type and Frequency		Dependent Variable Problem Gambling Versus Non-Problem Gambling			
		Non Problem Gambler % (SE%)	Problem Gambler %(SE%)	AOR (95% CIs)	Differences in AORs
VLTs outside casino	Never ^a	93.19 (0.38)	60.34 (3.91)	1.00 (-----)	a<b=c=d<e
	1-5 times per year ^b	4.94 (0.33)	9.25 (2.12)	2.37 (1.35-4.16)	b=c, b<d, b<e
	6-11 times per year ^c	0.52 (0.08)	2.34 (1.18)	6.14 (1.84-20.53)	c=d, c<e
	1-3 times per month ^d	0.90 (0.12)	14.16 (3.02)	17.67 (8.71-35.86)	d<e
	Weekly or more ^e	0.45 (0.10)	13.91 (2.62)	53.73 (24.85- 116.16)	a<e
VLTs inside casino	Never ^a	70.29 (0.68)	32.29 (3.43)	1.00 (-----)	a<b<c=d=e
	1-5 times per year ^b	25.18 (0.63)	28.08 (3.49)	2.84 (1.85-4.36)	b<c, b<d, b<e
	6-11 times per year ^c	1.83 (0.25)	13.80 (3.26)	22.98 (10.57- 49.93)	c=d, c=e
	1-3 times per month ^d	1.99 (0.18)	18.26 (3.10)	25.80 (14.25- 46.73)	d=e
	Weekly or more ^e	0.71 (0.12)	7.58 (1.83)	36.19 (15.55- 84.22)	a<e
Other casino games	Never ^a	94.36 (0.37)	76.58 (3.63)	1.00 (-----)	a<b<c
	1-11 times per year ^b	5.16 (0.36)	14.90 (3.23)	4.01 (2.25-7.17)	b<c
	monthly or more ^c	0.48 (0.11)	8.52 (2.23)	24.15 (8.95-65.18)	a<c
Internet	No ^a	98.79 (0.19)	98.59 (0.65)	1.00 (-----)	a=b
	Yes ^b	1.21 (0.19)	1.41 (0.65)	1.38 (0.38-5.05) NS	

Table 13 CONTINUED: Logistic Regression analysis for Type and Frequency of Gambling among Women					
Independent Variables Gambling Type and Frequency		Dependent Variable Problem Gambling Versus Non-Problem Gambling			
		Non Problem Gambler % (SE%)	Problem Gambler %(SE%)	AOR (95% CIs)	Differences in AORs
Horse racing	No ^a	95.02 (0.30)	88.57 (2.77)	1.00 (-----)	a<b
	Yes ^b	4.98 (0.30)	11.43 (2.77)	2.54 (1.31-4.93)	
Sports lotteries	No ^a	97.62 (0.21)	93.95 (2.74)	1.00 (-----)	a<b
	Yes ^b	2.38 (0.21)	6.05 (2.74)	3.29 (1.04-10.46)	
Stock market	No ^a	96.42 (0.27)	92.12 (2.46)	1.00 (-----)	a<b
	Yes ^b	3.58 (0.27)	7.88 (2.46)	3.22 (1.53-6.76)	
Games of skill	No ^a	96.41 (0.27)	95.50 (1.35)	1.00 (-----)	a=b
	Yes ^b	3.59 (0.27)	4.50 (1.35)	0.99 (0.46-2.16) NS	
Other gambling	No ^a	96.05 (0.26)	90.01 (3.02)	1.00 (-----)	a<b
	Yes ^b	3.95 (0.26)	9.99 (3.02)	2.83 (1.27-6.32)	

Separate regression models were run for each dependent variable. AORs (Adjusted Odds Ratios) = Models adjusted for age, income, education, marital status, perceived stress, social support, and negative coping. 95% CI = 95% Confidence Interval; NS = Not Significant; Percents based on weighted n.

lotteries, stock markets, and other types of gambling were associated with a significantly higher probability of problem gambling among women.

Results from Analysis Phase Five: Health and Functioning, Health Conditions, and Perceived Need for Help and Help-Seeking

Verifying the Assumptions of Analysis Phase Five

Health and functioning models

First, the data were examined to ensure the assumptions for logistic regression, multinomial logistic regression, and linear regression were verified for the health and functioning models in analysis phase five. For the logistic regression models (suicidal ideation and suicide attempts), the assumptions of linearity of the logit and absence of multicollinearity were satisfied. When investigating the standardized residuals, the largest value noted was 3.48, a value higher than the suggested guideline, but not high enough to be cause for concern in a logistic regression analysis with such a large sample. Therefore, all assumptions of logistic regression were satisfied for the health and functioning models in analysis phase five. The assumptions for multinomial logistic regression include linearity of the logit and absence of multicollinearity. An examination of the data determined that the assumptions of the multinomial logistic regression models (self-perceived general health) were satisfied. The assumptions for linear regression include normality, linearity, homoscedasticity, absence of multicollinearity, and lack of outliers in the solution. Normality indicates that each variable and all combination of variables have a normal distribution, linearity requires a straight-line relationship exists between variables, and homoscedasticity is the same variability in scores of continuous level variables.¹⁴³ To verify the assumption of

normality the distribution of each continuous variable was inspected using measures of skewness, kurtosis, histograms, and normality plots. Normality was also inspected using plots of the standardized residuals and predicted values and scatterplots of the residuals and independent variables. No pattern in the scatterplots would confirm that the assumption of normality is met. Likewise, the assumption of linearity and homoscedasticity would also be verified if no pattern in the scatterplot of the standardized residuals and predicted values is found.

The data were examined to verify if the assumptions were satisfied for the linear regression models (psychological well-being and distress) in analysis phase five. The distribution of the psychological well-being and distress, the two continuous level dependent variables, were examined. As previously mentioned the variables had a non-normal distribution and were transformed. For linear regression, there are no assumptions about the distribution of the independent variables except for the assumption that the continuous level independent variables are linearly related to the dependent variable, which can be determined through a scatterplot of the standardized residual and predicted values.¹⁴³ However, the distribution of the continuous level independent variables were still inspected. It was found that the distribution of the social support variable was only slightly non-normal (skewness = -1.47; SE = 0.001 and kurtosis = 2.27; SE = 0.002), but the negative coping variable had a very close to normal distribution (skewness = 0.37; SE = 0.001 and kurtosis = 0.16; SE = 0.001). Transformations were not performed on social support or negative coping. The scatterplot of the standardized residuals and independent continuous level variables and standardized residuals and predicted values revealed no patterns indicating that the assumption of normality as well as linearity and homoscedasticity were verified. Correlation matrices verified the absence of

multicollinearity. Finally, the standardized residuals were examined and no outlying values were noted. Therefore, the assumptions of linear regression for analysis phase five were verified.

Health condition models

The data were examined to ensure the assumptions for logistic regression were verified for the health condition models in analysis phase five. The assumptions of linearity of the logit and absence of multicollinearity were satisfied. When investigating the standardized residuals, the largest value noted was 3.73, and was not considered an outlying value due to the large sample size. Therefore, all assumptions of logistic regression were satisfied for the health conditions models in analysis phase five.

Perceived need for help and help-seeking models

The data were examined to ensure the assumptions for logistic regression were verified for the perceived need for help and help-seeking model in analysis phase five. The assumptions of linearity of the logit and absence of multicollinearity were satisfied. When investigating the standardized residuals, the largest value noted was 3.99, a value higher than the suggested guideline, but not considered an outlier in the solution for a logistic regression analysis with a large sample. Therefore, all assumptions of logistic regression were satisfied for the perceived need for help and help-seeking models in analysis phase five.

Health and Functioning Logistic, Multinomial, and Linear Regression Models

Results from the health and functioning models in analysis phase five are presented in Table 14. It was hypothesized (hypothesis five) that problem gambling relative to non-problem gambling would be associated with increased odds of poorer

Table 14: Multinomial Logistic, Logistic, and Linear Regression Analyses for Problem Gambling Versus Non-Problem Gambling and Health and Functioning among Women

Dependent Variables		Independent Variable Problem Gambling Versus Non-Problem Gambling			
		Non-Problem Gambler % (SE%)	Problem Gambler % (SE%)	ORs (95% CIs)	AORs (95% CIs)
Perceived general health	Excellent	15.40 (0.58)	7.39 (1.64)	1.00 (-----)	1.00 (-----)
	Very good	35.79 (0.77)	25.42 (3.42)	1.48 (0.83-2.65) NS	1.15 (0.61-2.16) NS
	Good	34.09 (0.72)	42.22 (4.01)	2.58 (1.51-4.42)	1.67 (0.91-3.09) NS
	Fair/Poor	14.71 (0.49)	24.97 (3.30)	3.54 (2.03-6.15)	1.81 (0.94-3.51) NS
Suicide	Ideation	3.07 (0.24)	10.18 (2.21)	3.58 (2.13-6.01)	1.55 (0.78-3.10) NS
	Attempts	0.52 (0.10)	2.43 (1.18)	4.72 (1.29-17.32)	1.46 (0.17-12.78) NS
		Mean (SE Mean)	Mean (SE Mean)	Beta (95% CIs)	Adjusted Beta (95% CIs)
Psychological well-being	reflect sqrt	4.16 (0.03)	4.87 (0.11)	0.71 (0.48-0.94)	0.04 (-0.18-0.27) NS
Distress	sqrt	2.03 (0.02)	2.68 (0.08)	0.65 (0.50-0.80)	0.17 (0.02-0.31)

Separate regression models were run for each dependent variable.

AORs (Adjusted Odds Ratios) and adjusted Betas = Models adjusted for age, income, education, marital status, perceived stress, social support, and negative coping.

95% CI = 95% Confidence Interval; NS = Not Significant; Percents based on weighted n.

health and functioning. Results from the logistic regression models were supportive of hypothesis five.

In models that did not adjust for covariates, problem gambling was associated with increased odds of poorer self perceived general health (rated as good and fair/poor relative to excellent). When adjusting for significant covariates, differences in perceived general health were not found. In unadjusted models (models not controlling for covariates), problem gambling relative to non-problem gambling among women was associated with increased odds of past year suicidal ideation and suicide attempts. When adjusting for covariates in the models, the odd ratios for suicidal ideation and suicide attempts were no longer statistically significant.

In the unadjusted linear regression model for psychological well-being, problem gambling among women was associated with an increase in (reflect and square root) psychological well-being scores of 0.71 (scale ranged from one to 9.85 with higher scores corresponding to poorer psychological well-being). In the model adjusting for covariates, problem gambling among women was no longer significantly related to poor (reflect and square root) psychological well-being. In the unadjusted linear regression model for distress, problem gambling among women was associated with an increase in (square root) distress scores of 0.65 points (scale ranged from zero to 6.32 points with higher scores corresponding to higher levels of distress). In the adjusted distress model, the regression coefficient for problem gambling among women was attenuated, but still remained significantly associated with higher levels of (square root) distress.

Psychiatric Disorder Logistic Regression Models

Results from logistic regression models for psychiatric disorders in analysis phase five are presented in Table 15. It was hypothesized (hypothesis six) that problem

Table 15: Logistic Regression Analyses for Problem Gambling Versus Non-Problem Gambling and Psychiatric Disorders among Women

Dependent Variables		Independent Variable Problem Gambling Versus Non-Problem Gambling			
		Non-Problem Gambler % (SE%)	Problem Gambler %(SE%)	ORs (95% CIs)	AORs (95% CIs)
Psychiatric disorders	Depression	5.27 (0.32)	10.16 (2.35)	2.03 (1.21-3.41)	0.89 (0.48-1.65) NS
	Mania	0.96 (0.12)	4.02 (1.49)	4.33 (1.69-11.08)	2.60 (0.76-8.93) NS
	Panic Attacks	10.14 (0.46)	21.46 (3.17)	2.42 (1.66-3.53)	1.62 (1.07-2.45)
	Social Phobia	3.49 (0.26)	6.75 (1.74)	2.00 (1.09-3.68)	0.92 (0.42-2.03) NS
	Agoraphobia	0.95 (0.13)	4.78 (1.91)	5.21 (2.10-12.92)	2.95 (1.08-8.06)
	Alcohol Dependence	1.44 (0.15)	5.30 (1.67)	3.84 (1.91-7.70)	1.79 (0.75-4.26) NS
	Drug Dependence	0.42 (0.09)	1.56 (0.89)	3.78 (0.88-16.26) NS	N/A
	Any Psychiatric Disorder	17.30 (0.62)	35.56 (3.83)	2.64 (1.88-3.70)	1.65 (1.10-2.46)
	Psychiatric Comorbidity	4.17 (0.27)	11.90 (2.61)	3.11 (1.86-5.19)	1.52 (0.75-3.09) NS

Separate regression models were run for each dependent variable.

ORs (Odds Ratios) = no covariates controlled for in the models.

AORs (Adjusted Odds Ratios) = Models adjusted for age, income, education, marital status, perceived stress, social support, and negative coping.

95% CI = 95% Confidence Interval; NS = Not Significant; N/A = Not Applicable; Percents based on weighted n.

gambling relative to non-problem gambling among women would be associated with increased odds of psychiatric disorders. Results from the logistic regression models were supportive of hypothesis six. In models not adjusting for covariates, problem gambling relative to non-problem gambling among women was associated with all psychiatric disorders with the exception of drug dependence. Problem gambling relative to non-problem gambling among women was also associated with increased odds of having any psychiatric disorder and psychiatric comorbidity in models not adjusting for covariates. When logistic regression models were adjusted for covariates, problem gambling relative to non-problem gambling among women was only associated with increased odds of having panic attacks, agoraphobia, and having any psychiatric disorder.

Physical Health Condition Logistic Regression Models

Results from logistic regression models for physical health conditions in analysis phase five are presented in Table 16. It was hypothesized (hypothesis seven) that problem gambling relative to non-problem gambling among women would be associated with increased odds of physical health conditions. Results from the logistic regression models were largely unsupportive of hypothesis seven. Problem gambling was only associated with a significantly higher probability of having three chronic conditions, namely chronic bronchitis, fibromyalgia, and migraines headaches. When logistic regression models were adjusted for covariates, the only health condition that remained significantly associated with problem gambling was fibromyalgia.

Perceived Need for Help and Help-Seeking Logistic Regression Models

Results from logistic regression models for perceived need for help and help-seeking in analysis phase five are presented in Table 17. It was hypothesized (hypothesis eight) that problem gambling relative to non-problem gambling among women would be

Table 16: Logistic Regression Analyses for Problem Gambling Versus Non-Problem Gambling and Physical Health Conditions among Women

Dependent Variables		Independent Variable Problem Gambling Versus Non-Problem Gambling			
		Non-Problem Gambler % (SE%)	Problem Gambler % (SE%)	ORs (95% CIs)	AORs (95% CIs)
Physical Conditions	Food allergies	9.72 (0.42)	8.09 (2.01)	0.82 (0.46-1.45)NS	N/A
	Asthma	9.54 (0.43)	12.35 (2.61)	1.34 (0.82-2.19)NS	N/A
	Chronic bronchitis	3.65 (0.24)	8.34 (2.19)	2.40 (1.34-4.31)	1.56 (0.82-3.00)NS
	Fibromyalgia	2.44 (0.26)	6.82 (1.97)	2.92 (1.43-5.96)	2.44 (1.12-5.34)
	Arthritis or rheumatism	21.05 (0.57)	22.88 (3.22)	1.11 (0.76-1.62)NS	N/A
	Back problems	21.60 (0.64)	24.34 (3.19)	1.17 (0.83-1.65)NS	N/A
	Chronic fatigue syndrome	1.54 (0.18)	2.00 (1.10)	1.30 (0.27-6.35)NS	N/A
	Heart disease	4.77 (0.29)	5.42 (1.52)	1.14 (0.61-2.16)NS	N/A
	High blood pressure	15.48 (0.47)	11.90 (2.11)	0.74 (0.48-1.13)NS	N/A
	Stroke	0.70 (0.11)	1.37 (0.65)	1.98 (0.64-6.18)NS	N/A
	Migraine	15.48 (0.56)	21.13 (3.13)	1.46 (1.00-2.14)	1.11 (0.74-1.68)NS
	Diabetes	4.40 (0.31)	7.59 (2.34)	1.79 (0.83-3.87)NS	N/A
	Thyroid	9.11 (0.40)	8.73 (2.61)	0.95 (0.47-1.93)NS	N/A
	Bowel disorder	4.15 (0.27)	4.93 (1.56)	1.20 (0.58-2.46)NS	N/A
	Stomach/intestinal ulcers	3.99 (0.24)	4.18 (1.36)	1.05 (0.51-2.17)NS	N/A
	Cancer	2.10 (0.27)	3.91 (1.75)	1.90 (0.67-5.37)NS	N/A
	Multiple chem. sens	3.04 (0.22)	3.07 (1.29)	1.01 (0.35-2.89)NS	N/A
	Any Physical Condition	61.86 (0.74)	65.32 (3.88)	1.16 (0.83-1.64)NS	N/A
	Comorbid conditions	34.87 (0.73)	40.70 (3.82)	1.28 (0.93-1.76)NS	N/A

Separate regression models were run for each dependent variable.

ORs (Odds Ratios) = no covariates controlled for in the models.

AORs (Adjusted Odds Ratios) = Models adjusted for age, income, education, marital status, perceived stress, social support, and negative coping.

95% CI = 95% Confidence Interval; NS = Not Significant; N/A = Not Applicable; Percents based on weighted n.

Table 17: Logistic Regression Analyses for Problem Gambling Versus Non-Problem Gambling and Perceived Need for Help and Help-Seeking among Women

Dependent Variables	Independent Variable Problem Gambling Versus Non-Problem Gambling			
	Non-Problem Gambler % (SE%)	Problem Gambler % (SE%)	ORs (95% CIs)	AORs (95% CIs)
Perceived need for help without help-seeking	3.31 (0.25)	4.61 (1.20)	1.41 (0.79-2.52) NS	N/A
Help-seeking from a professional	11.56 (0.48)	17.22 (2.65)	1.59 (1.09-2.32)	0.87 (0.55-1.38) NS
Self-help group	1.51 (0.18)	3.32 (0.96)	2.24 (1.16-4.35)	1.27 (0.59-2.75) NS
Telephone helpline	0.55 (0.09)	4.29 (1.62)	8.17 (3.10-21.51)	4.21 (1.29-13.74)

Separate regression models were run for each dependent variable.

ORs (Odds Ratios) = no covariates controlled for in the models.

AORs (Adjusted Odds Ratios) = Models adjusted for age, income, education, marital status, perceived stress, social support, and negative coping.

95% CI = 95% Confidence Interval; NS = Not Significant; N/A = Not Applicable; Percents based on weighted n.

associated with increased odds of perceived need for help and help-seeking. Results from the logistic regression models were partially supportive of hypothesis eight.

In the logistic regression model not adjusting for covariates, problem gambling versus non-problem gambling among women was not associated with increased odds of perceived need for help without help-seeking. In unadjusted logistic regression models, problem gambling was associated with a significantly higher probability of help-seeking from professionals. When covariates were included in the logistic regression model, this relationship was no longer significant. In models not adjusting for covariates, problem gambling was associated with a significantly higher probability of attending a self-help group. When adjusting for covariates in the logistic regression model, problem gambling versus non-problem gambling among women was no longer associated with increased odds of attending a self-help group meeting. Finally, in the logistic regression model not adjusting for covariates, problem gambling was associated with a significantly higher probability of calling a telephone help line. When covariates were included in the logistic regression model, the odds ratio associated with calling a telephone help line was attenuated, but remained statistically associated with problem gambling relative to non-problem gambling among women. A summary of all the key findings in the current research is provided in Table 18.

Table 18: A Summary of the Key Findings	
	Key Findings
At-Risk Gambling	The past 12 month prevalence of at-risk gambling among women in Canada was 11.01% (SE = 0.32%). Age 20 years and over, all household income categories less than \$80,000, all education categories less than a university degree, a common law relationship, having higher levels of social support, endorsement of negative coping skills, and both high and severe levels of gambling exposure were all associated with increased odds of at-risk gambling behaviour. Positive coping strategies were associated with decreased odds of at-risk gambling.
Gambling-Related Problems	Women problem gamblers reported higher prevalence of all gambling-related problems compared to women non-problem gamblers.
Problem Gambling	The past 12 month prevalence of problem gambling among women in Canada was 1.35% (SE = 0.10). Being aged 40 to 49 years, reporting a household income of less than \$50,000, having a high school education or less, being never-married, some elevated levels of life stress, and use of negative coping skills were significantly associated with increased odds of problem gambling among women, while endorsement of higher levels of social support was associated with decreased odds of problem gambling.
Types of Gambling	All types of gambling were associated with a significantly higher probability of problem gambling among women, with the exception of internet gambling and games of skill. The types of gambling associated with the highest odds of problem gambling among women in Canada were VLTs outside the casino, VLTs inside the casino, and other casino games.
Health and Functioning	Problem gambling among women was associated with poorer self-perceived general health, suicidal ideation and attempts, decreased psychological well-being, and distress.
Health Conditions	Problem gambling among women was associated with depression, mania, panic attacks, social phobia, agoraphobia, alcohol dependence, any psychiatric disorder, psychiatric comorbidity, chronic bronchitis, fibromyalgia, and migraine headaches.
Help-Seeking	Problem gambling among women was associated with help-seeking from a professional, use of self-help groups, and calling a telephone help line.

Chapter VII: Discussion

To date, a limited amount of information on women and problem gambling is available, especially within the Canadian context. The current research has contributed to our understanding of problem gambling among women from a population health perspective. The conceptual framework developed for this research based on Evans and Stoddart's population health model⁷ was useful in organizing the data and guiding the research objectives. Overall, the results from the current analysis largely support the research hypotheses. The findings provide new knowledge to further our understanding of the correlates of problem gambling and important relationships between problem gambling and health and functioning, mental and physical health conditions, and help-seeking among women in Canada.

Correlates of At-Risk Gambling Behaviour

At-risk gambling in the current research was identified using criteria from past harm reduction research that suggested responsible gambling guidelines.^{83, 84} In the current research, 11% of women met criteria for at-risk gambling behaviour. Responsible guidelines for gambling behaviour may help to identify gambling behaviours that may put women at-risk for developing gambling problems. To more accurately identify women who are at a potentially increased risk of developing gambling problems, it is important to identify the correlates that are associated with at-risk gambling behaviour. Using the conceptual framework as a guide, the current findings indicated that social/psychosocial variables and exposure to gambling were associated with a significantly higher probability of at-risk gambling behaviour. These findings are novel since this is the first study to use a representative sample of women to investigate the correlates of gambling above recommended gambling guidelines.

Overall, a common law relationship, having higher levels of social support, endorsement of negative coping skills, and both high and severe levels of gambling exposure were associated with increased odds of at-risk gambling behaviour. In addition, all age categories starting at age 20 years and older relative to the youngest age category of 15 to 19 years, middle to low income brackets relative to the highest income level of \$80,000 or more, and middle to low levels of educational attainment relative to the highest education level of university degree were associated with increased odds of at-risk gambling behaviour. Endorsement of positive coping skills was associated with decreased odds of at-risk gambling behaviour.

When collectively considering the relationships between at-risk gambling with age, income, and education, it should be noted that gambling at levels beyond the recommended responsible gambling guidelines, a once uncommon occurrence among women, now has widespread appeal to women from various socioeconomic echelons. The results from the current analysis indicate that at-risk gambling is associated with various age, income and educational levels. These results are similar to past research using a sample of men and women that found older adults gambled as much as younger adults.²⁴ Although, excessive gambling seems to have a widespread appeal to women from different sectors of the Canadian population, the most elevated odds of at-risk gambling appears to be among women with the lowest household income and educational attainment.

Compared to married women, the probability of at-risk gambling was significantly greater only among women who reported living in common-law relationships. It is not clear why only women in common-law relationships would have increased odds of at-risk gambling behaviour. This finding does highlight the

importance of considering married and common-law women in separate marital status groups when studying women and gambling. However, further research in this area is required to clarify this relationship.

Surprisingly, greater social support was associated with increased odds of at-risk gambling. This finding did not support the research hypothesis indicating that higher levels of social support would decrease the odds of at-risk gambling behaviour. Conclusions from past research on recreational gambling among older adults (men and women) identified increased activity and socialization as possible benefits of gambling.¹⁶¹ Although findings from this previous study are not generalizable to women gamblers, it may indicate that gambling activities that includes socialization may generate a sense belonging that facilitates the perception of social support. In addition, a qualitative study of women gamblers in Australia found that women preferred to gambling in local venues where they felt safe and a sense of belonging.⁵⁸ Women who gamble frequently with the same individuals or in the same location may develop a sense of connectedness, which may be reflected in higher perceptions of social support. Perhaps if gambling activities escalates to problem gambling behaviour, the gambling may become more isolated, secretive, and less social. Data on socialization or a sense of belonging while gambling are not available in the CCHS 1.2 and, therefore, this possible explanation of why higher levels of social support corresponded to increased odds of at-risk gambling behaviour cannot be examined further with these data.

Consistent with the research hypotheses, increased positive coping strategies were associated with decreased odds of at-risk gambling behaviours, while increased negative coping strategies were associated with increased odds of at-risk gambling

behaviours. As expected, positive coping abilities that include constructive, proactive strategies to deal with stress such as exercising, problem solving and talking to others were associated with reduced odds of at-risk gambling behaviour. However, negative coping abilities that include more passive strategies to manage stress such as avoidance of other people and blaming oneself were associated with increased odds of at-risk gambling behaviour. These findings identify the potentially important role that positive coping skills may play in reducing the odds of at-risk gambling among women. More specifically, future research that investigates the effectiveness of teaching women how to use positive coping skills and avoiding the use of negative coping skills to reduce at-risk gambling behaviour among women should be encouraged.

Finally, as hypothesized, increased levels of gambling exposure was associated with increased odds of at-risk gambling among women in Canada. Specifically, relative to women living in areas with low gambling exposure, women living in areas that had high and severe gambling exposure had increased odds of at-risk gambling behaviour. These findings suggest that high concentrations of VLTs placed in the community elevate the odds of at-risk gambling behaviour since all areas with high concentrations of VLTs in the community were associated with increased odds of at-risk gambling behaviour among women. These findings are consistent with past research that indicates that increased availability of gambling is associated with gambling problems.⁹

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Gambling has been marketed as a socially acceptable form of entertainment with some advertising specifically targeting women. The findings from the current research demonstrate that frequent gambling does appeal to women of diverse ages, income brackets, and education levels, and is more likely in areas with greater

accessibility of gambling through high concentrations of VLTs within the community. From a public health perspective, the wide appeal of gambling among women should be taken seriously to reduce the likelihood of potential harm.

Gambling-Related Problems

The most commonly endorsed gambling-related problem reported among women problem gamblers was spending more money than wanted to on gambling. Spending more money than intended is one indication of loss or potential loss of control of gambling behaviour. Past qualitative research on women gamblers identified loss of control as one of the negative aspect of gambling.^{5, 58} It should also be noted that spending more money than intended on gambling was also the most prevalent gambling-related problem among women non-problem gamblers, which may indicate that not being able to stop gambling once money is lost may be a common experience for many people. However, reporting spending more than intended was approximately 6 times more likely among women problem gamblers compared to women non-problem gamblers (86.47% compared to 14.43%; $\chi^2 = 155.89$, $df = 1$, $p < .001$).

Findings from the current research indicated that gambling as a means of forgetting about problems or dealing with depressed feelings was the second most prevalent gambling-related problem among women. For some women, gambling may start as a recreational activity, but later may become used as a mechanism to escape problems.¹⁶² In fact, gambling to forget about problems, escape problems, or to deal with depressed feelings is commonly reported as a motivational factor for gambling among women or has been found to be associated with being female.^{5, 26, 44, 58, 63, 163, 164} Therefore, the activity of gambling itself for some women may function as a negative coping mechanism for dealing with problems and emotions or a way to dissociate from

reality. Gambling as a means of escaping problems can quickly create other problems in other areas of life.¹⁶² As well, using gambling as a coping mechanism to escape problems or deal with mood may lead to more gambling and will likely create new gambling-related problems and exacerbate depressed mood. In the current analysis, reporting gambling to manage problems or depressed feelings was approximately 16 times more likely among women problem gamblers compared to women non-problem gamblers (44.33% compared to 2.77%; $\chi^2 = 71.63$, $df = 1$, $p < .001$).

To further underscore the importance of this gambling-related problem, a supplementary analysis indicated that gambling to forget about problems or manage mood was the only gambling-related problem found to be statistically different among women problem gamblers compared to men problem gamblers. Women problem gamblers were almost two times more likely to endorse gambling to forget about problems or manage mood compared to men problem gamblers. This finding further clarifies the unique role gambling plays for some women with gambling problems and may highlight an important area to be addressed in treatment.

Correlates of Problem Gambling

When applying the conceptual framework, several social/psychosocial variables were found to be associated with problem gambling. Determining which correlates are significantly associated with problem gambling among women in Canada can help to identify certain factors that place women at elevated odds of developing gambling problems. Not only has a small amount of research been conducted on women and problem gambling, to date, but research using representative data to investigate the social/psychosocial environment specific to women problem gamblers has not been conducted in any country. Therefore, the findings from the current research provide

new information on the correlates of problem gambling among women. In summary, the results determined that being aged 40 to 49 years, having an annual household income of less than \$50,000, having a high school diploma or less, and being never-married was associated with increased odds of problem gambling among women. Elevated self-perceived life stress and endorsement of negative coping abilities were also associated with increased odds of problem gambling. However, endorsement of higher levels of social support was associated with decreased odds of problem gambling among women in Canada.

With regard to age, the results identify the middle age category of 40 years to 49 years as a significant correlate of problem gambling among women in Canada. The age categories of 30 years to 39 years and 50 years to 59 years had odds ratios over two, but did not reach statistical significance in the multiple logistic regression model. Although there is limited information on the relationship between women's age and problem gambling, data from clinical research indicates that many women seeking help for gambling problems are middle-aged. For example, clinical data from Manitoba indicated that more than 50% of gambling clients were between the age of 35 years to 50 years.³⁵ In addition, data from Australia found that the majority of women calling a gambling help line and using gambling counseling services were between the ages of 30 years to 49 years.⁵⁸ Although women meeting criteria for problem gambling in this study and women seeking help through counseling and telephone help lines are not directly comparable groups, results from all of these study samples indicate middle age as a common life stage for women to experience gambling problems.

With regard to income, the findings from the current study further confirm that women in both low and middle income brackets have elevated odds of problem

gambling, which is consistent with clinical data from Manitoba. According to the clinical data, among women providing information on household income, approximately 48% of women gambling clients had a household income of \$29,999 or less and 26% of women reported a household income of \$30,000 to \$49,999.³⁵ These findings are important because they indicate that problem gambling among women is not isolated to families with the lowest household incomes and further demonstrates the widespread appeal of gambling among women.

Very little research has been conducted on the relationship between educational attainment and problem gambling among women. The current research indicates that women with either of the two lowest levels of educational attainment (not graduating high school or high school graduate) relative to having a university degree had increased the odds of problem gambling. Similarly, past research on women problem gamblers in Alberta found that problem gambling was related to having less than a high school education.⁶² Other research on problem gambling using a combined sample of men and women found that problem gambling was related to lower levels of educational attainment.²¹ Several factors may explain the relationship between problem gambling among women and lower levels of educational attainment. It is possible that women with lower levels of education attainment may have a misunderstanding of probabilities and randomness and may believe gambling myths such as being able to influence, control, or anticipate outcomes. It is also possible that women with lower levels of education may have less earning potential and may be motivated to gamble for the possible monetary gain from a large payout. Data from the current research is unable to determine the reason why women with lower levels of educational attainment were more likely to have gambling problems. However, the current findings do identify

that women with a high school diploma or less have elevated odds of problem gambling in Canada.

Due to the lack of research using representative samples of women problem gamblers, the relationship between marital status and problem gambling among women is largely unknown. The current findings shed light on the inconsistent results on problem gambling and marital status reported in previous studies that used non-representative samples and/or combined men and women into one group. The current findings indicated that only women who were never-married had increased odds of problem gambling relative to women who were married. This finding is consistent with a study of women gamblers from Alberta that found that women problem gamblers were two times as likely to be single.⁶² No other marital status groups in the current study were associated with increased odds of problem gambling. It is possible that without the presence of a marital partner, gambling behaviour may go unnoticed for women who are never-married. However, this rationale would not explain why being widowed, separated, or divorced relative to being married was not associated with a higher probability of problem gambling. The difference may be that women who are widowed, separated, or divorced may be more likely to have a network of older children who provide social support and help to recognize potential gambling problems. The explanation of these findings is beyond the data. Further research on problem gambling and marital status is required to clarify the relationship.

Social support is an important part of the social/psychosocial environment. Past research on elderly adults found that frequent casino gambling was associated with having poor social support networks.⁶⁵ The current research is the first study to investigate the relationship between social support and problem gambling among a

representative sample of women. As hypothesized, higher levels of social support were associated with decreased odds of problem gambling. These findings suggest social support is a protective factor against problem gambling. More specifically, women who feel more socially connected are less likely to become problem gamblers. Having a supportive social network can be helpful in recognizing excessive gambling activities before problems occur. Also, research has indicated that women report loneliness as a reason for gambling.^{27, 58} Having a supportive social network could help to reduce feelings of loneliness and thereby reduce the motivation to gamble for some women. Unfortunately, it was not possible to further investigate this relationship since reasons for gambling (i.e. loneliness) were not included in the CCHS 1.2.

Odds ratios were elevated for increasing levels of reported self-perceived life stress. However, not all levels of stress reached statistical significance. Failure to reach statistical significance or all levels of reported stress was likely due to underpowered models, which is evidenced by the wide confidence intervals.

As hypothesized, negative coping strategies were associated with increased odds of problem gambling among women in Canada. These findings indicate that women who use more passive coping strategies such as avoiding being around people, sleeping more, or blaming oneself are at increased odds of being a problem gambler. This finding is in keeping with past research using a small clinical sample of men and women that found problem gamblers compared to non-problem gamblers were more likely to report poor coping strategies.⁷⁴ Interestingly, in the current study, positive coping strategies were not associated with problem gambling among women. Perhaps the positive coping strategies identified in the current research such as exercising, talking to someone, and looking on the bright side may be effective in managing some

problems including at-risk gambling behaviour, but not effective in dealing with larger matters such as problem gambling. It may be that positive coping strategies need to be more specific to the needs of women gamblers to deal with the challenges faced when gambling becomes problematic. Therefore, further research should be conducted to identify positive coping strategies that are effective in managing or reducing gambling problems among women.

A somewhat surprising finding was the non-significant relationship between exposure to gambling and problem gambling in the model adjusting for all covariates. However, a supplementary analysis indicated that this relationship was significant when no covariates were included in the model. Therefore, the non-significant results in the adjusted models in the current analysis should be interpreted with caution. Although it was hypothesized that exposure to gambling would be associated with problem gambling, factors in the social/psychosocial environment may account for the association between exposure to gambling and problem gambling among women. Alternatively, the failure to find a significant relationship may be due to the reference group in the current investigation of low levels of gambling exposure being defined as the presence of a permanent casino only. The results from the current analysis indicate that casino gambling is associated with significantly high increased odds of problem gambling. Therefore, since casino gambling is associated with a higher probability of problem gambling, it may not be surprising that significant odds ratios corresponding with increasing levels of gambling exposure were not found. Likewise, it is possible that a failure to find a significant or large effect may be due to the way in which exposure to gambling was measured. It is possible that the information on gambling exposure available in the current data did not contain enough detail to accurately probe

the relationship between exposure to gambling and problem gambling. For example, prior research has found that living within 10 miles of a casino is associated with increased odds of gambling problems.⁵⁶ To better understand the impact exposure to gambling has on problem gambling outcomes, it may be necessary to know not only what types of gambling are available, but also how accessible gambling is for individuals. The current investigation would have benefited from inclusion of more information on gambling exposure including the distance the respondent lived from a permanent casino or the concentration of VLTs within a 10 mile radius of the respondent's residence. In addition, the physical environment also includes advertising and marketing of gambling. The CCHS 1.2 did not contain any information of the respondent's awareness of or exposure to gambling advertising, marketing campaigns, or promotional gambling material. The lack of detail in the measurement of exposure to gambling is considered a limitation of the current analysis, which indicates that further research on gambling exposure should be conducted before firm conclusions can be made.

The population health model was effective in identifying aspects of the social/psychosocial environment that were associated with problem gambling among women in Canada. In summary, when concurrently considering all variables, the model identified that age, income, education, marital status, social support, life stress, and negative coping are all significant correlates of problem gambling among women in Canada. More specifically, relative to the respective reference categories, the model has identified women who are middle aged, have a household income of less than \$50,000, have a high school diploma or less, have never been married, have less supportive

social networks, elevated perceived life stress, and endorse negative coping strategies at increased odds of problem gambling.

Type and Frequency of Gambling

When applying the population health model to problem gambling, genes, physical environment, and social/psychosocial environment function together to influence an individual's gambling behaviours with regard to type and frequency of gambling activities. The present findings determined that all types of gambling activities were associated with problem gambling among women with the exception of internet gambling and games of skill (i.e. golf or pool) after adjusting for the significant social/psychosocial covariates. The greatest odds of problem gambling were associated with gambling weekly or more on VLTs outside a casino, gambling weekly or more on VLTs inside a casino, and gambling monthly or more on other casino games relative to reporting never gambling on each type of gambling, respectively.

Most noteworthy, women who played VLTs outside a casino weekly or more were almost 54 times more likely to be problem gamblers than women who reported never gambling on VLTs outside a casino. Even lower frequencies of playing VLTs in the community were associated with a significantly higher probability of problem gambling. For example, women playing VLTs outside a casino one to three times a month were almost 18 times more likely to be problem gamblers than women reporting never playing VLTs outside a casino. However, greater frequency of gambling on VLTs outside a casino corresponded with a higher probability of problem gambling. Playing VLTs inside a casino was also associated with elevated odds of problem gambling. Women playing VLTs inside a casino weekly or more were 36 times more likely to be problem gamblers than women who reported never gambling on VLTs

inside a casino. These findings are consistent with past research on men and women that found that VLTs had the strongest association with gambling problems.⁸⁶ VLTs are considered to have high addictive potential⁸⁵ and have been referred to as the “crack cocaine” of gambling.¹⁶⁵ Possible reasons for the unique addictive nature of VLTs include: the quick continuous play with the gambler setting the pace, the misconception that there is a strategy to win, the mistaken belief that the gambler can manipulate the machine, the inability to understand that longer play means larger losses, the misunderstanding of the odds of winning, and the ability to dissociate during VLT play.¹⁶⁶ These results highlight the extremely increased odds of problem gambling associated with VLT play both inside and outside the casino, with VLTs outside the casino carrying the most elevated odds of problem gambling.

Additionally, women playing other casino games once a month or more were 24 times more likely to be problem gamblers than women who reported never gambling on other casino games. Therefore, it is not just VLTs throughout the community or in casinos that are highly associated with problem gambling, but also other games in the casino. Bingo is another socially acceptable form of gambling that is often found within casinos, but also in churches and community centres. Despite the wide acceptance of bingo, results from the current analysis indicate that frequent bingo play is associated with a significantly higher probability of problem gambling among women. More specifically, women reporting playing bingo several times a week were 16 times more likely to be problem gamblers than women who reported never playing bingo. Almost all types of gambling assessed in the current research were associated with problem gambling with the general trend of more frequent gambling corresponding to larger odds of having problems. There was a wide range in the size of the odds ratios, which

highlights types of gambling that are more likely to lead to problem gambling among women. These forms of gambling, namely, VLTs inside and outside casinos and other casino games, need to garner the most scrutiny to implement needed changes with regard to the gambling landscape in Canada.

Internet gambling was not associated with increased odds of problem gambling among women. To date, not a lot of research has been conducted on internet gambling. Internet gambling is considered a new form of gambling that is difficult to regulate.¹⁶⁷ Research using clinical data on men and women patients from medical and dental clinics from the United States determined that internet gambling still appears to be a rare event.¹⁶⁸ Similarly, placing bets on the internet was one of the least endorsed types of gambling among women seeking treatment for gambling problems in Manitoba.³⁵ Likewise, only 1.21% (SE = 0.19%) of non-problem gamblers and 1.41% (SE = 0.65%) of problem gamblers in the current research reported gambling on the internet in the past 12 months. Even though internet gambling may be accessed from within the home, it may still be less accessible for some women who do not have a computer and internet access or credit card. Also, internet gambling may be more difficult to hide from family and friends, which can be a concern for some problem gamblers. Gambling on games of skill such as golf or pool was also found to have no association with problem gambling among women. Past research has found that men compared to women are more likely to play games of skill.²⁴ Gambling on games of skill may not be a preferred type of gambling among women leading to the non-significant association with problem gambling found in the current research.

Problem Gambling and Health and Functioning

According to the population health model, problem gambling may have an impact on health and functioning including aspects of physical and mental health and well-being. To date, research on problem gambling among women and self-perceived general health, psychological well-being, and distress has not been conducted. Results from the current study found that in univariate models (models without covariates) that relative to excellent self-perceived general health, women problem gamblers were almost three times more likely to perceive their general health as good and almost four times more likely to rate their self-perceived general health as fair/poor. Past research using samples of older adults (men and women combined) also found a significant association between gambling and reduced levels of general health measured using the SF-36.^{90, 91} Although similarities are noted in the current findings and in earlier studies, the results are not directly comparable due to differences in the samples and measurement tools. Furthermore, in the current study, when controlling for the significant social/psychosocial covariates identified in analysis phase three, no statistical differences between women problem gamblers and women non-problem gamblers were found. These findings suggest that covariates in the social/psychosocial domain account for the variance in the relationship between problem gambling among women and decreased levels of self-perceived general health.

To date, research has not been conducted on psychological well-being and distress among a representative sample of women problem gamblers. Results from the current study found in an unadjusted model (not controlling for covariates) that problem gambling was associated with an increase in (reflect and square root) psychological well-being scores. This means that problem gambling among women was

related to poorer levels of psychological well-being. However, the variance in this relationship was accounted for when the social/psychosocial covariates were controlled. With regard to distress, problem gambling among women was associated with an increase in (square root) distress scores of 0.65 points. When social/psychosocial covariates were added to the model, the relationship between problem gambling and (square root) distress scores was attenuated, but still remained statistically significant. These findings indicate that part of the association between problem gambling and distress is explained by the social/psychosocial variables. However, the social/psychosocial variables assessed in the study did not fully account for the relationship between problem gambling and distress. These results highlight the potentially important role the social/psychosocial domain may play in improving psychological well-being and decreasing distress among women problem gamblers. Further research in this area is warranted.

A large body of research has found significant associations between problem gambling and suicidal ideation and attempts in various samples.^{44, 86, 96, 97, 169, 170} The present investigation confirms and extends past research with the findings that past year problem gambling among women was associated with increased odds of both past year suicidal ideation and attempts in univariate models using a representative sample. Although, the cross-sectional nature of the survey does not allow for conclusions that problem gambling causes suicidal ideation and attempts, an association does exist. These findings alert us to the importance of recognizing problem gambling early due to the increased likelihood of suicidal ideations and attempts found among these women. However, when controlling for the covariates in the social/psychosocial domains, these relationships between problem gambling and suicidal ideation and attempts were no

longer significant. These findings indicate that the variance in the relationships between problem gambling and suicidal ideation and attempts were accounted for by variables assessed in the social/psychosocial domain and highlights the potentially important protective factors within the social/psychosocial environment. Further research on problem gambling and interventions involving elements in the social/psychosocial environment may be useful as a possible means of reducing the odds of suicidal ideation and attempts among women problem gamblers in Canada.

Problem Gambling and Psychiatric Disorders

The current study provides the first data on problem gambling and psychiatric disorders among women in Canada. In models not adjusting for covariates, problem gambling relative to non-problem gambling was associated with increased odds of all psychiatric disorders assessed in the present analysis with the exception of drug dependence. Although the odds ratio for drug dependence was relatively large (odds ratio = 3.78; 95% CI = 0.88-16.26), the finding did not reach statistical significance likely due to a low powered model. These findings highlight the important association between problem gambling among women and poor mental health and are consistent with past community and clinical research from the United States and Spain that found an association between problem gambling among women and psychiatric disorders.^{29,}

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In the present investigation, when adjusting for the social/psychosocial covariates, only panic attacks, agoraphobia, and having any psychiatric disorder remained significantly associated with problem gambling among women. These findings indicate that elements in the social/psychosocial domains as identified through the population health model help to explain the relationship between psychiatric

disorders and problem gambling since these factors account for some or all of the variance in these relationships.

Panic attacks were a specific psychiatric condition that remained significantly associated with problem gambling among women after adjusting for social/psychosocial covariates. In prior qualitative research, women gamblers often reported panic as a negative health consequence of gambling.⁵⁸ Panic attacks are described as sudden moments of fear and apprehension accompanied with symptoms of shortness of breath and feeling of choking or suffocation, palpitations, chest pain or discomfort.⁸⁷ Feelings of panic may be associated with gambling that has become problematic for the individual. For some women, losing control of gambling behaviour, losing more money than intended or than one could afford to lose, or the realization of the consequences of their gambling problems may be associated with elevated panic. Conversely, for some women gambling may be used as a negative coping mechanism to deal with feelings of panic. To date, the current research is the only investigation of panic attacks among a representative sample of women problem gamblers. Although these findings provide insight into the mental health problems associated with problem gambling among women, more research is necessary to further understand this relationship.

Agoraphobia was also significantly associated with problem gambling among women after adjusting for all variables in the social/psychosocial domain. Agoraphobia is an anxiety disorder that is described as having anxiety about and avoiding places or situations that may be difficult to escape, create embarrassment, or lack help if panic ensues.⁸⁷ Few studies have specifically investigated the relationship between problem gambling and agoraphobia, especially among women. An earlier study that included a

community sample of men and women from Edmonton found that the prevalence of agoraphobia was significantly higher among problem gamblers compared to non-gamblers.⁹⁷ Another study found a significant association between problem gambling and agoraphobia with panic among a representative sample of women from the United States after adjusting for sociodemographic variables.²⁹ As well, a study using an affluent psychiatric outpatient sample of men and women found that agoraphobia with panic was associated with gambling problems.¹³⁹ Because of the nature of agoraphobia, it may be more theoretically likely that gambling may occur as a means of dealing with the stressful and anxious symptoms of agoraphobia, rather than gambling being the situation that is avoided. Although, it is also possible that problem gambling precedes or develops concurrently with agoraphobia. The mechanisms underlying the relationship between problem gambling and agoraphobia are unclear and require further investigation.

A number of possible mechanisms may explain the relationship between problem gambling and psychiatric disorders. First, a direct relationship may exist between problem gambling and psychiatric disorders. For example, problem gambling may lead to an increased risk of psychiatric disorders. Conversely, the reverse direction of this relationship is also possible with psychiatric disorders possibly leading to problem gambling if gambling is used as a means of negative coping to deal with stress, anxiety, and mood.

In addition, personality factors may play a role in the relationship between problem gambling and psychiatric disorders. More specifically, personality may cause variation in psychiatric disorders (dependent variable), and personality may be varied by problem gambling. Also if this is the case and if a direct relationship exists between

problem gambling and psychiatric disorders then personality factors may mediate this direct relationship. A study using a birth cohort of young adults found that those with a diagnosis of problem gambling at age 21 were more likely to have higher levels of nervousness or worry, anger or aggressiveness, feeling mistreated or victimized, risk taking, impulsivity, and rebelliousness.¹⁷¹ These personality characteristics may in turn have an impact on psychiatric disorders. In fact one study did find that impulsivity fully mediated the relationship between depression and problem gambling in a sample of university students.¹⁷² Whether the relationship between problem gambling and dimensions of personality would remain significant in a general population sample, if impulsivity could mediated the relationship between problem gambling and other psychiatric disorders, and whether other personality dimensions could play a mediational role in this relationship remains to be determined in future research.

Another underlying mechanism in the relationship between problem gambling and psychiatric disorders may be genetics. Although it is not clear if a genetic predisposition exists for problem gambling,⁴² it may be possible that genetic make-up may predispose an individual to both problem gambling and psychiatric disorders. Finally, shared environmental risk factors may predispose women to both problem gambling and psychiatric disorders. An example of a shared environmental risk factor may be poverty. Limited or inadequate financial resources may increase both the likelihood of gambling and poor mental health. Future research is necessary to understand the underlying mechanisms in the relationship between problem gambling and psychiatric disorders.

Problem Gambling and Physical Health Conditions

According to the population health model, problem gambling may have a negative impact on health outcomes. However, contrary to prior research from the United States,¹¹¹ results from the current analysis did not provide strong evidence for the relationship between problem gambling and physical health conditions.

Comparability is limited between these two studies since the study from the United States used different timeframes for measuring physical health (lifetime) and gambling problems (past year), the United States study combined men and women into one group, each study used a different measure of problem gambling, and only a few of the physical health conditions included in both study were the same. The physical health conditions found to be statistically associated with problem gambling in the current research (chronic bronchitis, fibromyalgia, and migraine headaches) were not assessed in the United States study.

In the current research, when controlling for social/psychosocial covariates, only fibromyalgia remained significantly associated with problem gambling among women. Fibromyalgia is a chronic pain disorder that includes widespread musculoskeletal pain, stiffness, paresthesia, disturbed sleep, and fatigue involving multiple painful tender points with a wide and symmetrical distribution.¹⁷³ It is a condition that is common in middle aged women¹⁷⁴ and has been found to be comorbid with psychiatric disorders among women.¹⁷⁵ Problem gambling among women in the current sample was also associated with middle age categories and having a psychiatric disorder, which may explain the relationship between fibromyalgia and problem gambling. It has been suggested that in some cases fibromyalgia may be a somatic response to stress with the relationship between chronic stress and subsequent

fibromyalgia explained by possible abnormalities in neuroendocrine function.¹⁷⁶ Although, research has yet to fully explain the predisposing role of stress in fibromyalgia.¹⁷⁷ Simply stated, a stress and fibromyalgia biopsychosocial model proposes that genetic predisposition to stress interacts with environmental and developmental factors leading to sensitization of the stress response system, which may lead to inadequate stress coping and result in unhealthy behaviours, dysfunctional lifestyle, and accumulating psychosocial stress that could precipitate illness for some individuals.¹⁷⁸ Therefore, it is possible that chronic stress related to problem gambling may help to explain the association found between problem gambling and fibromyalgia in the current research. Likewise, since out of 17 assessed physical health conditions, fibromyalgia was the only one that was significantly associated with problem gambling after adjusting for social/psychosocial covariates, it is also possible that this finding is due to chance alone. Without the replication of these results, firm conclusions regarding the real or spurious nature of the relationship between problem gambling and fibromyalgia cannot be made. However, further research is warranted.

Several explanations can be provided for why problem gambling was not associated with the vast majority of physical health conditions included in the current analysis. First, it has been found that women develop gambling problems at a much faster pace compared to men.^{49, 50} Therefore, women entering treatment may have only been gambling for a few years, while it might be common for men in treatment to indicate gambling for 20 or 30 years.⁵¹ The shorter time period of gambling may mean less time for the subsequent physical health conditions to develop and be diagnosed. Therefore, a relationship between problem gambling and physical health conditions may exist among women if problem gambling behaviours persist for an extended

period of time. Second, the physical health conditions assessed in the CCHS 1.2 were based on respondents self-reports of physician diagnoses, but were not verified using external sources. Although this method has been used in previous gambling research,¹¹¹ the method of assessment may introduce some sampling error with some conditions being over or under reported. For example, some diagnoses may have been missed if the respondent had physical health condition, but did not seek help and obtain a diagnosis. Likewise, individuals may report having a chronic health conditions such as migraine headaches even though a formal diagnosis has not been provided from a health care professional. Therefore, it is possible that the relationship between problem gambling and physical health conditions may be different if the physical health conditions were assessed using physician-confirmed diagnoses. Third, the list of chronic conditions was not exhaustive. Finally, it is possible that no significant relationship exists between problem gambling among women and numerous physical health conditions. More research needs to be conducted to clarify these findings.

Problem Gambling and Perceived Need for Help and Help-Seeking

According to Evans and Stoddart's population health model, accessing the health care system depends on perceiving a need and seeking care for available services.⁷ In the current study, problem gambling was not associated with perceiving a need for help with emotions, mental health, or use of alcohol or drugs. The non-significant finding may be due to the non-specific measurement of perceived need for help, which included perceiving a need for a wide range of mental health problems, but not specifically for problems related to gambling. Another possible reason that may explain the non-significant finding may be that women with gambling problems may not perceive a need for help until their gambling problems have reached a level of crisis

including emotional and/or financial concerns. Gambling counselors have indicated that financial crisis often motivates help-seeking among problem gamblers (E. Golden & S. Van Hull, personal communication, March 21, 2006). Therefore, some problem gamblers may not perceive a need for help until they acknowledge the financial costs of their behaviour. Alternatively, it is possible that a relationship between problem gambling among women and perceived need for help for emotions, mental health, and alcohol or drug problems does not exist. However, the findings from the current research may have been different if specific measures of perceived need for help and help-seeking for gambling problems were used. This is considered a limitation of the current analysis. Further research using more specific measures of perceived need for help for gambling problems is necessary.

With regard to help-seeking, women problem gamblers were almost two times more likely to seek help from professionals (i.e. psychiatrist, family doctor or general practitioner, psychologist, etc) than women non-problem gamblers. In addition, women problem gamblers were more than two times more likely to attend a self-help meeting than women non-problem gamblers. As well, women problem gamblers were more than eight times more likely to call a telephone help line than women non-problem gamblers. However, when controlling for social/psychosocial variables, the only relationship that remained statistically significant was calling a telephone help line.

The significantly higher probability of calling a telephone help line associated with problem gambling may not be surprising since telephone help lines are likely the most advertised way to seek help for gambling problems. Pamphlets with warning signs of gambling problems and gambling help line telephone numbers are often available in casinos. Also, gambling help line telephone numbers are also displayed on VLT screens

and can be printed out on a ticket. As well, the anonymity of calling a telephone help line may also make it a desirable choice for women problem gamblers since women are often reluctant to seek help for gambling problems.¹²⁷ If organized effectively, telephone help lines can be a valuable tool in helping women access help for gambling problems. For example, in Manitoba, when someone calls the gambling help line he/she is then referred to services at the Addictions Foundation of Manitoba (E. Golden & S. Van Hull, personal communication, March 21, 2006). Similarly, referrals for 24 hour problem gambling counseling services throughout the province of British Columbia can be coordinated when calling the British Columbia gambling help line (A. Nicholson, personal communication, October 18, 2007). Since, in the current research, problem gambling was associated with a higher probability of calling a telephone help line, help lines should be well coordinated with services and resources to encourage further help-seeking among women.

Chapter VIII: Research and Policy Implications and Directions for Future Research

Findings from the current investigation have important research and policy implications. From a public health perspective research investigating the health and social correlates of problem gambling among women can help to reduce harm and inform healthy public policy. Rather than primarily focusing on preventative (e.g. educational campaigns) or remedial approaches (e.g. treatment) that may only target a small proportion of the population, it has been suggested that a whole population approach that balances upstream (healthy public policy), midstream (preventative), and downstream (remedial) interventions will have the greatest overall impact on the health of a society.¹⁷⁹ The current research has important research and policy implications that could inform a whole population public health approach. A summary of the research and policy recommendations based on the results from the current research are presented in Table 19.

Upstream Intervention: Healthy Public Policy

Upstream interventions involve governmental, institutional, and organizational actions and are effective because they are intended for the entire population.¹⁷⁹ Results from the current research have important implications that could inform healthy public policy. First, the two types of gambling associated with the largest odds of problem gambling among women were VLTs both outside and inside a casino. Women gambling weekly or more on VLTs outside a casino are almost 54 times more likely to be a problem gambler than women not gambling on VLTs outside a casino. Likewise, women gambling weekly or more on VLTs inside a casino are approximately 36 times more likely to be a problem gambler than women not gambling on VLTs inside a

Table 19: Research and Policy Recommendations Based on a Whole Population Approach	
Intervention	Recommendations
Upstream: Healthy Public Policy	(1) Develop a plan to remove all VLTs from bars, restaurants, lounges, and legions and permanently prohibit VLTs from these types of locations.
	(2) Limit VLTs to casinos only.
	(3) Reduce the number of VLTs currently available in casinos/province and implement a lower provincial cap of machines in casinos.
	(4) Reduce the hours of operation of VLTs to midday or evening to midnight daily.
	(5) Reduce casino hours of operation.
	(6) Remove casinos from heavily populated urban and rural areas and lower socioeconomic status neighborhoods and prohibit the construction of new casinos in these areas.
	(7) Prohibit all casino advertising or casino promotion.
Midstream: Primary and Secondary Prevention	(1) Create awareness and educational campaigns highlighting the facts of women and problem gambling and provide information on the resources currently available that would especially appeal to women with gambling problems.
	(2) Develop prevention programs to address the specific needs of women with gambling problems and help women self-manage their gambling behaviour. Prevention efforts should always be evaluated for proven effectiveness.
	(3) Develop strategies to improve positive coping skills, supportive networks, and healthy stress management to reduce gambling among women and conduct research to ensure utility.
	(4) Conduct research on effectiveness of altered VLTs features such as removal of stop buttons, decreased play speed, mandatory cash outs, and gambling myths and responsible gambling screens are on reducing time and money spent on gambling.
Downstream: Remedial or Tertiary Prevention	(1) Promote 24 hour toll free gambling telephone help lines and ensure telephone help lines and treatment and resources options are well coordinated. Telephone help lines should function as the primary entry point for help-seeking.
	(2) Screen women with gambling problems for suicidal ideation and attempts.
	(3) Screen women with gambling problems for comorbidity of other psychiatric disorders since it may have implications for effective treatments.

casino. These extremely high odds of problem gambling associated with VLTs both inside and outside casinos are beyond levels of risk that should be considered acceptable and highlights a priority area of gambling regulation that needs to be reassessed. These findings signify the importance of reducing the availability and accessibility of VLTs.

Therefore, several recommendations can be made to reduce the availability and accessibility of VLTs in Canada. The VLT recommendations include: (1) the generation of formal plans to remove all VLTs outside of casinos including: community bars, restaurants, lounges, and legions and permanently prohibit VLTs from these community locations in all provinces; (2) only permitting VLTs in casinos; (3) reducing the number of VLTs available in casinos and implementing lower provincial caps on the number of VLTs allowed in casinos/provinces; and (4) limiting the hours of operation of VLTs (for example midday or evening until midnight) regardless of the hours of operation of the establishment.

A study from Switzerland indicated that prevalence of problem gambling remained stable from 1998 to 2005 despite the opening of 19 new casinos in 2002.¹⁸⁰ The authors speculate that the stability of the prevalence of problem gambling may be due to new legislation put in place concurrently with the opening of numerous casinos that lead to the removal of 12,000 VLTs in public venues such as bars and cafes and limited the number of machines to 3,309, which were only available in casinos.¹⁸⁰ These findings suggest that legislation to remove VLTs from communities without widespread expansion of casinos may be a successful means of prevention.

Since the collection of the CCHS 1.2 data in 2002, Nova Scotia and Newfoundland and Labrador have implemented strategies to reduce the number of

VLTs, reduce the hours of operation of VLTs, and alter features of VLTs such as removing stop buttons and reducing speed of play.^{181, 182} Initial results from a study on the effectiveness of the VLT removal efforts in Nova Scotia were positive with 16% of gamblers reporting reduced time spent gambling on VLTs due to the removal of stop buttons and reduced speed of the machine and 11% of gamblers reported reduced time gambling due to a reduction in VLT availability.^{182, 183} In addition, a decrease of money spent on gambling was noted, public was generally supportive of the changes, but revenue from VLTs was decreased.^{182, 183} As well, Quebec has implemented a strategy to reduce the number of sites housing VLTs with the reconfiguration of VLTs to approximately five gambling sites and removal of VLTs in lower SES areas.¹⁸⁴ This is an important change since research from Montreal found a significant association between walking accessibility of sites with VLT permits and lower socioeconomic communities.¹⁸⁵ Although such a plan reduces the number of sites housing VLTs, it does not reduce the number of machines available in the province of Quebec. Currently, no other provinces have plans to reduce the number of VLTs or sites housing VLTs. Reducing the number of VLTs available in a province is a good start for responsible gambling efforts. However, a significant reduction in the prevalence of problem gambling will not likely be noted until VLTs are no longer available outside of casinos, accessibility of VLTs within casinos are reduced in number and in hours of operation, and opening of new casinos are forbidden.

Gambling on casino games other than VLTs was also associated with large odds of problem gambling among women. More specifically, women gambling on casino games monthly or more were approximately 24 times more likely to be a problem gambler compared to women not gambling on casino games. The odds of problem

gambling associated with VLTs and casino gambling were much higher than any other form of gambling. Therefore, changes to casino operations should also be considered. Based on these findings, it is recommended that: (1) hours of operation of casinos be reduced to reduce availability of gambling; (2) casinos be relocated away from highly populated urban and rural areas or in low socioeconomic status neighborhoods and further construction of new casinos in these areas be prohibited to reduce the accessibility of gambling; and (3) all casino advertising or promotions be eliminated to reduce the visual and audio stimulus to gamble.

It is important to seriously consider the highly significant association between VLTs and casino games with problem gambling among women found in the current research. Reducing the hours of casino operation and restricting locations of casinos will make gambling less available and accessible. In addition, casino promotions and advertising need to be prohibited since it is another prominent environmental factor that increases visibility of gambling, manipulates the perception of gambling as harmless and exciting and a way to improve one's lifestyle, and can trigger gambling behaviour. Prior research has indicated that women find casino advertising and promotions influential.^{5, 58} As well, 60% of women from a convenience sample from Ontario who were concerned with their gambling behaviour strongly supported less commercial promotion of casinos as a harm reduction strategy.¹⁸⁶

In many provinces, VLTs are placed throughout communities in bars, restaurants, lounges, legions, and casinos in high concentrations. From a public health perspective, VLTs are analogous to an environmental toxin.⁵⁵ Reluctance to remove or reduce the concentration of VLTs in the community or in casinos is likely due to the large revenue generated from VLTs. In fact, the largest amount of profit generated from

gambling comes from VLTs.¹⁸⁷ Therefore, adding more VLTs rather than removing them may seem more desirable in terms of government-run gambling revenue. Within Canadian provinces, government owned Crown corporations manage legal gambling operations, which means provincial governments are responsible for both contrasting roles of maximizing profits and protecting and promoting public health.¹⁰ The large-scale increase in gambling that has occurred in Canada since the early 1990s has largely been revenue driven with little consideration for possible consequences of widespread gambling. However, results from the current study clearly demonstrates the high association between VLTs and problem gambling and the necessity to remove the most accessible VLTs found in bars, restaurants, lounges, and legions and reduce the number of VLTs in casinos.

The recommendation of removing VLTs from the community and limiting access of VLTs within casinos will be challenged because the revenue generated from gambling is arguably the most important benefit of gambling. Although research from the United States has found that increased casino development does not necessarily translate into increased funding for programs such as local public health services.¹⁸⁸ As well, in theory, gambling revenue will benefit all of society, yet the reality is gambling revenue is allocated for certain programs and services and those who benefit from gambling revenue the most are individuals who do not spend money on gambling activities.¹⁸⁹ Regardless, a public health perspective recognizes the health, social, and economic costs and benefits of gambling for individuals, families, and communities, and strives to find the optimal balance which maximizes the benefits while minimizing the costs.^{1, 66} Balancing the costs and benefits of gambling does mean that some level of risk needs to be assumed to gain from the benefits of gambling. For this reason, it is

not suggested that all VLTs within casinos or casino gambling be banned, but revisions to the current state of gambling in Canada need to be made to minimize gambling costs. Results from the current research indicate that the odds of problem gambling associated with VLTs are much higher than any other type of gambling and are too large to be considered an acceptable level of risk. The removal of VLTs within the community and limited access to VLTs within casinos will reduce gambling revenues. However, the advantages of such a policy change outweigh the benefit of additional revenue through the reduced risk of problem gambling and all of its associated costs for individuals, families, and communities.

Midstream Intervention: Primary and Secondary Prevention

The current research findings can also inform midstream (primary and secondary prevention) interventions. Primary prevention aims to reduce the incidence of a condition, while secondary prevention aims to reduce the prevalence of a condition.¹³³ Based on the findings from the current research, recommendations for primary and secondary prevention of problem gambling among women include: (1) creating awareness and educational campaigns for the public health concern of problem gambling among women and provide information on the resources currently available that would especially appeal to women with gambling problems; (2) creating and evaluating prevention programs that focus on the specific needs of women with gambling problems and help women to self-manage their gambling behaviours; (3) developing strategies to encourage positive coping skills, supportive networks, and healthy stress management to prevent problem gambling among women and conduct research to ensure utility of these prevention strategies; and (4) conducting research on the effectiveness of altering VLTs features such as removal of stop buttons, decreased

play speed, mandatory cash outs, and responsible gambling screens to reduce time and money spent on gambling.

Awareness and educational campaigns that provide information on problem gambling among women can help to change social norms that indicate that gambling is a safe and acceptable form of entertainment. Campaigns can inform society of the negative correlates associated with problem gambling, which serves as a means of primary prevention. For example, findings from current research could be used to inform Canadians of the odds of problem gambling among women associated with specific types of gambling or the significant association between problem gambling and psychiatric disorders. Increased awareness of problem gambling among women may lead to earlier detection of problem gambling behaviour among women.

In addition, creating prevention programs specifically tailored to meet the needs of women, reduce the frequency of VLT gambling, and building VLTs that reduce play time and large wagers may help to control gambling behaviours and in turn, reduce prevalence of problem gambling. Conducting research using randomized control trials or Quasi experimental design is an important step to ensure the effectiveness of prevention programs or strategies. Very few gambling prevention studies of this nature currently exist. However, in a recent VLT gambling prevention study, problem-solving skills and cognitive restructuring were taught to individuals from a convenience sample from Prince Edward Island.¹⁹⁰ Results from the study indicated that after the implementation of a prevention program, the experimental group had lower irrational beliefs related to gambling, engaged in less VLT and non-VLT gambling, and had lower problem gambling scores at a one-month follow-up compared to the control group. Research that evaluates prevention programs using non-experimental designs

can also provided valuable information regarding effectiveness. For example, a study examining a casino self exclusion program indicated some positive effects of the program including a reduced urge to gamble, reduced negative consequences on daily activities, social life, work, and mood, and reduced gambling severity scores, while the prevention program still had limited effectiveness due to flawed detection of self excluders who returned to the casino.¹⁹¹ The development of prevention programs that are tailored to women, VLT and casino gambling, and the reduction of gambling problems need to be encouraged and researched for effectiveness.

It is also important to research changes to VLTs since some changes to machines that are intended to reduce gambling may inadvertently cause more harm.^{192,}
¹⁹³ Prior research has identified specific changes to VLTs that are associated with decreased gambling.^{192, 194, 195} Other research has indicated that VLT responsible gambling features such as time clocks and pop-up reminders of time spent gambling were not very effective in reducing time and money spent on VLT gambling.¹⁹⁶

Downstream Intervention: Tertiary Prevention

The current research findings can also inform downstream (tertiary prevention) interventions. Tertiary prevention aims to reduce negative impact of a condition.¹³³ Tertiary prevention includes treatment and remedial approaches. Based on the findings from the current research, recommendations for tertiary prevention of problem gambling among women include: (1) promoting 24 hour toll free gambling telephone help lines and ensuring help lines and treatment options and resources are well coordinated; (2) screening women with gambling problems for suicidal ideation and attempts; and (4) screening women with gambling problems for comorbidity of other psychiatric disorders.

Of the help-seeking behaviours assessed in the current research, problem gamblers were most likely to phone a help line. These results highlight the potentially important role telephone help lines may play in helping women find treatment options. Telephone help lines should function as the primary entry point for help-seeking. The help line and treatment options should be well coordinated to facilitate the help-seeking process. An example of this is the gambling help line in Manitoba, which connects callers to counselors who invites the caller and/or family members to attend an orientation session held weekly at the Addictions Foundation of Manitoba where free counseling (one on one, couples, or family) or residential treatment can be arranged (E. Golden & S. Van Hull, personal communication, March 21, 2006). Personnel from a gambling help line in Virginia conducts follow-up calls to encourage callers to attend their counseling appointments.¹⁹⁷ The implementation of follow-up calls to Canadian gambling help line callers may be an additional service worth considering.

The significant associations found between problem gambling and suicidal ideation, attempts, and psychiatric disorders may help to inform treatment efforts. Currently, assessments of gambling problems are not ordinarily conducted during a call to the problem gambling help line in Manitoba (E. Golden, personal communication, October 11, 2007). However, adding a routine assessment of the problem gambling with the use of the nine CPGI items or 10 DSM-IV criteria may be helpful in detecting individuals who may be at an increased risk for suicidal ideation and attempts. Also, screening problem gamblers for suicidal ideation and attempts may help to identify individuals at increased risk of self-harm. If the possibility of suicide is a concern, treatment can then be focused not only on the gambling problems, but also on helping the individual manage suicidal thoughts and behaviors to prevent self-harm. Likewise,

screening problem gamblers for psychiatric disorders is also important since the success of treatment efforts may partly depend on treatments that address the issue of comorbidity. Because of the high comorbidity of problem gambling and other psychiatric disorders, it may also be beneficial to screen women with psychiatric disorders for gambling problems since it is believed that women may be reluctant to seek help for gambling problems,¹²⁷ but may be more likely to seek help for emotional problems and not reveal their gambling issues.²³

The current research is not able to address the effectiveness of treatments or extent of rehabilitation, but can still offer valuable information to inform tertiary prevention efforts. It should also be noted that although treatment may help an individual regain control of gambling problems, it is not able to relinquish financial losses or correct the damage associated with loss of wealth.¹⁸⁹ For this reason, treatment plays an important and necessary, but limited role within a whole population approach to prevent problem gambling. As with tobacco control strategies, reduction of problem gambling in Canada will depend on effective changes to public policy.¹⁸⁹

Future Directions for Problem Gambling Research

Gambling among women is a newly emerging phenomenon making research on women who gamble an urgent public health concern. The current research was able to identify correlates of problem gambling and clarify the relationships between problem gambling and health and functioning, mental and physical health conditions, and help-seeking behaviour. However, our current state of knowledge is still limited. Specific recommendations for future research based on the limitations of the current research have been mentioned above. Many of these recommendations are related to improving measurements and inclusion of additional variables to further clarify significant and

non-significant relationships found in the current investigation. Based on the present state of knowledge of problem gambling among women, several avenues for future directions of problem gambling research can be recommended.

First, prospective research on women and problem gambling is necessary to understand the incidence of problem gambling, changes and trends in gambling over time, and the course of problem gambling. Prospective studies could also provide knowledge on how increases or decreases in the availability of gambling correspond to changes in gambling behaviour and gambling-related problems among women. Another advantage of a prospective study design would be to clarify the relationship between problem gambling and psychiatric disorders. More specifically, research is needed to understand the temporal relationship that specifies if problem gambling is more likely to precede, follow, or develop concurrently with psychiatric disorders. Such information would have important implications for understanding the etiology of problem gambling, identifying women at risk for problem gambling, and inform treatment options.

A second avenue of future research on women and problem gambling is research that further clarifies the relationship between problem gambling and physical health. The current research did not find support for this relationship. However, it is important to conduct additional studies to determine if this finding can be replicated or if the use of physician diagnosed physical health conditions yields contradictory results.

A third area of research requiring critical investigation is research identifying and developing harm reduction, prevention, and treatment strategies that show effectiveness through research endeavors. This includes research on effective methods to reduce problem gambling among women and to increase help-seeking behaviours.

The current research was not able to investigate barriers that prevent women with gambling problems from seeking help. However, it is also important to research barriers to treatment among women and how services can be improved to promote help-seeking. For example, women gamblers from a convenience sample from Ontario identified several barriers to treatment (i.e. feeling gambling behaviours could be managed on their own, hoping to win large sums of money, believing that treatment would require abstinence from gambling, being unaware of treatment services, fearing criticism, and feeling guilt or shame related to gambling) and services that they thought would be helpful in reducing gambling behaviour (i.e. individual counseling, group counseling for women only, phone counseling, 24 hour help line, intensive day program, venues at women's centres or gambling treatment centres, services available in the evenings and weekends, availability of child care, and reading material specific to women gamblers).¹⁸⁶ Understanding women's perceived barriers to care and what services women feel would be helpful is a useful tool in developing effective programs. Further research needs to be conducted on perceived barriers to help-seeking, how barriers can be effectively overcome, and which services or programs are proven to be successful in reducing gambling problems among women.

Another important area of research is studying the impact problem gambling among women has on their children and families. To date, only a few small scale qualitative studies have been conducted, which interviewed children of problem gamblers.¹⁹⁸ Research that examines the consequences problem gambling among mothers has on children, how children interpret gambling and their mother's gambling problems, and what types of resources are required to help children of problem gamblers is necessary. When studying problem gambling and the family, it is also

important to understand how family histories of gambling can impact gambling behaviour among other family members. Future research should also focus on familial traits of problem gambling and include detailed measures that can distinguish between heredity through genetic factors and shared environments. As well, an association has also been found between problem gambling and child abuse, neglect, and intimate partner violence.^{162, 199, 200} Further research needs to be conducted to clarify this relationship and inform efforts to prevent family violence.

Finally, another important area of research is the comparison of women problem gamblers to men problem gamblers in Canada using the population health model to understand gender similarities and differences with regard to types and frequency of gambling, psychiatric disorders, physical health conditions, health and functioning, perceived need for help, and help-seeking.

Conclusions

The current research is the first comprehensive nationally representative investigation of women and problem gambling. The key findings indicate that elements from the social/psychosocial environment are important for understanding problem gambling, VLT and casino gambling have the highest odds associated with problem gambling, and that problem gambling is associated with poor health and functioning and psychiatric disorders among women. Problem gambling among women is an important public health concern. It is hoped that results from this dissertation will be of interest to policy makers and be used as evidence-based research to inform healthy public policies on gambling in Canada.

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APPENDIX A

Choosing the Most Appropriate Statistic Method for the Current Research

To ensure the most appropriate statistical method was chosen for the currently research, several methods were considered and expert statistical advice was provided from a consultation with Dr. Lisa Lix, the Director of the Biostatistical Unit in the Department of Community Health Science at the University of Manitoba. The statistical methods chosen to answer the research questions were logistic and linear regression models. However, multilevel modeling (also known as random coefficient regression models) such as HLM (Hierarchical Linear Modeling) was also considered. A multilevel model was considered to determine if it would be useful to study women nested in the province they live in. It is important to obtain statistical advice from experts to ensure that the most sound and appropriate methodological approach for my dissertation research have been selected.

Tabachnick and Fidell (2007) indicate that if the ratio of variance between groups at the second level of the hierarchy to the variance within those groups is high, then it is desirable to use a multilevel model, otherwise a single-level regression analysis may be used.¹⁴³ Therefore, to determine if a multilevel model is necessary or desirable, the question to consider is, *do you expect there to be substantial amount of variance that can be explained by province of residence?* I believe based on several factors, the answer to this question is *no*.

First, I do not expect a substantial amount of variance to be explained by province, since many provinces (for example, Manitoba, Saskatchewan, Nova Scotia) are similar to each other with regard to gambling. Second, the specific province of

residence is not what is of importance in the conceptual model. Nor is it of interest to make inferences about provinces and problem gambling. What is of interest is an individual's exposure to gambling. An individual's exposure to gambling and the province of residence will be related, but they are not simply equivalent measures. An individual's exposure to gambling is considered to be low, moderate, high, or severe based on a calculation considering the concentration of VLTs per 1000 population and the availability of a permanent casino. I understand how province of residence *could* be used as a second level variable in a multilevel model. However, I believe it may be an overly complex and not necessarily a superior or appropriate method for answering the research questions, since specific province of residence is not a theoretical part of the model and, therefore, not a necessary second level variable. I suspect that using a multilevel model with women nested within province would produce a low intraclass correlation and that the random components of the intercept only model would indicate non-significant variance in intercepts across provinces, suggesting that it is not desirable to nest women within provinces. In other words, since many provinces are similar, it is not expected that province will account for a substantial amount of the variance, in which case a single-level model would be a better choice of analysis. Based on the conceptual framework, research questions, and measurement level of the data, I have determined that single-level logistic and linear regression models that adjust for the complex sampling design of the dataset are the best methods for the current research.

I consulted with Dr. Lisa Lix, the Director of the Biostatistical Unit, on what would be the best analytical approach for my dissertation research. I provided Dr. Lix with my proposed theory and conceptual framework, proposed method, and the

possibility that a multilevel modeling approach may be a more appropriate method for the dissertation. Dr. Lix read my proposed methods in great detail and indicated that she thought my justification for my chosen methods (logistic and linear regression models) and for not using a multilevel model were correct. Furthermore, Dr. Lix indicated that *“I wouldn’t choose a multilevel model for these data because, as you indicated, the theory does not support the idea that clustering/nesting within provinces will reduce error variance. Also, from a pragmatic perspective, you have too few level-two units (provinces) to implement a multi-level model. You should have at least 30, and ideally 50 level-two units.”* (L. Lix, personal communication, August 10, 2006).

APPENDIX B

Disclaimer

Statistics Canada collected and provided the data for academic purposes, but the analyses are the sole responsibility of the author. The opinions expressed do not represent the views of Statistics Canada.