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Adult Canadian Disordered Gambling and Poor Physical or Mental Health

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
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Abstract

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MPH, Des Moines University, 2006

BA, Graceland University, 2001

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Public Health

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Abstract

Disordered gambling has become the first recognized nonsubstance addiction. Low- and moderate-level gamblers have been found to be more likely to suffer health consequences. The purpose of this quantitative, cross-sectional, comparative study was to explore whether and to what extent being a disordered gambler in Canada increases the likelihood of having a concurrent physical or mental health problems (i.e., heart disease, diabetes and/or suicidal ideation or attempts). The research questions were whether there was a significant difference in having heart disease, diabetes, or suicidal ideations or attempts between Canadian adults who are and who are not disordered gamblers. The theoretical framework was Maslow's hierarchy of needs, which was employed to analyze the importance of social and esteem needs. The study sample consisted of 127,462 respondents to the Canadian Community Health Survey, conducted in 2013. Chi-square and binary logistic regression analyses revealed that disordered gamblers were more likely to display suicidal ideation or attempts but less likely to report having been diagnosed with diabetes than their nonproblematic gambler counterparts. No significant association was found between disordered gambling and heart disease. Health care workers and other relevant stakeholders could use the findings as support when requesting funding dedicated to the prevention and treatment of mental health issues associated with disordered gambling. The findings could promote positive social change, as by offering better funding and support, it may be possible to lower cases of disordered gambling and, in turn, potentially decrease cases of suicidal ideation or attempts in affected individuals.

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Dedication

This is dedicated to the memory of my mother, who always instilled in me that I can do anything to which I put my mind.

Acknowledgments

I would first like to thank my committee chair, Dr. Vasileios Margaritis, whose expertise was invaluable in moving through this process. Your insightful feedback pushed me to sharpen my thinking and brought my work to a higher level. I am incredibly grateful for your guidance.

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Section 1: Foundation of the Study and Literature Review

Introduction

Evidence of luck-oriented rituals dates as far back as 4,000 BCE, when designated objects were used to conduct rituals—many of which involved interacting with deceased ancestors with the intent of producing positive or negative outcomes (Ferentzy & Turner, 2013). Luck-based practices eventually transitioned from solely ritual-based activities to games, with the earliest card games and gambling behaviors having originated in China in the 1700s. In modern times, gambling can be defined as "placing monetary or material items at risk in hopes of gaining money or items of greater material value" (Loo et al., 2019, p. 625). Conversely, the terms "pathological gambling," as defined in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-4; American Psychiatric Association, 1994) and *International Classification of Disease* (ICD-10; World Health Organization, 1992), and "gambling disorder," as defined in the DSM-5, refer to a continuous behavior that leads to significant distress and interference with functioning in major life domains (American Psychiatric Association, 2013). While gambling behavior may have negative effects on the daily lives of practicing individuals, such behavior may not necessarily meet the ICD or DSM-5 criteria; thus, the term "problem gambling" can better be used to describe this particular behavior (Morasco et al., 2006).

The acceptance and legalization of gambling have gone through numerous changes in its history. For example, government-regulated lotteries and gambling have provided an alternative way to create income without further taxing citizens (Bush, 2020). A result thereof has been that government revenue has seen an increase, which in

turn has provided for the enhancement of public services such as health and education, decreases in current governmental debt, or a way to continue to avoid raising taxes (Williams et al., 2011)

For most people, gambling is a social activity that is fun and relaxing. However, for some individuals, gambling may become a problem that could lead them to experiencing clinically significant impairment and/or unmanageability in some or any area of their lives (American Psychiatric Association, 2013). Symptoms of problem gambling include persistent and recurrent maladaptive gambling behavior that disrupts personal, family, vocational, and/or educational pursuits; a pattern of "chasing losses," which is exhibited an urgent need to keep gambling, often with the placing of larger bets, so as to undo a loss or series of losses; lying to family members or others to conceal the extent of involvement with gambling, which may include covering up illegal behaviors such as forgery, fraud, theft, or embezzlement to obtain money with which to gamble; and needing a bailout, which includes turning to friends or family for help with a desperate financial situation caused by gambling.

In this section, I identify both the problem statement and purpose of this study. This is followed by documentation of the research questions and hypotheses, theoretical foundations, and nature of this study. Also in this section, I explain the literature search strategy and present a literature review. Towards the end of the section, I note the assumptions, scope, and delimitations of the study before offering a summary of Section 1.

Problem Statement

A disordered gambler is someone who gambles regardless of any harmful, adverse consequences or a desire to stop (Langham et al., 2016). According to the American Psychiatric Association (2013), the nine criteria for a gambling disorder diagnosis are that the individual:

- Needs to gamble with increasing amounts of money to achieve the desired excitement.
- After losing money gambling, often returns another day to get even (i.e., "chasing" their losses).
- Relies on others to provide money to relieve desperate financial situations caused by gambling.
- Lies to conceal the extent of involvement with gambling.
- Has made repeated unsuccessful efforts to control, cut back, or stop gambling.
- Often gambles when feeling distressed (e.g., helpless, guilty, anxious, depressed).
- Has jeopardized or lost a significant relationship, job, or educational or career opportunity because of gambling.
- Is restless or irritable when attempting to cut down or stop gambling.
- Is often preoccupied with gambling (e.g., having persistent thoughts of reliving past gambling experiences, planning the next venture, and/or thinking of ways to get money with which to gamble; sect. 312.31).

An individual who meets four to five of these criteria is considered as having a mild gambling disorder, six to seven as having a moderate gambling disorder, and eight to nine as having a severe gambling disorder (American Psychiatric Association, 2013). In 1976, approximately 0.8% of the U.S. national sample could be classified as probable pathological gamblers, with another 2.33% being noted as potential pathological gamblers (United States Commission on the Review, 1976). This means that in a population of 100,000, about 1,000 to 1,900 people could be viewed as disordered gamblers. More recently, in 2012, there were an estimated 5.77 million people with disordered gambling in the United States (Williams et al., 2012). Of this figure, only 10,387 (i.e., 0.2%) sought treatment. Calado and Griffiths (2016) approximated that between 0.4% and 3.4% of adults nationwide are problem gamblers. Based on these growing statistics, disordered gambling has, thus, become the first recognized nonsubstance addiction in the DSM-5 (American Psychiatric Association, 2013).

Disordered gamblers have also been found to be 1.66 times more likely to report fair or poor health (Algren et al., 2014). To discover more about the incidence of problem gambling and related issues, Hare (2015) used data collected between June and November 2014 from 13,554 phone interviews with people residing in Victoria, Australia. The results indicated that 0.8% of those interviewed were considered problem gamblers. The study also indicated that low- and moderate-level gamblers were more likely to suffer health consequences due to increased drinking. A further finding was that both moderate- and problem-level gamblers tended to visit their doctors between seven and eight times annually, which, according to the author, is higher than the Australian

average of 5.6 times annually. Problem drinkers were also found to experience challenges with their mental health, with 24.06% of moderate-level gamblers and 41.86% of problem gamblers having been diagnosed with depression over the prior 12 months. Hare (2015) further noted that 20% of moderate-level gamblers and 39.53% of problem gamblers had been diagnosed with anxiety over their lifetimes. Add summary and synthesis throughout the paragraph to balance out the use of information from the literature.

In a similar study, Buth et al. (2017) researched the incidence and related health issues of problem gamblers in Austria. In that study, the author collected data via a quantitative survey of 10,000 people living in Austria, of which 4,082 reported gambling within 12 months of the survey. The results indicated that problem gamblers are at a significant risk of alcohol use (4.9), which was ranked according to the DSM-5 criteria of *1 = at risk, 2-3 = problem criteria,* and *4-9 = disordered*. The authors also found that problem gambling could be triggered by parents with addiction problems (3.8), poor mental health (2.6), and young age (2.2).

Ekholm et al. (2018) also conducted a study on the health of problem gamblers using the *2010 Danish Health and Morbidity Survey*, which contained a nationally representative sample of 25,000 Danish adults aged 16 and older. Of that larger sample, 14,952 individuals completed the full questionnaire. The authors found that of the individuals who completed the survey, past and present problem gamblers were 1.7 and 2.4 times more likely than nonproblem gamblers to report fair or poor health, respectively. Add summary and synthesis.

In 2014, Weinstock et al. conducted a study of 2,867 callers, who contacted the telephone hotline of Problem Gamblers Help Network of West Virginia between 2000 and 2007. According to the data collected of the calls, 85% were problem gamblers and 11% had suicidal ideations within 7 days of calling. Weinstock et al. also reported that this percentage was higher than that of the overall population. The authors did not, however, have a control group with which to compare their findings, nor did they cite suicidal ideation statistics for West Virginia, overall, or for the nation, for the period examined. Despite these study limitations, the problem gamblers with the highest likelihood to experience suicidal ideations were found to be those with a family history of alcoholism and psychiatric comorbidity, according to the survey results.

Giovanni et al. (2017) similarly examined the prevalence of suicidality in problem gamblers. The authors used a qualitative synthesis of current research ($N = 86$) papers to determine the propensity found for a positive relationship between gambling and suicidality, expression of suicide ideation, or attempts at suicide. The findings of over 80% of the articles examined showed other specific traits were frequent causations of suicidal behavior in chronic and problem gamblers.

In addition to the noted studies, researchers have also presented evidence that problematic gambling can affect the cardiovascular system. For example, Meyer et al. (2000) conducted a study on 20 male problematic gamblers (average age: 44.5 years old) concerning how gambling affected their heart rate and salivary cortisol levels to determine stress in a casino. Ten of the participants were part of the experimental study and 10 were part of the control group. The participants played cards, specifically

blackjack, and were evaluated at 30 minutes of card-playing and again after 1 hour. The experimental group played for money and the control group played for points. The results indicated that in the experimental group, which was gambling with money, participants' heart rates increased from the 0- to the 30-minute mark and remained high for the duration of the hour. Similarly, at 30 minutes, these participants' salivary cortisol levels had also increased and continued to increase throughout the 1 hour of gambling, only to decrease again once the game was completed. In contrast, the control group presented with opposite responses—decreased heart rates versus the experimental group's average of 18 heart beats per minute. These results highlighted how high levels of stress due to gambling could directly trigger an increase in cardiovascular activity. Stress was also found to be a significant determinant of heart diseases. Add summary and synthesis throughout the paragraph.

Gambling has been hypothesized to have both positive and negative effects on the health conditions of diabetic patients (Blackman et al., 2019; Bush, 2020; Humphreys et al., 2016, 2021; Subramaniam et al., 2015). While researchers previously determined that gamblers have poorer self-reported health, casual and recreational gambling was found to have positive effects on diabetic patients and the mental health of patients (Blackman et al., 2019; Bush, 2020; Humphreys et al., 2016, 2021; Subramaniam et al., 2015). Gambling has also been found to be a source of relaxation, socialization, and hopefulness (Humphreys et al., 2016; Langham et al., 2016). Individuals with disordered gambling have, however, reported a higher likelihood of having diabetes due to the lack of physical movement and the general consumption of food and drinks undertaken while gambling

(Subramaniam et al., 2015). As most of the noted studies were conducted in countries other than Canada, the gap in the research is, then, that there is a current lack of evidence on the impact of disordered gambling on heart disease, diabetes, and suicidal ideation or attempts in adult Canadian disordered gamblers.

Purpose of the Study

The purpose of this quantitative, cross-sectional, comparative study was to explore whether and to what extent being a disordered gambler in Canada increases the likelihood of having a concurrent physical or mental health problems (i.e., heart disease, diabetes and/or suicidal ideation or attempts).

Research Questions and Hypotheses

I attempted to answer three research questions and related hypotheses in order to meet the aforementioned study purpose.

RQ1: Is there a significant difference in having heart disease between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status?

$H_0$1: There is no significant difference in having heart disease between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status.

$H_1$1: There is a significant difference in having heart disease between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status.

RQ2: Is there a significant difference in having diabetes between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status?

$H_0$2: There is no significant difference in having diabetes between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status.

$H_1$2: There is a significant difference in having diabetes between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status.

RQ3: Is there a significant difference in experiencing suicidal ideation or attempts between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status?

$H_0$3: There is no significant difference in experiencing suicidal ideations between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status.

$H_1$3: There is a significant difference in experiencing suicidal ideations between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status.

Theoretical Foundation for the Study

The theoretical framework that underpinned this study was Maslow's hierarchy of needs, developed in 1954, which is a well-known theory related to the satisfaction of needs (i.e., once one level is satisfied, a higher-level need is activated). According to Maslow's (1954) theory, human beings' needs follow a definite hierarchy of importance that, ultimately, form a "need pyramid." This hierarchy is based upon the most basic needs being at the bottom of the pyramid and progressing upwards through a series of levels to reach the final needs level of "self-actualization". Maslow's five hierarchy of need levels are (a) physical needs of an individual for food, clothing, shelter, and sex; (b) safety needs related to physical protection; (c) social needs related to affection, friendship, and acceptance from, by, and with others; (d) esteem needs related to self-respect, achievement, status, recognition, and attention; (e) and the need for self-actualization, which is associated with a sense of accomplishment and self-fulfillment (Maslow, 1943). When one level of the hierarchy of needs is satisfied, an individual can then move to the next need that becomes dominant (Maslow, 1954).

For this study, I assumed that for disordered gamblers, there is a need that is not being satisfied. I applied Maslow's (1954) hierarchy of needs to analyze the importance of social and esteem needs. With the inability to satisfy specific needs, distress was deemed to occur, and negative implications manifested in relation to the health of an individual.

Stress is common for disordered gamblers (Meyer et al., 2000). For individuals to flourish, it is important that they realize all five levels in the noted hierarchy (Maslow,

1954). A lack or delay in a given need (e.g., through stress) may affect individuals in different aspects of their lives. In terms of this study, disordered gamblers were believed to experience an inability to fulfill one of the needs levels—specifically in relation to social and esteem needs. Disordered gamblers were, thus, hypothesized as finding these needs from and in gambling, which led them to spend hours in gambling to experience satisfaction. In this study, therefore, I explored the relationship of being a disordered gambler and different diseases (i.e., heart disease and diabetes) as well as suicidal ideation or attempts.

Nature of the Study

In this quantitative study, I attempted to determine whether disordered gamblers have different levels of prevalence in heart disease, diabetes, or suicidal ideation or attempts than nongamblers. A quantitative, nonexperimental, cross-sectional design using secondary data was used to compare Canadian adults with heart disease or diabetes, as well as Canadian adults with suicidal ideation or attempts to Canadian adults without heart disease or diabetes, and who did not have suicidal ideation or attempts. Each group's rates of disordered gambling (i.e., the independent variable) was then compared.

Literature Search Strategy

As a means of meeting the purpose and address the noted problem stated for the current study, a review of the literature was conducted using key terms and phrases such as: *problem gambling*, *pathological gambling*, *gambling and heart disease*, *gambling and diabetes*, *gambling and suicidal ideation*, and *gambling and health*. These terms and

phrases were used to search databases such as Google Scholar, EBSCOHost, JSTOR, Elsevier, and ProQuest.

Literature Review Related to Key Variables or Concepts

Chronic Physical Health Conditions

Problem gambling can cause pathological changes in the mind, which can, in turn, result in changes to bodily systems (Cowlishaw & Kessler, 2016). Problematic gambling may also coincide with other health problems—for instance, the toll that is taken on the body following gambling sessions or binges that may last hours or days, sometimes without food or sleep. Binges affect the body both mentally and physically, resulting in stress. Should the addiction escalate, the stress associated with problem gambling may trickle out of wherever the gambling is conducted into the gambler's personal life. For example, if a gambler experiences debt they may also experience heightened urges to gamble and devote even more time to gambling in hopes of paying off the debt. Aside from elevated stress levels and the ever intensifying need to gamble that may coincide with debt, problem gamblers often also experience sleep deprivation. Add summary and synthesis throughout the paragraph to balance out the use of information from the literature with your own analysis.

The effects of problem gambling are also correlated with other problems that affect the health of a problem gambler. For example, the conditions associated with being addicted in gambling have resulted in heart disease and diabetes diagnosis of such individuals (Humphreys et al., 2016). The high levels of stress, lack of sleep, depression, and at times alcohol or nicotine consumption have all been found to result in the

development of heart disease (Germain et al., 2012). The lack of movement as well as continuous eating and alcohol consumption have, moreover, been found to result in diabetes diagnoses among disordered gamblers (Subramaniam et al., 2015). Add summary and synthesis.

In 1999, researchers for the National Opinion Research Center published a study about problematic gambling and related consequences. These researchers included a national survey of 2,417 adults and 534 adolescents that was conducted via phone, along with 530 adults in gambling locations and information from a 100-community database and 10 community case studies about how the opening of casinos could affect the surrounding communities. One of the conclusions made in this study was that problem gamblers were more likely to have declared bankruptcy, been on welfare, or been arrested or incarcerated than nonproblematic gamblers. The results also indicated that problem gamblers were more likely to experience emotional or psychological problems, such as mania and depression, and to have received care for a mental condition within a 12-month period. Add summary and synthesis throughout the paragraph to balance out the use of information from the literature with your own analysis.

To further the National Opinion Research Center (1999) study, other experts observed gambling behavior with primary care implications based on the relationship between pathological gambling and medical or mental health issues (e.g., Cunningham-Williams et al., 1998; Potenza et al., 2002). One set of such researchers found positive correlations between gambling and mental health issues such as antisocial personality, alcohol use, and major depressive syndrome (Potenza et al., 2002). Other researchers

found temporal relationships between gambling problems and pathological and comorbid disorders (Binde et al., 2017; Heiskanen, 2017; Latvala et al., 2019), while still others relayed such associations between gambling and phobias and nonstimulant drug dependences (Griffiths, 2004; Wardle et al., 2019). Add summary and analysis.

Loft and Loo (2015) investigated the effects and mechanisms for sleep deprivation and health problems due to problem gambling. These authors examined answers gathered from 59 volunteers who had been in a treatment-seeking program for gambling from the Pittsburgh Sleep Quality Index (sleep difficulty), the Sleep Hygiene Index (negative sleep habits), the Problem Gambling Severity Index. The authors also included measures of self-regulatory capacity and "arousability" in their survey. The collected data were entered into a regression analysis and the results proved that there was a relationship between problem gambling and sleep difficulty. The Loft and Loo study, which build upon the earlier work of Anderson (2010) and Barber et al. (2010), provided further reasoning behind sleep deprivation due to problem gambling based on psychological behavior and its potential threat to health. Add summary and synthesis to connect back to your study.

Suicidal Ideation and Lifetime Suicide Attempts

The stress, pain, and isolation of a gambling problem may cause some individuals to experience suicidal thoughts or attempts. For example, according to the American Psychiatric Association (2013), up to half of those in treatment for gambling have had suicidal ideations, and 17% have attempted suicide. While there is currently limited research where scholars have focused specifically on gambling and suicide, Battersby et

al., (2006) did conducted a study to describe the 12-month prevalence and associated risk factors for suicidal ideation and related behaviors in patients presenting with gambling addiction at a treatment center near Adelaide, Australia. Of this participant pool, 79% received a survey in the mail, 54.4% of which were completed and returned. Regarding the returned surveys, 81.4% of respondents indicated suicidal ideation, while 30.2% reported one or more suicide attempts within a year to the date that their survey was completed.

The results of the Battersby et al. (2006) study also indicated that suicidal ideation was aggravated by the severity of the addiction, the amount of debt, alcohol use, and depression. The characteristics of the survey respondents were mostly male (30 men, or 69.8% of participants), with only 13 women (30.2%) taking part in the study. The average age of participants was 41.5 years old. Most participants were Caucasian, except for one Asian participant, and most were single (55.8%). Regarding participants' occupation, most (seven) participants' work fell under "home duties" (16.3%), while six participants were laborers (14%), followed by participants with managerial statuses (five, 11.6%) and clerical levels (five, 11.6%). Twenty-one of the participants (48.8%) disclosed that their social security checks were their main source of income, while 29 of the 43 participants were in debt, with four of the participants' debts exceeding $10,000.

Add summary and synthesis throughout the paragraph and connect back to your study. Develop a strong conclusion for the section.

Operational Definitions

Disordered gambler: A person who suffers from a gambling disorder and is an active gambler who displays a "persistent and recurrent problematic gambling behavior leading to clinically significant impairment or distress as indicated by the individual exhibiting four (or more) of the following in a 12-month period" (American Psychiatric Association, 2013, p. 585).

Diabetes: A group of related metabolic disorders that lead to elevated blood glucose levels because of insulin insensitivity and/or a lack of insulin production (UK Diabetes & Lobby, 2014).

Ethnicity: The state of "belongingness" to a social group that has a common national or cultural tradition (American Psychiatric Association, 2013).

Heart disease: A group of closely related syndromes related to an imbalance between oxygen demand and blood supply to and from the heart and other parts of the body (Yusoff et al., 2016).

Insurance status: An individual's state of being or not being insured (Berchick et al., 2019).

Problem gambler: An individual whose gambling activities have resulted in detrimental effects to their life (American Psychiatric Association, 2013).

Suicidal ideation or attempts: A nonfatal, self-directed, potentially injurious behavior undertaken with the intent to die (American Psychiatric Association, 2013).

Assumptions

The following is a list of assumptions that I made about this current study:

- The 2013 Canadian Community Health Survey was a sample survey with a cross-sectional design.
- Data entry was conducted in an efficient and effective manner with minimal errors.
- Any potentially missing data occurred in a completely random manner and, thus, their absence did not bias the study.
- Participants in this study responded to questions in a wholly truthful manner.

Scope and Delimitations

The data used in this study came from Canada's 2013 Community Health Survey, which collects information every 2 years related to health status, health care use, and health determinants for the Canadian population (Statistics Canada, 2013). There was no primary data collection or contact with the participants in the survey. It should also be noted that there was also a delay between the time when the 2013 Canadian Community Health Survey data was compiled and the time that this secondary analysis took place. Despite such delay, this was the most relevant and up-to-date research available at the time of this study, as researchers are still currently producing the next survey. Based on the noted scope, the delimitations of the current study are presented in the following paragraphs.

This was a secondary data analysis without any opportunity for primary data collection. Thus, only variables available in the dataset were analyzed. I delimited this study to the variables present in the selected dataset. This study was further delimited by the number of questions in the data collection tools and the sample size used for the

survey. However, missing data may have affected the inferences made in this study. The most recent set of data available for public use was from the survey year 2013; therefore, this study offered a more historical discussion and current realities may differ. The survey excluded persons from Aboriginal settlements in the Canadian provinces, full-time members of the Canadian Forces, incarcerated populations, and persons living in the Quebec health regions of Region du Nunavik and Region des Terres-Cries-de-la-Baie-James. Altogether, these exclusions represented less than 3% of the Canadian population aged 12 and over, which formed the population that the selected survey covers.

The quality of the dataset was dependent on the survey respondents' ability to follow directions, be thorough, be timely, understand the questions being asked of them, and be honest. It was noted that there is a stigma attached to many of the questions asked in the selected survey, and although the surveys are anonymous, respondents may have felt pressure to answer questions in a certain way. While a respondent may not have intentionally lied, questions were stated with different timelines, such as "within the past week," "within the past month," and "within the past year" and, therefore, accurate answers were dependent upon a respondent's best recollection. The quality of the dataset was also dependent on the researchers and field workers who submitted and collected the primary data; the statisticians and data clerks who entered the data into a database system; and the capacity of the staff who compiled, organized, and sent the public-use dataset folder to me as the researcher for this current study. I cannot confirm the capacity of these individuals but agreed in good faith that they all did honorable work at the different phases of the development, collation, management, and dissemination of the

data. To further validate the data, I did, however, inquire into how validity was assessed for the survey.

Significance of the Study and Potential for Social Change

There are potential implications for social change because of this research. The medical community, including therapists, counselors, prevention advocates, outreach workers, and primary care physicians, could, through the findings presented in this study, better understand the physical and mental health comorbidities of disordered gamblers. The findings may also add to the previous research by taking into consideration discussions regarding available funding for disordered gambling prevention and treatment. An increase in funding for the prevention and treatment of disordered gambling may, in turn, result in less actual monetary costs related to destructive family behaviors, which have been associated with problem gambling, along with criminal behaviors and higher rates of suicide (United States General Accounting Office, 2000).

An increase in funding may further result in less actual monetary costs associated with the social implications of problem gambling that are difficult to quantify (e.g., domestic violence, child abuse, divorce, homelessness, and substance abuse; United States General Accounting Office, 2000). According to a report issued by the United States General Accounting Office (2000), testimonies were collected from caretakers who locked their children in vehicles while they gambled, which indicated child neglect. Increased awareness may also be used to lower the actual costs absorbed by problem gamblers' communities. Ultimately, having a better understanding of the comorbidities of disordered gambling could aid those affected by this issue (i.e., the addicts, their families,

their workplaces, current and future treatment professionals, current and future researchers, the medical community, as well as any community with a pervasive gambling culture).

Summary

In this section, I generally described the prevalence of disordered gambling as well as its direct link to mental and physical health problems. The purpose, nature, and research questions and hypotheses of this study, along with a detailed literature review with an emphasis on assumptions and delimitations was provided. I ended this section with a description of the potential social change impact of this study.

In Section 2 I present the methodology used for this inquiry. In this second section, the studied population is described, the dataset discussed, and the data management processes elaborated upon. Ethical issues and threats to validity are also addressed in the second section.

Section 2: Research Design and Data Collection

Introduction

The purpose of this quantitative study was to explore whether and to what extent being a disordered gambler in Canada increases the likelihood that someone would have concurrent physical or mental health problems (i.e., heart disease, diabetes and/or suicidal ideation or attempts). In this section, the dataset selected for the study is described, along with the research design and methodology. The operationalization of variables, data analysis plan, and ethical considerations are also presented.

Research Questions and Hypotheses

As noted in the previous section, I attempted to answer the following research questions and hypotheses:

RQ1: Is there a significant difference in having heart disease between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status?

$H_0$1: There is no significant difference in having heart disease between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status.

$H_1$1: There is a significant difference in having heart disease between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status.

RQ2: Is there a significant difference in having diabetes between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status?

$H_0$2: There is no significant difference in having diabetes between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status.

$H_1$2: There is a significant difference in having diabetes between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status.

RQ3: Is there a significant difference in experiencing suicidal ideation or attempts between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status?

$H_0$3: There is no significant difference in experiencing suicidal ideations between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status.

$H_1$3: There is a significant difference in experiencing suicidal ideations between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status.

Selected Dataset

For this study, the Canadian Community Health Survey conducted by Statistics Canada (2013) was selected for use, which listed data for the year 2013. Of the available data, the noted survey was found to be the most current public-use dataset available. The central objective of the Canadian Community Health Survey was to gather health-related data at the subprovincial level. The Canadian National Task Force on Health Information cited several issues and problems with the health information system in 1991. To address these noted, the Canadian Institute for Health Information and Statistics Canada conceived the Canadian Community Health Survey. The objectives of the Canadian Community Health Survey include (a) supporting health surveillance programs by providing health data at the national, provincial, and intraprovincial levels; (b) providing a single data source for health research on small populations and rare characteristics; (c) the timely release of information that is easily accessible to a diverse community of users; and (d) creating a flexible survey instrument that includes a rapid response option to address emerging issues related to the health of the population.

Research Design

I used a quantitative, cross-sectional, comparative design to explore whether and to what extent being a disordered gambler in Canada increases the likelihood that someone would have concurrent physical or mental health problems (i.e., heart disease, diabetes and/or suicidal ideation or attempts). The Canadian Community Health Survey (Statistics Canada, 2013) was a national sample survey with a cross-sectional design that collected information related to health statuses, health care use, and health determinants

for the Canadian population aged 12 and older. The study design applied in the present study was quantitative in nature and focused on analyzing the secondary data gained from the Survey.

As a result of the Canadian Community Health Survey (Statistics Canada, 2013) data being numerical in nature, a quantitative, as opposed to a qualitative method was deemed necessary for the current study. Similarly, a cross-sectional design is a research design wherein data are collected at a single point in time (Spector, 2019), which aligned with the data collected in the survey. The research questions were focused on exploring differences between Canadian adults who are and who are not disordered gamblers; thus, a comparative design was used in this current study. A comparative design is focused primarily on determining whether identified groups are significantly different based on a dependent variable (Przeworski & Teune, 1970).

Target Population

The Canadian Community Health Survey collected information from all residents in Canada aged 12 years and older who live in one of the 10 provinces across the country's three territories (Statistics Canada, 2013). The survey excluded, however, full-time members of the Canadian Forces, the incarcerated population, and people living in the Quebec health regions of Region du Nunavik and Region des Terres-Cries-de-la-Baie-James. Altogether, the noted exclusions represented less than 3% of the Canadian population aged 12 years and older. With the exclusion of this 3%, the Canadian Community Health Survey collected information from all Canadian citizens, and it was this data that was analyzed in the current study.

Instrument Design

The Canadian Community Health Survey questions were designed for computer-assisted interviewing, which meant that as the questions were developed, the associated logical flow into and out of the questions was programmed (Statistics Canada, 2013). The survey included three content components. The first consisted of common content that was collected from all survey respondents. The second component was optional content that fulfilled the need for data at the health region level, which was unique to each region or province, and may have which varied from year to year. The final component included rapid response content, which was offered to organizations interested in national estimates on an emerging or specific issue related to the population's health.

Sampling

As noted previously, the 2013 Canadian Community Health Survey was a sample survey with a cross-sectional design (Statistics Canada, 2013). Each year, 65,000 respondents are required to participate in the survey, and those conducting the survey use a multistage sample allocation strategy. In the first step, the sample was allocated among the provinces according to the size of their respective populations and the number of health regions that they contain. Each province's sample was then allocated among its health regions, proportionally, to the square root of the population in each health region.

Data Sources

Data were collected directly from survey respondents who took part voluntarily (Statistics Canada, 2013). The 2013 Canadian Community Health Survey questionnaire was administered using computer-assisted interviewing, which offered several data

quality advantages over other collection methods. First, the tool offered question text, including reference periods and pronouns, which was customized automatically based on factors such as the age and gender of the respondent, the date of the interview, and participants' answers to previous questions. Second, questions that were not applicable to a specific respondent were automatically skipped.

Approval and Access Procedures

The 2013 data gathered from the Canadian Community Health Survey and presented by Statistics Canada (2013) was used in this research. This dataset was acquired from the Statistics Canada's Division of Health Statistics office by submitting a request through their website. After I signed a nondisclosure and data custodian contract, a link to a secure file transfer protocol (FTP) website was emailed to me from the office. I then received a unique login name and password that enabled access to the secondary dataset. It should be noted that, in accordance with ethical considerations, I only accessed the data after obtaining institutional review board (IRB) approval.

Sample Size

The data used in this current study were based on a sample of approximately 127,462 respondents for the 2013 dataset. According to Calder (n.d.), to ensure accurate and representative results for this particular type of study, the sample size had to be based on a 95% confidence level with a 5% margin of error (i.e., 95 out of every 100 participants would need to provide correct information or value that is representative of the total population). Based on a power analysis with 95% confidence interval, 0.05 probability of error, and 0.30 effect size, the minimum sample to be obtained for this

study was 111. One sample was deemed equivalent to one study subject. The minimum number of samples and subjects to be obtained for this study was, thus, 111 responses from the total population of 127,462 respondents.

Operationalization

The three dependent variables in this study were heart disease, diabetes, and suicidal ideation or attempts. For the purposes of this secondary study, heart disease was confirmed by a "yes" answer to survey question CCC_Q121, "Do you have heart disease?"; diabetes was confirmed by a "yes" answer to survey question CCC_Q101, "Do you have diabetes?"; and suicidal ideation or attempts was confirmed by a "yes" answer to either survey question SUI_Q1, "Have you ever seriously considered committing suicide or taking your own life?" or SUI_Q3, "Have you ever attempted to commit suicide or tried taking your own life?"

The independent variable in this study was disordered gambling. Seven of the nine disordered gambling criteria were represented in the selected questionnaire. The same percentages used on the nine-item mild-to-severe survey were used to evaluate problem gamblers, which meant that meeting three to seven of the presented criteria defined a respondent as a problem gambler. The questions asked in the questionnaire, along with the American Psychiatric Association (2013) criteria to which the questions correlated, are explained in Table 1.

Table 1

Questionnaire Questions and the American Psychiatric Association (2013) Criteria to which They Correlated

Questionnaire	American Psychiatric Association Criteria
CPG_Q03 – How often have you needed to gamble with larger amounts of money to get the same feeling of excitement?	Needs to gamble with increasing amounts of money in order to achieve the desired excitement.
CPG_Q04 – When you gambled, how often did you go back another day to try to win back the money you lost?	After losing money gambling, often returns another day to get even ("chasing one's losses").
CPG_Q05 – How often have you borrowed money or sold anything to get money to gamble?	Relies on others to provide money to relieve desperate financial situations caused by gambling.
CPG_Q11 – How often have you lied to family members or others to hide your gambling?	Lies to conceal the extent of involvement with gambling.
CPG_Q14 – Have you tried to quit or cut down on your gambling but were unable to do it?	Has made repeated unsuccessful efforts to control, cut back, or stop gambling.
CPG_Q15 – Have you gambled as a way of forgetting problems or to feel better when you were depressed?	Often gambles when feeling distressed (e.g., helpless, guilty, anxious, or depressed).
CPG_Q16 – Has your gambling caused any problems with your relationships with any of your family members or friends?	Has jeopardized or lost a significant relationship, job, or educational or career opportunity because of gambling.
CPG_Q19B1 – During the past 12 months, how much did your gambling activities interfere with your ability to attend school?	
CPG_Q19B2 – How much did these activities interfere with your ability to work a job?	
CPG_Q19C – How much did your gambling activities interfere with your ability to form and maintain close relationships with other people?	

Questions 3, 4, 5, 11, 14, 15, and 16 all offered a scale for response, which included “Never,” “Sometimes,” “Most of the time,” and “Always.” Any answer to these questions other than “Never” was considered as meeting the corresponding American Psychiatric Association (2013) criteria. Questions 19B1, 19B2, and 19C offered a 0-10 scale, with 0 being “No interference” and 10 being “Severe interference.” Any answer to these questions other than “0” was considered as meeting the American Psychiatric Association criteria.

There were four questions that satisfied the criterion regarding whether a respondent had jeopardized or lost a significant relationship, job, or educational or career opportunity because of gambling. Any respondent who met the criterion on any one of these four questions was considered as meeting that criterion. Combined, having met three to seven of the American Psychiatric Association (2013) criteria using these questions would categorize a respondent as a disordered gambler.

Data Analysis Plan

The dataset was analyzed using IBM SPSS v.27. Researchers have used this program to conduct both bivariate and multivariate analysis effectively in the past (e.g., Bhatti et al., 2019; Hinton & McMurray, 2017).

Initial descriptive analyses were conducted to identify outliers, missing data, and the overall consistency of the dataset. The research questions and respective hypotheses, as presented in Section 1 and in the beginning of this current section, were tested using chi-square tests. These tests were conducted in order to determine the difference between

Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers.

Chi-square tests are generally conducted when the purpose of an analysis is to test the association between dependent and independent variables that are categorical in nature (Connelly, 2019). For the first research question, the variable to be tested for significant difference was having heart disease (yes/no); for the second research question, having diabetes (yes/no); and for the third research question, experiencing suicidal ideation or attempts (yes/no). To consider the control variables of gender, age, race/ethnicity, and insurance status, a binary logistic regression analysis was conducted for each research question. The categorical independent variable of either being or not being a disordered gambler was represented using a dummy variable to match the requirements of a binary logistic regression. The dependent measure was having or not having heart disease, having or not having diabetes, and having or not having suicidal ideation or attempts, respectively. A significance level of .05 was used for all analyses.

Threats to Validity

Threats to External Validity

The dataset was collected from Statistics Canada's Division of Health Statistics office, which is the office responsible for all the country's statistical data (Statistics Canada, 2013). Data from this office has been used by other researchers in many previous studies and peer-to-peer reviews. The most-requested download, as of the time of publication for this current study, has been the 2015-2016 census data (Statistics Canada, 2016). These data have been supported by a governmental agency in Canada (i.e.,

Statistics Canada), and have, therefore, had their validity affirmed. The threats to validity are, therefore, minimal, as the data have already been collected and verified. My intent with this study was to draw conclusions related to the posed research questions based on the same available data, which means that any generalization of the results to other populations with similar characteristics should be done with caution.

Threats to Internal Validity

The dataset used for this study has been validated several times in the past (Beland, 2002; Orpana et al., 2017; Shields & Tremblay, 2002). These data were further supported by information from 2015, which was collected and reported on in 2017, and which highlighted that incident rates of all involved conditions may currently be different (Orpana et al., 2017). Verifying the difference was, however, beyond the scope of this current study, and I opted, instead, to make use of the more validated 2013 data. The use of a validated instrument as well as multivariable analysis (i.e., logistic regression) further ensured the internal validity of the study.

Ethical Procedures

In order to acquire the dataset used in this study, I first had to receive approval from Statistics Canada's Division of Health Statistics office. This approval was duly acquired. I also only used deidentified data collected in the 2013 Canadian Community Health Survey (Statistics Canada, 2013). As the 2013 Canadian Community Health Survey dataset did not contain any personal or identifying information, there was no possibility of violating any of the participants' privacy. Walden IRB approval was also

obtained prior to using this dataset. The dataset was kept on my personal, password-protected computer, and will be destroyed at the conclusion of the research process.

Summary

I elaborated on the research design, rationale, and methodology of the study in this section. The dependent and independent variables were also clarified, along with threats to the study's validity and ethical considerations. In the next section, I present the results and findings of this study.

In the following section, I describe the time frame for data collection, as well as the actual recruitment and response rates of the secondary dataset. I also present any discrepancies in the use of the secondary dataset from the plan presented here in Section 2. As further part of Section 3, I report the baseline descriptive and demographic characteristics of the sample; describes how representative the sample was in relation to the population of interest, or how proportional it was to the larger population; and provides results of the basic univariate analyses. I also detail the statistical analysis findings, including exact statistics, confidence intervals, and levels of significance.

Section 3: Presentation of the Results and Findings

Introduction

The purpose of this quantitative study was to explore whether and to what extent being a disordered gambler in Canada increases the likelihood that someone would have concurrent physical or mental health problems (i.e., heart disease, diabetes and/or suicidal ideation or attempts). Specifically, three research questions were addressed in this analysis through testing three sets of hypotheses. The research questions and hypotheses were as follows:

RQ1: Is there a significant difference in having heart disease between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status?

$H_0$1: There is no significant difference in having heart disease between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status.

$H_1$1: There is a significant difference in having heart disease between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status.

RQ2: Is there a significant difference in having diabetes between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status?

$H_0$2: There is no significant difference in having diabetes between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status.

$H_1$2: There is a significant difference in having diabetes between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status.

RQ3: Is there a significant difference in experiencing suicidal ideation or attempts between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status?

$H_0$3: There is no significant difference in experiencing suicidal ideations between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status.

$H_1$3: There is a significant difference in experiencing suicidal ideations between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status.

This section includes a background of the secondary dataset collection process employed in this study. I also detail the demographic characteristics, chronic diseases, and/or disordered gambling status of participants, along with the results of the hypotheses testing in this section. This section ends with a summary of the key findings.

Data Collection of the Secondary Dataset

Data from the Canadian Community Health Survey (Statistics Canada, 2013) were used in this study. This dataset was acquired from Statistics Canada's Division of Health Statistics office by submitting a request through their website. After signing a nondisclosure and data custodian contract, I received a link to a secure FTP website via email. I was also given a unique login name and password that enabled access to the secondary dataset.

Before accessing the data, I first obtained Walden IRB approval (#01-07-21-0533144). Among the variables obtained from the secondary dataset, I focused on variables pertaining to age; gender; insurance status; chronic diseases such as heart disease, diabetes, and suicidal ideation or attempts; and the classification of participants as disordered gamblers. Data were based on a sample of approximately 127,462 respondents for the 2013 dataset. The participants included in the secondary dataset were all aged 12 years or older. All data included in the gathered dataset were used for the analyses conducted in this current study.

Results

Upon gaining access to the secondary dataset, data for the variables researched in this study were transferred to IBM SPSS v.27 in preparation for data analyses. Table 2 presents the demographic characteristics of the participants in this study. As noted previously, the targeted participants were aged 12 years or older. Among the 127,462 participants, approximately 9.9% were 60 to 64 years old (n = 12,615), and 9.4% were 55 to 59 years old (n = 12,025) and 65 to 69 years old (n = 12,044), respectively.

Regarding insurance coverage, only 28.3% of the participants were found to have their costs covered by insurance (n = 36,083). There were 70,288 participants who were females (55.1%) and 57,174 participants who were males (44.9%). Although one of the initial control variables considered in the study was the race of participants, race data were not available and were, thus, not considered in the final analyses.

Table 2

Frequencies and Percentages of Demographic Characteristics

		Frequency	Percent
Insurance Coverage	Yes	36083	28.3
	No	9763	7.7
	Total	45846	36.0
Missing	System	81616	64.0
Total		127462	100.0
Gender	Male	57174	44.9
	Female	70288	55.1
	Total	127462	100.0
Age	12-14 years old	4896	3.8
	15-17 years old	5132	4.0
	18-19 years old	3157	2.5
	20-24 years old	6692	5.3
	25-29 years old	7086	5.6
	30-34 years old	7117	5.6
	35-39 years old	7563	5.9
	40-44 years old	7352	5.8

45-49 years old	6332	5.0
50-54 years old	9607	7.5
55-59 years old	12025	9.4
60-64 years old	12615	9.9
65-69 years old	12044	9.4
70-74 years old	9131	7.2
75-79 years old	7142	5.6
above 80 years old	9571	7.5
Total	127462	100.0

The dependent variables in this study consisted of participants' being diagnosed with a chronic disease. The chronic diseases considered in this study were diabetes, heart disease, and suicidal ideation or attempts. Conversely, the independent variable considered in this study was the classification of participants as disordered gamblers. There were 11,493 participants who reported having diabetes (9%), 9,250 participants who reporting having heart disease (7.3%), and 26,245 participants who reported experiencing suicidal ideation or attempts (20.6%%). Among the participants, 53,447 were classified as disordered gamblers (41.9%). Details pertaining to both the dependent and independent variables are presented in Table 3.

Table 3

Frequencies and Percentages of Chronic Diseases and Disordered Gambling Classifications

		Frequency	Percent
Diabetes	Yes	11493	9.0
	No	115796	90.8
	Total	127289	99.9
Missing	System	173	0.1
Total		127462	100.0
Heart Disease	Yes	9250	7.3
	No	117785	92.4
	Total	127035	99.7
Missing	System	427	0.3
Total		127462	100.0
Suicidal Ideation or Attempts	Yes	26245	20.6
	No	101217	79.4
	Total	127462	100.0
Disordered Gambling	Yes	53447	41.9
	No	74015	58.1
	Total	127462	100.0

To address the first research question, a chi-square analysis was conducted to determine whether or not there was a significant difference in the classification of participants with heart disease, based on their classification as disordered gamblers. The results, as presented in Table 4, showed that there was no significant difference in the

classification of participants in terms of heart disease and their classification as disordered gamblers (chi-square = .693; *p*-value = .405).

Table 4

Chi-square Analysis of Heart Disease and Disordered Gamblers

		Disordered Gambling				Total		Chi-square	p-value
		Yes	%	No	%		%		
Heart Disease	Yes	3841	7.2	5409	7.33	9250	7.3	0.693	0.405
	No	49432	92.8	68353	92.67	117785	92.7		
Total		53273		73762		127035			

As a means of controlling for covariates such as the insurance coverage, gender, and age of participants, a binary logistic regression considering disordered gambling classification as the predictor variable was conducted. The disordered gambling variable was dummy coded. Sample weights were not considered because all available data from the secondary source were included in the study. Based on the results presented in Table 5, the disordered gambling variable was not a significant predictor of heart disease after adding the covariates (*OR* = 1.024, 95%; *CI*: 0.094-1.087; *p*-value = .443). The covariates were, thus, determined to be significant in the model.

This finding implies that the covariates were significant predictors of the dependent variable when compared to the disordered gambling variable. There was, therefore, no significant difference in having heart disease between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while

controlling for gender, age, race/ethnicity, and insurance status. The null hypothesis for the first research question could, thus, not be rejected. The Hosmer and Lemeshow test further showed that the results marginally fit the data at $p = 0.049 < 0.05$. The Nagelkerke R^2 test similarly indicated a 19.4% variation in the outcome. Chi-square analysis was further conducted to determine whether there was a significant difference in the classification of participants with diabetes based on their classification as disordered gamblers, as per the previously presented RQ2. Table 6 presents the result of this chi-square analysis. Specifically, the results showed that there was a significant difference in the classification of those participants with diabetes based on their classification as disordered gamblers. The participants with both diabetes and a gambling disorder were significantly less when compared to those with diabetes but without a gambling disorder (8.6% versus 9.3%, respectively; chi-square = 20.894; *p*-value < .001).

Table 5

Binary Logistic Regression of Heart Disease Variable

							95% *CI* for *OR*	
	B	S.E.	Wald	df	p-value	Odds Ratio	Lower	Upper
Disordered Gambling	0.023	0.031	0.588	1	0.443	1.024	0.964	1.087
Insurance Coverage			30.997	2	0.000			
Insurance Coverage (Yes)	-0.137	0.051	7.151	1	0.007	0.872	0.789	0.964
Insurance Coverage (No)	-0.249	0.049	25.909	1	0.000	0.779	0.708	0.858
Gender (Male)	-0.501	0.023	485.079	1	0.000	0.606	0.579	0.634
Age (12-14)			6522.382	15	0.000			
Age (15-17)	3.580	0.149	579.953	1	0.000	35.888	26.816	48.028
Age (18-19)	4.054	0.182	496.733	1	0.000	57.601	40.329	82.270
Age (20-24)	4.057	0.231	307.217	1	0.000	57.817	36.730	91.011
Age (25-29)	3.624	0.132	753.079	1	0.000	37.483	28.935	48.556
Age (30-34)	3.605	0.129	781.640	1	0.000	36.780	28.566	47.355
Age (35-39)	3.975	0.153	672.971	1	0.000	53.227	39.420	71.870
Age (40-44)	3.559	0.121	865.848	1	0.000	35.131	27.716	44.529
Age (45-49)	3.031	0.096	1004.059	1	0.000	20.726	17.182	25.000
Age (50-54)	2.639	0.086	936.414	1	0.000	14.005	11.827	16.585
Age (55-59)	2.125	0.059	1317.930	1	0.000	8.375	7.467	9.394
Age (60-64)	1.686	0.046	1344.759	1	0.000	5.400	4.935	5.909
Age (65-69)	1.264	0.040	991.597	1	0.000	3.541	3.273	3.830

Age (70-74)	0.926	0.037	609.925	1	0.000	2.524	2.345	2.716
Age (75-79)	0.572	0.038	229.206	1	0.000	1.771	1.645	1.908
Age (80+)	0.307	0.039	63.153	1	0.000	1.360	1.261	1.467
Constant	1.496	0.050	881.640	1	0.000	4.463		

Table 6

Chi-square Analysis of Diabetes and Disordered Gamblers

		Disordered Gambling				Total		Chi-square	p-value
		Yes	%	No	%		%		
Diabetes	Yes	4588	8.6	6905	9.3	11493	9.0	20.894	.000
	No	48780	91.4	67016	90.7	115796	91.0		
Total		53368		73921		127289			

A binary logistic regression considering disordered gambling classification as the predictor variable and diabetes as the dependent variable while controlling for the insurance coverage, gender, and age was then conducted. The disordered gambling variable was dummy coded. Based on the results presented in Table 7, the disordered gambling variable was a significant predictor of diabetes after adding the covariates (*OR* = 1.138, 95%; *CI*: 1.079-1.199; *p*-value < .05). This relationship indicated that individuals who were not disordered gamblers were 1.138 times more likely to have diabetes when compared to those who were classified as disordered gamblers. There was, therefore, a significant difference in having diabetes between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while

controlling for gender, age, race/ethnicity, and insurance status. Thus, the null hypothesis was rejected. The Hosmer and Lemeshow test further showed that the results adequately fit the data at $p = 0.278$ (> .05). Similarly, the Nagelkerke R^2 test presented a 14.9% variation in the outcome.

Table 7

Binary Logistic Regression of Diabetes Variable

							95% *CI* for *OR*	
	B	S.E.	Wald	df	p-value	Odds Ratio	Lower	Upper
Disordered Gambling	0.129	0.027	22.912	1	0.000	1.138	1.079	1.199
Insurance Coverage			25.376	2	0.000			
Insurance Coverage (Yes)	-0.171	0.045	14.493	1	0.000	0.843	0.772	0.920
Insurance Coverage (No)	-0.217	0.043	25.276	1	0.000	0.805	0.739	0.876
Gender (Male)	-0.290	0.020	204.791	1	0.000	0.748	0.719	0.779
Age (12-14)			4850.566	15	0.000			
Age (15-17)	3.867	0.220	307.690	1	0.000	47.821	31.041	73.669
Age (18-19)	3.437	0.174	388.537	1	0.000	31.083	22.086	43.745
Age (20-24)	3.256	0.203	257.934	1	0.000	25.957	17.445	38.623
Age (25-29)	3.420	0.154	494.206	1	0.000	30.569	22.612	41.327
Age (30-34)	2.978	0.123	590.979	1	0.000	19.655	15.459	24.989
Age (35-39)	2.629	0.104	638.726	1	0.000	13.861	11.304	16.996
Age (40-44)	2.168	0.082	694.933	1	0.000	8.739	7.438	10.267
Age (45-49)	1.573	0.065	578.389	1	0.000	4.821	4.241	5.481
Age (50-54)	1.188	0.060	385.710	1	0.000	3.280	2.913	3.693
Age (55-59)	0.914	0.048	365.287	1	0.000	2.494	2.271	2.739
Age (60-64)	0.610	0.041	217.216	1	0.000	1.840	1.697	1.996
Age (65-69)	0.236	0.038	38.379	1	0.000	1.266	1.175	1.364

Age (70-74)	0.021	0.037	0.312	1	0.576	1.021	0.949	1.098
Age (75-79)	-0.162	0.039	17.754	1	0.000	0.850	0.788	0.917
Age (80+)	-0.264	0.040	42.731	1	0.000	0.768	0.710	0.831
Constant	1.862	0.048	1519.555	1	0.000	6.436		

In order to determine whether or not there was a significant difference in the classification of participants with suicidal ideation or attempts based on their classification as disordered gamblers (i.e., Research Question 3), I conducted another chi-square test. Table 8 presents the result of this chi-square analysis. In particular, it should be noted that the results showed a significant difference in the classification of participants with suicidal ideation or attempts based on their classification as disordered gamblers (chi-square = 3703.238; *p*-value < .001). The results specifically established that there were significantly more participants with suicidal ideation or attempts who were also classified as disordered gamblers when compared to those who were not classified as disordered gamblers (28.7% versus 14.7%). Conversely, there were more participants with no suicidal ideation or attempts who were also not classified as disordered gamblers.

Table 8

Chi-square Analysis of Suicidal Ideation and Disordered Gamblers

		Disordered Gambling				Total		Chi-square	p-value
		Yes	%	No	%		%		
Suicidal Ideation	Yes	15340	28.7	10905	14.7	26245	20.6	3703.238	.000
	No	38107	71.3	63110	85.3	101217	79.4		
Total		53447		74015		127462			

A binary logistic regression considering disordered gambling classification as the predictor variable and suicidal ideation as the dependent variable while controlling for the insurance coverage, gender, and age was also conducted. The disordered gambling

variable was dummy coded. Based on the results presented in Table 9, the disordered gambling variable was a significant predictor of suicide ideation or attempts after adding the covariates (*OR* = 0.687, 95%; *CI*: 0.664-0.711). Those participants who were classified as disordered gamblers were found to have a higher likelihood (1/0.687 = 1.455) of exhibiting suicide ideation or attempts when compared to those who were not classified as disordered gamblers. The results, therefore, showed that there was significant difference in having suicidal ideation or attempts between Canadian adults who are disordered gamblers and Canadian adults who are not disordered gamblers while controlling for gender, age, race/ethnicity, and insurance status. Thus, the null hypothesis was rejected. The Hosmer and Lemeshow test further indicated that the results did not adequately fit the data at $p = 0.006 < 0.05$, and the Nagelkerke R^2 test showed a 6.7% variation in the outcome.

Table 9

Binary Logistic Regression of Suicidal Ideation Variable

	B	S.E.	Wald	df	p-value	Odds Ratio	95% *CI* for *OR* Lower	Upper
Disordered Gambling	-0.376	0.017	466.244	1	0.000	0.687	0.664	0.711
Insurance Coverage			1649.744	2	0.000			
Insurance Coverage (Yes)	-0.881	0.037	581.807	1	0.000	0.414	0.386	0.445
Insurance Coverage (No)	-0.034	0.038	0.811	1	0.368	0.967	0.898	1.041
Gender (Male)	0.041	0.014	8.072	1	0.004	1.041	1.013	1.071
Age (12-14)			257.801	15	0.000			
Age (15-17)	0.058	0.044	1.694	1	0.193	1.060	0.971	1.156
Age (18-19)	0.084	0.044	3.644	1	0.056	1.088	0.998	1.186
Age (20-24)	0.202	0.054	14.231	1	0.000	1.224	1.102	1.360
Age (25-29)	0.213	0.041	26.367	1	0.000	1.237	1.141	1.342
Age (30-34)	0.262	0.041	41.054	1	0.000	1.300	1.200	1.408
Age (35-39)	0.241	0.040	35.437	1	0.000	1.273	1.175	1.378
Age (40-44)	0.150	0.039	14.614	1	0.000	1.162	1.076	1.255
Age (45-49)	0.035	0.039	0.815	1	0.367	1.036	0.959	1.119
Age (50-54)	-0.003	0.041	0.006	1	0.939	0.997	0.921	1.079
Age (55-59)	0.003	0.036	0.009	1	0.926	1.003	0.935	1.077
Age (60-64)	0.039	0.034	1.287	1	0.257	1.040	0.972	1.112

Age (65-69)	-0.099	0.034	8.710	1	0.003	0.906	0.848	0.967
Age (70-74)	-0.123	0.034	13.208	1	0.000	0.884	0.828	0.945
Age (75-79)	-0.025	0.036	0.489	1	0.484	0.975	0.908	1.047
Age (80+)	-0.035	0.039	0.817	1	0.366	0.965	0.894	1.042
Constant	2.114	0.042	2538.639	1	0.000	8.280		

Summary

The purpose of this quantitative study was to explore whether and to what extent being a disordered gambler in Canada increases the likelihood that someone would have concurrent physical or mental health problems (i.e., heart disease, diabetes and/or suicidal ideation or attempts). The data from the 2013 Canadian Community Health Survey were used in this research and were based on a sample of approximately 127,462 respondents for the 2013 dataset (Statistics Canada, 2013). Both chi-square analysis and binary logistic regressions were conducted to test the hypotheses posed in this study. The chi-square analyses determined that participants who were classified as disordered gamblers were statistically more prone to have suicidal ideation or attempts, but less likely to have diabetes. There was no significant association between gambling disorders and heart disease. These results were further confirmed by the binary logistic regression conducted for each research question. Based on the findings presented in this section, while there was insufficient evidence to reject the first null hypothesis, there was sufficient evidence to reject both the second and third null hypotheses posed in this study.

Section 4: Application to Professional Practice and Implications for Social Change

Introduction

The purpose of this quantitative study was to explore whether and to what extent being a disordered gambler in Canada increases the likelihood that someone would have concurrent physical or mental health problems (i.e.., heart disease, diabetes and/or suicidal ideation or attempts). Previous researchers have identified heart disease (see Hare, 2015; Meyer et al., 2000), diabetes (see Subramaniam et al., 2015), and suicide ideation (see Giovanni et al., 2017; Weinstock et al., 2014) as concurrent physical or mental health problems among those with disordered gambling. However, these previous researchers did not examine all three physical or mental health problems concurrently. To better address the needs of individuals with disordered gambling, research was needed to understand the association between disordered gambling and physical and/or mental health problems among Canadians. To gain such understanding, I conducted this current study.

Binary logistic regression and chi-square analysis were conducted on data from the 2013 Canadian Community Health Study to compare the likelihood of heart disease, diabetes, and suicidal ideation or attempts in those with and without disordered gambling. Significant differences in physical or mental health problems were found when comparing Canadians with and without disordered gambling. The findings from the current study hold the potential to create positive social change by showcasing the multifaced needs of those with disordered gambling. In this section, the findings of the current study are discussed in the context of previous literature and I also identify the

limitations of the current study and provide recommendations and implications for practice and social change.

Interpretation of the Findings

There were significant differences found in this current study regarding concurrent physical or mental health problems when comparing Canadians with and without disordered gambling. Several findings of the current study also differed from previous research. Consistent with previous literature (e.g., Weinstock et al., 2014) was the finding that those with disordered gambling were more likely to report suicide ideation or attempts when compared to those without disordered gambling. Findings regarding diabetes and heart disease did, however, differ from previous literature. I found that those without disordered gambling were more likely to report diabetes when compared to those with disordered gambling. Also contrary to previous literature was the finding that there were no significant differences between the two groups of interest when examining heart disease. The results for each research question are discussed in more detail the following subsections.

Heart Disease and Disordered Gambling

In contrast to previous literature, this study's results revealed no statistically significant difference in heart disease in Canadians with and without disordered gambling. This finding is contradictory to previous literature which found associations between problem gambling and poor health across multiple populations (e.g., Ekholm et al., 2018). Hare (2015), for example, noted that problem drinkers were more likely to suffer from poor health due to increased drinking. Other researchers similarly noted that

poor sleep (Loft & Loo, 2015), poor eating habits (Subramaniam et al., 2015), and increased cortisol levels (Meyer et al., 2000) could also contribute to problem gamblers' poor health. Thus, based on previous findings, problem it appeared gamblers are at a much higher risk of heart disease when compared to nonproblem gamblers (Germain et al., 2012; Humphreys et al., 2016), yet no such finding could be confirmed in the current study.

The discrepancy between the current study and previous research may be due to the lower percentage of respondents in the current study who reported having heart disease. Many of the previous studies examining the risks of heart disease among problem gamblers used samples from the United States (e.g., Centers for Disease Control and Prevention [CDC], 2019; Williams et al., 2012). According to the CDC (2019), 11.2% of Americans were diagnosed with some kind of heart disease in 2018. The percentage of respondents who reported heart disease in the current study was 7.3%, which indicates nearly a 4% difference. It may be possible, then, that Canadians are generally less likely to have heart disease when compared to other populations and, therefore, factors that increase the likelihood of heart disease in other populations (e.g., U.S.-based population) may not have the same effect when examining Canadian-based populations.

Alternatively, it may be possible that those who responded to the current study were in either better or worse health than individuals who did not respond to the 2013 Canadian Community Health Study. On the one hand, those with poorer health may be less inclined to respond to general surveys about their health. On the other hand, those

with little to no health concerns may be more likely to report on their health problems or, alternatively, healthier individuals may not feel motivated to report on their own health. As it is not possible to compare the health of those who did respond to the 2013 Canadian Community Health Study and those who did not, it was not possible to exclude response bias in the current study.

There were also a significant number of participants in the current study who reported problem gambling (i.e., nearly 42%). This number is significantly higher than previous estimates in other populations. For example, estimates of problem gambling available in the previous literature range from 0.4% and 3.4% of adults who are problem gamblers (Calado & Griffiths, 2016). Previous researchers who compared the health of problem gamblers to nonproblem gamblers further estimated the total percentage of the sample that meets the criteria for problem gambling at 0.8% (Hare, 2015). It is unclear why such a large percentage of the participants in the current study reported problem gambling. It could not, therefore, be excluded that the current study identified individuals as problematic gamblers when they were not, which may have made comparisons across those with and without problematic gambling more difficult.

Diabetes and Disordered Gambling

In contrast to the previous literature, the current study revealed that Canadians with disordered gambling were not more likely to have diabetes and Canadians without disordered gambling were more likely to report diabetes than those with disordered gambling. Disordered gambling has previously been linked to diabetes among problem

gamblers due to their lack of physical activity, consumption of high amounts of alcohol, and poor eating habits (Humphreys et al., 2016; Subramaniam et al., 2015).

In the current study, however, the measurement of diabetes may have contributed to this discrepancy with previous research. Specifically I included only one question related to determining whether or not participants had diabetes. For participants to respond affirmatively, they would have needed to be aware of a diagnosis of diabetes. Thus, it may have been possible that more participants had diabetes but were simply unaware of having the disease as they had not been formally diagnosed. Previous researchers have suggested that Australian problem gamblers tend to see their primary care doctors more frequently than nonproblem gamblers (see Hare, 2015); hence, it may be that among Canadian samples of problem gamblers, they seek medical care less frequently than nonproblem gamblers. Future researchers would, however, need to confirm this assertion, as it could not be verified in the current study. Future researchers may consider examining the frequency of health care visits among Canadian problem gamblers. If Canadian problem gamblers seek medical care less often, they may be less likely to receive a diagnosis of diabetes and may, therefore, have answered negatively to the question posed in this current study.

Suicidal Ideation or Attempts and Disordered Gambling

Consistent with the previous literature, I found that Canadians with disordered gambling were more likely to report experiencing suicidal ideation or attempts when compared to those without disordered gambling. Problem gamblers have also previously been found to be more likely to be diagnosed with depression and/or anxiety when

compared to nonproblem gamblers, which may contribute to their risk of suicide ideation and attempts (Hare, 2015). Previous researchers have further shown a link between disordered gambling and suicide ideation and attempts (Giovanni et al., 2017; Meyer et al., 2000; Weinstock et al., 2014).

Gambling increases cortisol levels and heart rates, which, in those with disordered gambling, may lead to an increase in stress and contribute to suicidal ideation or attempts (Meyer et al., 2000). Those with disordered gambling also share many of the same traits as those who report suicide ideation and attempts (Giovanni et al., 2017). It should be noted, however, that there was some variation in suicide ideation and attempts among those with disordered gambling. For example, I found that individuals with disordered gambling and a family history of alcoholism or mental health problems appeared to be at a greater risk of suicide ideation and attempts than those with disordered gambling but with no family history of alcoholism or mental health problems. Based on the study findings, problem gambling seems to present a serious risk factor for suicide ideation and attempts, which should be taken seriously by health care professionals.

Theoretical Implications

Some of the findings of the current study were consistent with Maslow's (1954) hierarchy of needs. For example, the finding that disordered gambling is associated with more suicide ideation and attempts was consistent with this theoretical perspective, as individuals who develop problem gambling tend to use gambling to meet unmet esteem or social needs, as put forward by Maslow. As gambling did not fulfill these important needs, participating individuals tended to report poorer mental health.

The finding that disordered gambling is not associated with heart disease or diabetes was not, however, consistent with Maslow's (1954) theory. There is evidence of a hereditary risk of heart disease and diabetes (American Diabetes Association, n.d.; CDC, 2019), which means that these health issues are not purely physical health problems that develop solely from behavioral causes. As the development of these diseases is complex and influenced by multiple factors, it may be that the choice of a behavioral theory was not fully appropriate to explain the risks of these diseases, as presented in this study.

Limitations of the Study

The findings of the current study should be considered within the context of a few limitations. First, the current study was limited regarding the questions that participants answered, which were specific to their physical and mental health as well as to their gambling. While the use of a national study allowed for a representative sample of Canadians, the questionnaire aimed for breadth rather than depth (Statistics Canada, 2013). The physical and mental health questions were restricted to simple yes or no answers. It is possible that these yes or no questions excluded those without a formal diagnosis or those who may have had physical and mental health problems but who did not meet the criteria for a specific disorder. The gambling questions, in turn, focused on the impact of gambling on relationships and opportunities, which may not be a serious concern for those whose disordered gambling is less severe. All such factors within the questionnaire itself may have led to less comprehensive responses; thereby limiting this current study's findings.

Second, the current study was cross-sectional in nature and I could not determine cause and effect. While previous researchers have hypothesized that behaviors associated with disordered gambling could lead to physical and mental health problems such as heart disease, diabetes, or suicidal ideation or attempts (e.g., Subramaniam et al., 2015), it may also be that those with physical and mental health problems begin engaging in disordered gambling as an inferior coping response to their poor health. As I only included a single point in time to investigate in this current study, it was not possible to control for health problems that developed prior to disordered gambling.

Despite the careful steps of the Canadian Institute for Health Information and Statistics, it is possible that the results of the current study were affected by some response bias. It may be particularly possible that those with disordered gambling did not feel comfortable disclosing their gambling behavior on a governmental survey and may even have not responded to the survey at all. It is also possible that those with poorer overall health are less inclined to respond to surveys regarding their health (Cheung et al., 2017; Lallukka et al., 2020). Thus, it may be that valuable data were missing from the final analysis; thereby limiting the study findings.

There are numerous other outside factors that may influence a person's likelihood of becoming a problem gambler, or that may affect their health status, that we were not able to account for, and therefore, may have affected the outcome of the study. One such outside factor is socioeconomic status. However, the use of the insurance coverage variable can be considered as surrogate of the socioeconomic status of survey respondents.

The sample included in the current study was, however, larger than the minimum requirement of 111 participants for this particular type of study and greater than the size required by the Canadian Institute for Health Information and Statistics for its surveys. The same was also deemed nationally representative, and nearly half of the sample reported problem gambling. It is unlikely, therefore, that individuals were generally wary of participating in the survey or that the sample may have, in some way, limited the accuracy of this current study's findings. Finally, although sample weights were not considered because all available data from the secondary source were included in the study, this can be also considered as a limitation of the study.

Recommendations

The findings of the present study have implications for future research. First, longitudinal research is needed to better understand the links between disordered gambling and physical or mental health problems. The current researcher's study, as well as much of those by previous authors (e.g., Hare, 2015; Meyer et al., 2000; Weinstock et al., 2014) were cross-sectional in nature. While researchers have hypothesized that behaviors associated with disordered gambling might lead to various physical and mental health problems (e.g., Subramaniam et al., 2015), the converse may also be true, namely that individuals begin gambling as a means of coping with a decline in their health. Longitudinal research could better illuminate the circumstances under which disordered gambling leads to poor health and/or poor health leads to disordered gambling.

Second, future researchers should collect more comprehensive health data from participants instead of or in addition to the yes/no questions regarding physical or mental

health problems used in the current study. While the use of a large, secondary dataset allowed the current study's results to be more generalizable to the population of interest, these benefits came at the cost of less intensive screenings. The simple yes/no questions may have also inadvertently excluded participants without a formal diagnosis, as they would not have met the criteria for diagnosis or may not have sought medical care. Future researchers may, thus, consider a more holistic measurement of health when examining the links between problem gambling and physical or mental health among Canadians.

Last, future researchers may consider alternative methods for measuring problematic gambling among Canadian populations. While the questionnaire used in the current study included screening questions that aligned with the American Psychiatric Association's criteria established in 2013 for problem gambling, nearly 42% of the sample met the criteria (i.e., responded affirmatively to at least three out of seven questions) for problematic gambling. This percentage was significantly larger than previously estimated by authors such as Calado and Griffiths (2016) and Hare (2015). It is not clear why so many participants in the current study met the criteria for problem gambling; hence, future researchers should attempt finding alternative means for measuring problematic gambling in Canadian samples.

Implications for Professional Practice and Social Change

As noted previously, this current study's findings hold some implications for both professional practice and social change. The first implication relates to the result of the high percentage of individuals who were identified as problem gamblers in the current study. Previous estimates of problem gambling in the population ranged from 0.4% and

3.4% of adults (Calado & Griffiths, 2016). I found, however, that nearly 42% of Canadians who participated in the 2013 Canadian Community Health Study (Statistics Canada, 2013) met at least three criteria for problem gambling. This finding should be of serious concern for health care providers, advocates, and government officials, who should begin considering examining the rates of problematic gambling among Canadians 12 years and older so as to identify strategies for reducing this percentage.

A second implication is that both the current and previous research findings (e.g., Weinstock et al., 2014) have consistently indicated that those with problematic gambling tend to be at a higher risk of suicide ideation and attempts. Health care providers should, therefore, consider screening individuals for problem gambling, such as in the case of gambling due to poverty, so as to better understand their risk of suicide ideation and attempts. Studies have shown that problem gambling is more prevalent in low income communities, and that there is an association between problem gambling and poverty (Hahmann et al., 2020). Practitioners working with individuals who have problematic gambling should also screen these individuals for suicide ideation and attempts. These practitioners should further consider making mental health support a key part of their treatment programs aimed at addressing problematic gambling.

The last implication is that the findings presented in the current study could be used to support positive social change by adding them to the growing body of literature that has shown, across multiple populations, that problematic gambling tends to be associated with mental health problems. This evidence could be used by health care providers and advocates to lobby for funding to prevent and treat problem gambling in

Canada. It may be possible that reducing problem gambling in Canada could, in turn, reduce the risk of mental health problems in at-risk Canadians.

Conclusion

Consistent with previous researchers' findings, I found that Canadians with disordered gambling were more likely to report suicide ideation and attempts than Canadians without disordered gambling. In contrast to previous findings, however, I found no difference between the two groups in respect to heart disease, and Canadians without disordered gambling were found to be more, not less, likely to report having diabetes. Unlike previous researchers' studies, participants who responded to the 2013 Canadian Community Health Study had a greater likelihood of being identified as having problematic gambling, which may explain, at least in part, the differences in findings between this current study and previous literature. To effectively address the noted discrepancies in the findings, future researchers should consider more holistic measurements of problem gambling and health among Canadians. Suicide ideation and attempts among Canadian problem gamblers was also noted as a serious concern in this study, and would need to be addressed by health care practitioners. Additional prevention or intervention should also be considered by health care providers so as to reduce suicide ideation and attempts among this particular population.

References

Algren, M. H., Ekholm, O., Davidsen, M., Larsen, C. L., & Juel, K. (2014). Health behaviour and body mass index among problem gamblers: Results from a nationwide survey. *Journal of Gambling Studies, 31*(2), 547-556. https://doi.org/10.1007/s10899-013-9437-y

American Diabetes Association. (n.d.). *Learn the genetics of diabetes*. Diabetes Overview. https://www.diabetes.org/diabetes/genetics-diabetes

American Psychiatric Association. (1994). *Diagnostic Criteria from DSM-IV*. American Psychiatric Press.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). American Psychiatric Publishing.

Anderson, C. (2010). The impact of sleep on dealing with daily stressors: A need for controlled laboratory evidence. *Journal of the International Society for the Investigation of Stress, 26*(3), 194-197. https://doi.org/10.1002/smi.1301

Barber, L. K., Munz, D. C., Bagsby, P. G., & Powell, E. D. (2010). Sleep consistency and efficiency: Are both necessary for less psychological strain. *Stress and Health, 26*, 186-196. https://doi.org/10.1002/smi.1292

Battersby, M., Thomas, L., & Tolchard, B. (2006). Suicide ideation and behavior in people with pathological gambling attending a treatment service. *International Journal of Mental Health and Addiction, 4*, 233-246. https://doi.org/10.1007/s11469-006-9022-z

Beland, Y. (2002). Canadian community health survey: Methodological overview. *Health*

Reports, 13(3), 1-14.

Berchick, E. R., Barnett, J. C., & Upton, R. D. (2019). *Health insurance coverage in the United States: 2018*. U.S. Department of Commerce.

Bhatti, N. B., Siyal, A. A., Qureshi, A. L., & Bhatti, I. A. (2019). Socio-economic impact assessment of small dams based on t-paired sample test using SPSS software. *Civil Engineering Journal*, *5*(1), 153-164. http://dx.doi.org/10.28991/cej-2019-03091233

Binde, P., Romild, U., & Volberg, R. A. (2017). Forms of gambling, gambling involvement and problem gambling: Evidence from a Swedish population survey. *International Gambling Studies, 17*(3), 490-507. https://doi.org/10.1080/14459795.2017.1360928

Blackman, A., Browne, M., Rockloff, M., Hing, N., & Russell, A. M. T. (2019). Contrasting effects of gambling consumption and gambling problems on subjective wellbeing. *Journal of Gambling Studies, 35*, 773-792. https://doi.org/10.1007/s10899-019-09862-z

Bush, D. (2020). *Government-regulated lotteries and gambling have provided an alternative way to create income without further taxing*. ICLG.com. https://iclg.com/practice-areas/gambling-laws-and-regulations/canada

Buth, S., Wurst, F. M., Thon, N., Lahusen, H., & Kalke, J. (2017). Comparative analysis of potential risk factors for at-risk gambling, problem gambling and gambling disorder among current gamblers—results of the Austrian representative survey 2015. *Frontiers in Psychology*, *8*. https://doi.org/10.3389/fpsyg.2017.02188

Calado, F., & Griffiths, M. D. (2016). Problem gambling worldwide: An update and systematic review of empirical research (2000-2015). *Journal of Behavioral Addictions, 5*(4), 592-613. https://doi.org/10.1556/2006.5.2016.073

Calder, K. (n.d.). *Statistics 528—Lecture 21* [Lecture notes, PowerPoint slides]. Ohio State University. https://www.asc.ohio-state.edu/calder.13/stat528/Lectures/lecture21_6slides.PDF

Centers for Disease Control and Prevention. (2019). *Know your risk for heart disease*. https://www.cdc.gov/heartdisease/risk_factors.htm#:~:text=Genetic%20factors%20likely%20play%20some,that%20may%20increase%20their%20risk

Cheung, K. L., ten Klooster, P. M., Smit, C., de Vries, H., & Pieterse, M. E. (2017). The impact of non-response bias due to sampling in public health studies: A comparison of voluntary versus mandatory recruitment in a Dutch national survey on adolescent health. *BMC Public Health, 17*(1), 276. https://doi.org/10.1186/s12889-017-4189-8

Connelly, L. (2019). Chi-square test. *Medsurg Nursing, 28*, 127.

Cowlishaw, S., & Kessler, D. (2016). Problem gambling in the UK: Implications for health, psychosocial adjustment and health care utilization., *European Addiction Research, 22*(2), 90-98. https://doi.org/10.1159/000437260

Cunningham-Williams, R. M., Cottler, L. B., Compton, W. M., & Spitznagel, E. L. (1998). Taking chances: Problem gamblers and mental health disorders—results from the St. Louis Epidemiologic Catchment Area Study. *American Journal of Public Health, 88*, 1093-1096. https://doi.org/10.2105/ajph.88.7.1093

Ekholm, O., Davidsen, M., Larsen, C., & Juel, K. (2018). A nationwide study of health-related quality of life, stress, pain or discomfort and the use of medicine among problem gamblers. *Scandinavian Journal of Public Health, 46*(5), 514-521. https://doi.org/10.1177/1403494817739501

Ferentzy, P., & Turner, N. E. (2013). The history of gambling and its intersection with technology, religion, medical science, and metaphors. In P. Ferentzy & N. E. Turner (Eds.), *The history of problem gambling* (pp. 5-28). Springer.

Germain, A., Richardson, R., Moul, D. E., Mammen, O., Haas, G., Forman, S. D., Rode, N., Begley, A., & Nofzinger, E. A. (2012). Placebo-controlled comparison of prazosin and cognitive-behavioral treatments for sleep disturbances in US Military Veterans. *Journal of Psychosomatic Research, 72*(2), 89-96. https://doi.org/10.1016/j.jpsychores.2011.11.010

Giovanni, M., Fabiola, S., Federica, F., Mariangela, C., Nicola, P., Ilaria, T., Gianluca, S., Maurizio, P., & Massimo, D. G. (2017). Gambling disorder and suicide: An overview of the associated co-morbidity and clinical characteristics. *International Journal of High Risk Behaviors and Addiction, 6*(3), e30827. https://doi.org/10.5812/ijhrba.30827

Griffiths, M. (2004). Betting your life on it: Problem gambling has clear health related consequences. *BMJ, 329*(7474), 1055-1056. https://doi.org/10.1136/bmj.329.7474.1055

Hahmann, T., Hamilton-Wright, S., Ziegler, C., & Matheson, F. I. (2020). Problem gambling within the context of poverty: a scoping review. *International Gambling*

Studies, 1–37. https://doi.org/10.1080/14459795.2020.1819365

Hare, S. (2015). *Study of gambling and health in Victoria: Findings from the Victorian prevalence study 2014*. Victorian Responsible Gambling Foundation and Victorian Department of Justice and Community Safety. https://apo.org.au/node/59171

Heiskanen, M. (2017). Is it all about money? A qualitative analysis of problem gamblers' conceptualizations of money. *Nordic Studies on Alcohol and Drugs, 34*(5), 362-374. https://doi.org/10.1177/1455072517718455

Hinton, P. R., & McMurray, I. (2017). *Presenting your data with SPSS explained*. Taylor & Francis.

Humphreys, B. R., & Nyman, J. A., & Ruseski, J. E. (2016). *The effect of recreational gambling on regional health outcomes: Evidence from Canadian provinces* (Working Paper No. 16-28). Department of Economics, West Virginia University.

Humphreys, B. R., Nyman, J. A., & Ruseski, J. E. (2021). The effect of recreational gambling on health and well-being. *Eastern Economic Journal, 47*, 29-75. https://doi.org/10.1057/s41302-020-00181-5

Lallukka, T., Pietiläinen, O., Jäppinen, S., Laaksonen, M., Lahti, J., & Rahkonen, O. (2020). Factors associated with health survey response among young employees: A register-based study using online, mailed and telephone interview data collection methods. *BMC Public Health, 20*, 184. https://doi.org/10.1186/s12889-020-8241-8

Langham, E., Thorne, H., Browne, M., Donaldson, P., Rose, J., & Rockloff, M. (2016).

Understanding gambling related harm: A proposed definition, conceptual framework, and taxonomy of harms. *BMC Public Health, 16*(1), 80. https://doi.org/10.1186/s12889-016-2747-0

Latvala, T., Lintonen, T., & Konu, A. (2019). Public health effects of gambling: Debate on the conceptual model. *BMC Public Health, 19*(1077), 1-15. https://doi.org/10.1186/s12889-019-7391-z

Loft, M. H., & Loo, J. M. Y. (2015). Understanding the mechanisms underlying gambling behaviour and sleep. *Journal of Gambling Studies, 31*, 1273-1286. https://doi.org/10.1007/10899-014-9514-x

Loo, J., Kraus, S. W., & Potenza, M. N. (2019). A systematic review of gambling-related findings from the National Epidemiologic Survey on Alcohol and Related Conditions. *Journal of Behavioral Addictions, 8*(4), 625-648. https://doi.org/10.1556/2006.8.2019.64

Maslow, A. H. (1954). *Motivation and personality*. Harpers.

Maslow, A. H. (1943). A theory of human motivation. *Psychological Review, 50*(4), 370-396. https://doi.org/10.1037/h0054346

Meyer, G., Hauffa, B. P., Schedlowski, M., Pawlak, C., Stadler, M. A., & Exton, M. S. (2000). Casino gambling increases heart rate and salivary cortisol in regular gamblers. *Biological Psychiatry, 48*(9), 948-953. https://doi.org/10.1016/S0006-3223(00)00888-X

Morasco, B. J., Pietrzak, R. H., Blanco, C., Grant, B. F., Hasin, D., & Petry, N. M. (2006). Health problems and medical utilization associated with gambling

disorders: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Psychosomatic Medicine, 68*(6), 976-984. https://doi.org/10.1097/01.psy.0000238466.76172.cd

National Opinion Research Center. (1999). *Report to the National Gambling Impact Study Commission: Gambling impact and behavior study*. https://www.norc.org/pdfs/publications/gibsfinalreportapril1999.pdf

National Task Force on Health Information. (1991). *Health information for Canada, 1991: Report of the National Task Force on Health Information*. Supply & Service.

Orpana, H., Vachon, J., Dyxhoorn, J., & Jayaraman, G. (2017). Measuring positive mental health in Canada: Construct validation of the mental health continuum: short form. *Health Promotion and Chronic Disease Prevention in Canada, 37*(4), 123-130. https://doi.org/10.24095/hpcdp.37.4.03

Potenza, M. N., Fiellin, D. A., Heninger, G. R., Rounsaville, B. J., & Mazure, C. M. (2002). Gambling: An addictive behavior with health and primary care implications. *Journal of General Internal Medicine, 17*(9), 721-732. https://doi.org/10.1046/j.1525-1497.2002.10812.x

Przeworski, A., & Teune, H. (1970). *The logic of comparative social inquiry*. Wiley-Interscience.

Shields, M., & Tremblay, S. (2002). The health of Canada's communities. *Supplement to Health Reports, 13*, 1-24.

Spector, P. E. (2019). Do not cross me: Optimizing the use of cross-sectional designs.

Journal of Business and Psychology, 34, 125-137. https://doi.org/10.1007/s10869-018-09613-8

Statistics Canada. (2013). *Canadian community health survey: Annual component*. https://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&Id=144170

Statistics Canada. (2016). *Census profile, 2018 census*. https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=PR&Code1=01&Geo2=PR&Code2=01&Data=Count&SearchText=01&SearchType=Begins&SearchPR=01&B1=All&Custom=&TABID=3

Subramaniam, M., Wang, P., & Soh, P., Vaingankar, J., Chong, S., Browning, C., & Thomas, S. (2015). Prevalence and determinants of gambling disorder among older adults: A systematic review. *Addictive Behaviors, 41*, 199-209. https://doi.org/10.1016/j.addbeh.2014.10.007

UK Diabetes, & Lobby, H. (2014). *What is diabetes? Tips to keep you and your baby healthy*. Ascensia Diabetes Care.

United States Commission on the Review. (1976). *Gambling in America: Final report of the Commission on the Review of the National Policy Toward Gambling*. Creative Media Partners.

United States General Accounting Office. (2000). *Impact of gambling: Economic effects more measurable than social effects*. United State General Accounting Office. https://www.gao.gov/new.items/gg00078.pdf

Wardle, H., Reith, G., Langham, E., & Rogers, R. D. (2019). Gambling and public

health: We need policy action to prevent harm. *BMJ, 365*(18), 180-187. https://doi.org/10.1136/bmj.l1807

Weinstock, J., Scott, T. L., Burton, S., Rash, C. J., Moran, S., Biller, W., & Kuredelbach, N. (2014). Current suicidal ideation in gamblers calling a helpline. *Addiction Research and Theory, 22*(5), 398-406. https://doi.org/10.3109/16066359.2013.868445

Williams, R. J., Rehm, J., & Stevens, R. M. (2011). *The social and economic impacts of gambling: Final report*. CCGR. http://www.ccgr.ca/en/projects/resources/The-Social-and-Economic-Impacts-of-Gambling-Full-report-English.pdf

Williams, R. J., Volberg, R. A., & Stevens, R. M. (2012). *The population prevalence of problem gambling: Methodological influences, standardized rates, jurisdictional differences, and worldwide trends*. Ontario Problem Gambling Research Centre. https://opus.uleth.ca/bitstream/handle/10133/3068/2012-PREVALENCE-OPGRC%20(2).pdf

World Health Organization. (1992). *The ICD-10 classification of mental and behavioural disorders: Clinical descriptions and diagnostic guidelines*. WHO.

Yusoff, F. B. M., Haque, A. T. M. E., Hashim, S. R. B., Haque, M., Ariffin, B., & Bin Ab Hamid, M. F. (2016). Lipid profile of the coronary heart disease (CHD) patients admitted in a hospital in Malaysia. *Journal of Applied Pharmaceutical Science, 6*(05), 137-142. https://doi.org/10.7324/japs.2016.60521