AN ECOLOGICAL AND LIFE COURSE ANALYSIS OF BINGE DRINKING AND PROBLEM GAMBLING AMONG INDIGENOUS POPULATIONS IN CANADA

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ABSTRACT

The focus of this thesis was to better understand the link between social environments: namely, the school and workplace; and addictive behaviour among Indigenous youth and adults in Canada. Secondary datasets were accessed and analyzed. Data derived from the *2012 Aboriginal Peoples Survey* was used to examine the impacts of the school environment, extracurricular activity, and peer risk behaviour on binge drinking among First Nations and Métis youth aged 15 to 24 living in urban environments. Results indicate that peer risk behaviour was the strongest determinant of binge drinking, but that the school environment both positively and negatively influenced peer behaviour making it an important target for interventions to reduce binge drinking. Results suggest increased opportunities for extracurricular activities at school may also reduce binge drinking among Indigenous youth, particularly among those disengaged from school. Data derived from the *Quinte Longitudinal Study* was used to examine the role of trauma and changes in job satisfaction and stressful life events on at-risk gambling behaviour among employed Indigenous adults. Overall, results indicate that those who were more satisfied in their work were less likely to engage in at-risk gambling. Among Indigenous women, those who experienced more stressful life events were more likely to engage in at-risk gambling. These findings highlight the need for policies and programs aimed upstream to improve work and school environments and reduce structural inequalities.

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LIST OF ABBREVIATIONS

ANOVA	Analysis of variance
APS	Aboriginal Peoples Survey
B	Unstandardized statistical effect size
CI	Confidence interval
CS	Current Students
CCHS	Canadian Community Health Survey
d	Cohen's d statistical mean effect size comparison
DSM	Diagnostic and Statistical Manual of Mental Disorders
EGM	Electronic Gaming Machine
F	Statistical test to compare model fit
GLMM	Generalized linear mixed model
GREO	Gambling Research Exchange Ontario
HPA	Hypothalamic-pituitary-adrenal axis
HSL	High School Leavers
HSC	High School Completers
IRSSA	Indian Residential Schools Settlement Agreement
M	Mean
MAR	Missing at random
MLM	Multilevel modeling
N, n	Sample size, sub-sample size
NHS	National Household Survey
OR	Odds ratio
p	Statistical p-value
PG	Problem Gambling
PGSI	Problem Gambling Severity Index
PPGM	Problem and Pathological Gambling Measure
QLS	Quinte Longitudinal Study
r	Pearson's r correlation
R^2	Statistical coefficient of determination
RDC	Statistics Canada's Research Data Centre
RHS	Regional Health Survey
SD	Standard deviation
SOGS	South Oaks Gambling Screen
TRC	Truth and Reconciliation Commission of Canada
ω	Conditional indirect effect point estimate

CHAPTER 1: INTRODUCTION

Indigenous peoples in Canada include persons of First Nations, Métis, or Inuit descent and comprise the youngest and fastest growing segment of the Canadian population.[1] From 1996 to 2006, the growth rate among the Indigenous population exceeded that of the non-Indigenous population by nearly six-fold, with a trend towards an increasingly urbanized population.[1] A better understanding of the factors influencing the health and wellbeing of Indigenous Canadians is important as they are the first peoples of this territory and experience significant gaps in health outcomes as compared to non-Indigenous Canadians.[2] Indigenous populations experience a disproportionate burden of morbidity and mortality from chronic and infectious diseases, suicide, and mental health and addictive disorders.[3] The legacy of colonialism and environmental, economic, and social marginalization has transformed the health status of Canada's Indigenous population.[3] This can be observed today in poorer living conditions, increased social stressors, and inequitable chances in life, also known as the social determinants of health.[4]

This thesis examined the ways in which social environments, such as the school and workplace, influence alcohol use and gambling behaviour among Indigenous youth and adults in Canada, respectively. In the literature, limited attention has been placed on understanding broader social determinants of addictive behaviour as well as modifiable factors that may be targeted to reduce alcohol use and problem gambling among Indigenous peoples. The goal of this thesis was to better understand the role these environments can play in shaping resilience and adaptive capacities and in reducing addictive behaviours among Indigenous peoples.

THEORETICAL FRAMEWORK

Over the life course, individuals are influenced by social systems and life experiences that shape health through biological, behavioural, and psychosocial pathways.[5] For this thesis, I

integrated the ecological-systems and life course perspective to examine how social determinants of health operate across development (see Figure 1-1). The ecological-systems framework conceptualizes the individual as embedded at the centre of a nested hierarchical set of levels (i.e., macro, meso, and micro).[6] The macro level represents societal structures and values, the meso level considers social formations and community conditions such as the school and work environment, and the micro level reflects individual interactions and support.[6]

The life-course perspective adds value by identifying key mechanisms of social integration (i.e., linked lives), time, and human agency to explain the ways in which environmental changes and pathways influence the course and meaning of human lives.[7] Both perspectives are complementary and congruent with various forms of Indigenous ways of knowing, which tend to view individual health as an embodiment of the social environment, including family, community, nation, and the environment.[8] Human development over the life course is viewed as grounded in a continuum of time, relationships, and collectively lived experiences.[9] Together, these perspectives were used throughout this thesis to guide the development of research questions as well as a lens to interpret results.

THESIS OVEVIEW AND METHODS

This thesis is paper-based format. Chapter 2 reviews the literature related to this thesis. Chapters 3 and 4 examines determinants of addictive behaviours among Indigenous youth and adults, respectively. Chapter 3 and 4 include its own introduction, methods, results, and discussion to be submitted for publication. Chapter 5 discusses findings across these two studies and provides overall conclusions and implications of findings.

Paper 1: Binge Drinking among Indigenous Adolescents

    Background. Binge drinking, usually defined as five or more alcoholic drinks on one occasion, is considered the most problematic form of alcohol consumption in terms of its health and social impacts.[10] Binge drinking in adolescence represents an important public health issue as it elevates the risk for intentional and unintentional injury, mental health issues, substance dependence, and social problems both in adolescence and adulthood.[10] The majority of youth over the age of 15 have tried alcohol, with binge drinking peaking between the ages of 18 to 24 years of age.[10] Thus the focus of this study was on youth aged 15 to 24 as this is a time of critical brain development and the formation of drinking habits and practices.[11]

    Indigenous youth are more likely to be abstinent from alcohol than other youth in Canada.[12] However, for Indigenous youth who choose to consume alcohol, the prevalence of binge drinking is elevated as are alcohol-related harms.[8,12,13] Limited attention has been given to protective factors associated with reduced binge drinking behaviour across this population. To inform prevention strategies, Paper 1 examined the role meso-level school environments and extracurricular activities may play in contributing to reduced binge drinking among youth who identify as First Nations or Métis and live outside Aboriginal communities in Canada.

    Exposure variables. Educational attainment is an important determinant of Aboriginal wellbeing as it represents a pathway to improved health and economic success.[14] School connectedness, which refers to students' beliefs about adults and peers in the school environment caring about them as an individual and their education, has been shown to be a particularly promising factor in promoting academic achievement and school engagement.[15,16] A recent Canada-wide study found school connectedness was associated with reduced prescription drug misuse among First Nations, Métis, and Inuit youth living outside Aboriginal communities.[17]

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General population studies have shown that a positive school environment improves psychological wellbeing, reduces substance use and other risk behaviour, and mitigates the negative impact of poverty on academic success.[18–20] Supportive relationships and opportunities to engage in extracurricular activities outside of school are key factors shown to increase school connectedness and reduce substance use.[15,19] However, positive youth developmental outcomes tend to vary based on the form of extracurricular activity.[21] For Indigenous peoples, participation in cultural activities is cited as an important protective and resilience factor.[22] Cultural experiences have been shown to contribute to positive emotional and mental health and reduced alcohol problems among Indigenous peoples, which was investigated for this thesis.[23–25]

Mediator. Both meso-level variables (i.e., school environment and involvement in extracurricular activities) being examined in this thesis also influence adolescent's choice of peers and norms within peer groups. Given consistent evidence supporting the link between peer relationships and adolescent alcohol use,[26–29] peer risk behaviour was investigated as a mechanism (i.e., mediator) that may help explain how meso-level exposure variables influence binge drinking. The role of age was also explored given the significant developmental changes occurring during adolescence.

Research objectives. Paper 1 builds on what is already known in the scientific literature by using an ecological approach to examine the ways in which social environments interact with relevant mediators and moderators to influence binge drinking behaviour among Indigenous youth. Data were derived from the 2012 Aboriginal Peoples Survey (APS) Master File. A nationally representative sample of 4,110 First Nations and Métis youth aged 15 to 24 living outside Aboriginal communities in Canada was analyzed. Permission to access this confidential

dataset was gained through Statistics Canada. Data were examined in the Prairie Regional Data Centre (RDC). The following research questions were examined:

1. How do Indigenous youth living in cities perceive their school environment?

2. Is participation in extracurricular activities inversely associated with binge drinking?

3. Do associations between school environment, extracurricular activities, and binge drinking vary by education group (i.e., current students, leavers, completers)?

4. Are these associations moderated by age or mediated by the behaviour of peers?

Data analysis. All analyses were conducted on bootstrapped weighted data and stratified by education group (i.e., current students, high school leavers, and high school completers). Research question 1 examined how perceptions of positive and negative school environment varied across strata (i.e., education group, gender, and Aboriginal identity) using 2-way analysis of variance (ANOVA). Research questions 2 and 3 examined associations between binge drinking and school environment and activity variables using bootstrapped linear regression models. Research question 4 examined moderated mediation models with peer risk behaviour as a mediator variable (e.g., mechanism through which the school environment influences binge drinking) and age as a moderator (i.e., strength of an association conditional on age). Moderation and mediation together in a single integrated analytical model was examined using the conditional process modeling method described by Hayes[30] using bootstrapped 95% bias-corrected confidence intervals. All regression models were adjusted for the potential confounding effects of covariates selected *a priori* based on existing literature, including age, gender, Aboriginal identity (i.e., First Nations or Métis), total number of schools attended, parental education status, household income, and census metropolitan area. A list of these variables can be found in Table 1-1.

Paper 2: At-Risk Gambling among Indigenous Adults

Background. Gambling is normally viewed as occurring along a continuum ranging from social or recreational gambling to problem and pathological gambling. Healthy gambling involves informed choice and a pleasurable gambling experience in low-risk situations; whereas, problem gambling involves difficulties in limiting money and/or time spent on gambling leading to adverse consequences for the individual, others, or the community.[31,32] While only a small percentage of people develop a gambling problem, the minority who do are more likely to have comorbid disorders and experience poor subjective wellbeing.[33,34] Most gambling studies to date have been limited by small non-representative samples, but overall prevalence rates of problem gambling have been consistently shown to be elevated among Indigenous groups.[32,35–37] Historical trauma and inequitable experiences of social and economic stress are key risk factors associated with problem gambling behaviour among Indigenous populations.[38] Thus, Paper 2 examined the ways in which past trauma, stressful events, and job satisfaction impact at-risk gambling behaviour among a sample of Indigenous adults in the Quinte region of Southeastern Ontario.

Exposure Variables. Individuals who gamble to reduce the negative effect of stress or traumatic events are more likely to experience gambling problems.[37,39–41] Risk factors that may predispose individuals to engage in gambling as a coping mechanism include disadvantageous social conditions, poverty, low occupational status, stress, and social exclusion.[32,38] Psychological stress and satisfaction from employment or unemployment has been shown to have a clear link to mental health and wellbeing and has been proposed as a possible contributor to the development of gambling.[34,42] To date, little is known about whether current job satisfaction and life stress precede and play a role in the development of problem gambling or

whether they are a consequence of gambling. Specifically, Paper 2 explores the role of these social environments along with how past traumatic events (e.g., childhood abuse or other significant event) influence problematic gambling given that prior research indicates that childhood maltreatment and traumatic life events are prevalent and important risk factors for problem gambling among Indigenous peoples.[43–46]

Research Objectives. Paper 2 used a prospective longitudinal dataset to examine how cumulative effects of trauma, stress, and job satisfaction influence at-risk gambling behaviour among a community sample of Indigenous adults. Gender and age were also examined as gambling behaviour has been shown to be vary across the life course with some gender-specific differences.[47–49] Data were derived from the Quinte Longitudinal Study (QLS), which consisted of 145 employed Indigenous adults living within 70 km of the city of Belleville, Ontario. This region includes the Tyendinaga First Nation community, who are known as the Mohawks of the Bay of Quinte. Recruitment was *not* done within this First Nation community, but many participants in this sample are likely from this Mohawk Territory. Permission to access this dataset was obtained through the Gambling Research Exchange Ontario (GREO). These objectives were addressed through the following research questions:

1. Does at-risk gambling status change over time?
2. Do group differences in gender, age, and past trauma associate with at-risk gambling behaviour over time?
3. Do changes in job satisfaction or stressful events associate with at-risk gambling behaviour over time?
4. Do group differences moderate the relationship between job satisfaction, stressful events, and at-risk gambling over time?

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Data Analyses. As commonly found in population survey data, most individuals were non-problem gamblers with a score of 0 according to the Problem Gambling Severity Index (PGSI). This caused the distribution of the outcome variable (PGSI score) to be heavily skewed and not suitable to be examined as a linear variable. Therefore, PGSI score was dichotomized to examine those who were moderate- or severe-risk gamblers (PGSI≥3) versus those who were low-risk or non-problem gamblers (PGSI ≤2). Given that moderate- and severe-risk gamblers are a heterogeneous group, they were labelled *at-risk gamblers* rather than problem gamblers. Generalized linear mixed models (GLMMs) with binomial error distribution and a logit function were used to test whether variations in the probability of at-risk gambling could be explained by the exposure variables of interest. The longitudinal nature of this study produced a multilevel or nested data structure in which repeated measures across five years (level 1) were nested *within* participants with person-level *between* characteristics (level 2). At level 1, longitudinal within-participant main effects (i.e., job satisfaction and stressful life events) were estimated. At level 2, main effects of differences between participants (i.e., gender, age, past trauma) were estimated. Also at level 2, between-participant characteristics were evaluated as moderators of level 1 effects (e.g., gender influencing the strength or direction of the association between stressful events and at-risk gambling). A list of these variables can be found in Table 1-2.

RESULTS AND SIGNIFICANCE OF RESEARCH

To date, most research examining addictive behaviours among Indigenous Canadians has examined risk factors at one stage in the life course and at one ecological level. In contrast, this thesis focused on modifiable contextual and environmental factors that influence addictive behaviours at multiple ecological levels, along with some underlying mechanisms behind these associations. Paper 1 adds to the literature by highlighting the role that meso-level school

environments play in shaping micro-level peer relationships, individual-level educational success and binge drinking among urban Indigenous youth. Paper 2 revealed some novel findings in terms of how change and stability in stress exposure and job satisfaction associate with problematic gambling behaviour among a sample of Indigenous adults. The goal of this work is to produce translational research that provides information about protective and resilience mechanisms to inform policies and programs focused on improving socioeconomic living conditions, strengthening Indigenous health, and advancing reconciliation between Indigenous and non-Indigenous Canadians.

Table 1-1. Paper 1: Binge Drinking Frequency - Key Exposure Variables

Meso-Level Variables	Mediator (M)	Covariates
Positive school environment	Peer risk behaviour	Age (moderator)
Negative school environment		Gender
Sports/physical activities		Aboriginal identity status
Art, music, drama activities		Number schools attended
Clubs, groups activities		Parental education
FN/Métis/Inuit cultural activities		Household income
Volunteering in community		Census metropolitan area
Activity breadth (sum of activities)		

Table 1-2. Paper 2: At-Risk Gambling (PGSI ≥3) - Key Exposure Variables

Repeated Measures (Level 1)	Group-level Variables (Level 2)
Job satisfaction (past year)	Past trauma / childhood abuse
Stressful life events (past year)	Gender
	Age
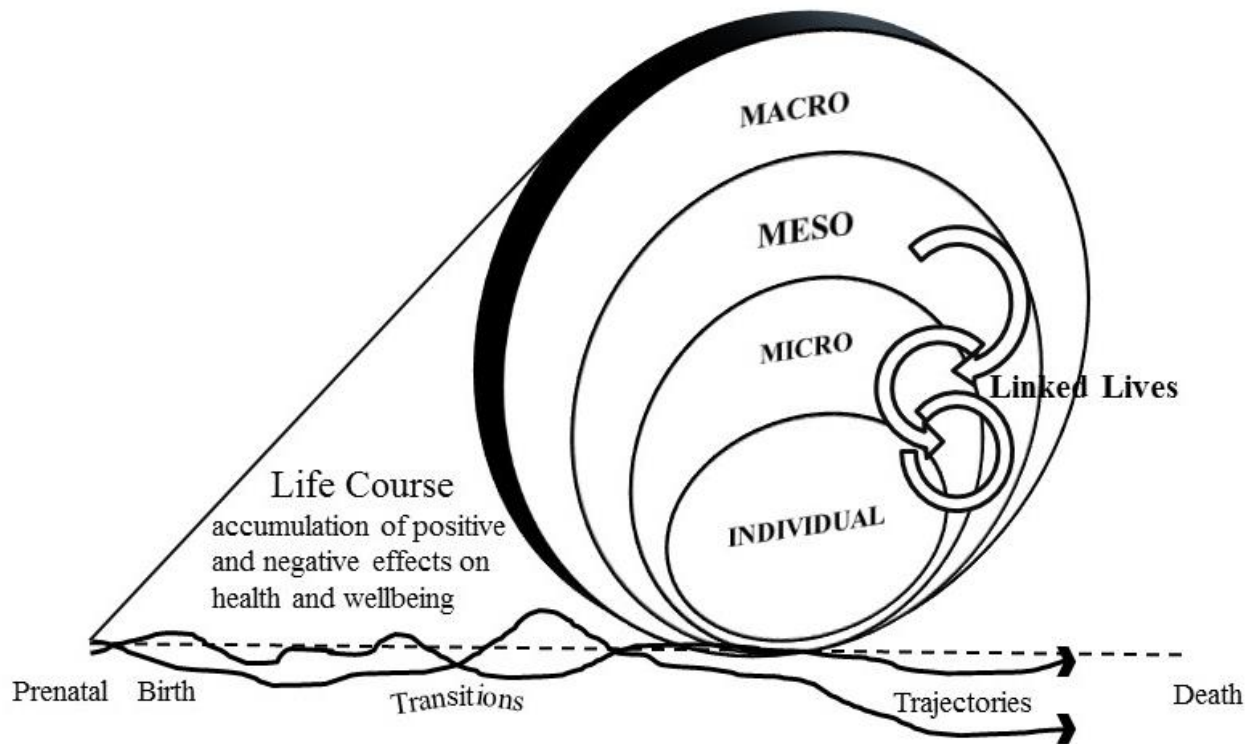
Figure 1-1. Conceptual Framework of Human Development as Lifelong Processes

Note. Adapted from Elder and Giele[50] and Bronfrenbrenner[6]

CHAPTER 2: LITERATURE REVIEW

According to 2011 census data, over 1.4 million people in Canada are of Aboriginal ancestry, representing 4.3% of the total Canadian population.[1] Despite colonial attempts to assimilate and eradicate Indigenous peoples and their culture, the Indigenous population in Canada is young and rapidly growing with many individuals thriving and immersed in their Indigenous culture.[51–53] However, health inequities are present and demonstrated by higher prevalence of chronic and infectious diseases, mental health issues, and addictive disorders.[3] Canada's colonial legacy of environmental, economic, and social marginalization has undoubtedly transformed the health and wellbeing, life chances, and social environments surrounding Indigenous peoples.[14,53] Most research to date has focused on risk factors and documenting poor health outcomes. This work, in contrast, focuses on better understanding the link between modifiable social environments, such as the school and workplace, and their association with substance- and process-based addictive behaviours among Indigenous youth and adults. This knowledge is intended help inform the development of policies and programs by identifying factors that can lead to improved health and wellbeing within these populations.

This review begins by providing context regarding current inequities in alcohol- and gambling-related harms experienced by Indigenous peoples. Next, it provides an overview of an integrated ecological and life course theoretical framework developed to guide this research. Literature pertaining to binge drinking, the school environment, extracurricular activity participation, and peer risk behaviour among adolescents is then summarized. This is followed by a summary of the current knowledge on associations between problem gambling, employment, stress, and trauma among adults. Finally, research questions which will address some key gaps in the literature are reviewed.

BACKGROUND

Indigenous peoples in Canada include persons of First Nations, Inuit, or Métis descent regardless of official registration. Debate surrounds the use of the terms 'Indigenous' and 'Aboriginal', as they are in the language of the colonizer and can have problematic connotations; however, the term Indigenous is preferred by many, as it denotes a shared collective history and beliefs regarding relationships and close connections to the land.[54] Both terms are used interchangeably in the literature and are the words available in the English language.[55] Throughout this thesis, the term Indigenous will be predominately used and refers to the descendants of the First Peoples of Canada as well as shared beliefs systems. However, it is important to recognize that these umbrella terms do not reflect the very different histories, cultural practices, spiritual beliefs, languages, and relationships that make each group and community unique.[56] These distinct differences have important implications to self-identity and health.[57] Respecting this diversity, it is also accurate to state that as a whole, Indigenous peoples in Canada share a collective experience and history of colonization and subsequent marginalization that continues to this day in varying intensities, depending on the community of focus. Current health inequities among Indigenous peoples must be understood within the complexity inherent in this historical context.

Prior to European arrival, the Indigenous population in North America was estimated to number seven million people.[8] Communities and individuals were healthy and flourishing.[8] Indigenous cultures across Canada had developed over millennia to encourage high levels of psychosocial integration through strong family, clan, and village relationships.[58] Alcohol use and abuse was virtually unknown, and tobacco was used respectfully within a ceremonial context.[8] There were several mind-altering substances used by some Indigenous groups across the

continent, but similar to tobacco, these were used mainly for ceremonial rather than recreational purposes.[59] Gaming practices were also common to many Indigenous groups before European contact.[32,60] It is generally understood that gaming practices were used to engage in healthy competition between clans among other social functions, as well as to teach spiritual lessons about balance.[61] No reliable evidence has emerged to suggest that disorders defined today as addiction were present among Indigenous peoples during pre-contact times.[58]

Contact with fur traders in the early seventeenth century brought the introduction of alcohol and trading practices, which altered traditional ways of life, including gaming practices.[8,56] As the fur trade grew, European settlers also brought many forms of depredation, such as diseases, warfare, and displacement from traditional lands, causing poverty and mass starvation.[8,56] It is estimated that 50% to 90% of Indigenous populations across North America died as a result of direct and indirect contact with European invaders.[8,56,62]

In the 1800s, relations that were previously respectful and co-operative between Europeans and Indigenous peoples began to shift in equality as Europeans began to dominate in numbers and proclaim an ideology of superiority, viewing Indigenous peoples as an obstruction to economic success and unable to govern themselves.[63] In response, federal policies such as the Indian Act (1876) and Indian Residential Schools, which were in operation from 1828 to 1996, were created to *civilize* Indigenous peoples.[8,63]

The Indian Act was designed to control and assimilate Indigenous people through legislation that subjected them to a different set of rights and obligations meant to compel them to renounce their Indian status: a process called enfranchisement.[55,64] Some examples of policies of domination and assimilation included: the pass system, which restricted First Nations people from leaving reserve lands and prohibiting business with outsiders; the removal of the status

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rights of women who married non-Indigenous men and their children; criminalizing the use of traditional spiritual ceremonies; making it illegal to kill any of their own livestock for sale off the reserve and restricting commercial fishing sales; and replacing traditional leaders with government chosen leaders.[8,63] Métis peoples who have a blended heritage of Aboriginal, French, and British were not considered *Indian* or legitimate settlers and were pushed to the edge of society and impoverished.[63] Métis peoples were also stripped of their lands, hunting and trapping rights, and beginning in the 1950s, many Métis children were sent to attend residential school.[51] The history of the Inuit people reflects that of First Nations people; however, social change occurred much later in the 1950s and 1960s, with passive resistance ensuring that more elements of language and culture remained intact.[62] Inuit were the last group to be affected by the residential school system.

The first residential school opened in 1828, the Mohawk Institute in Brantford, Ontario.[65] By 1884, enrollment of First Nations children under the age of 16 in Indian Residential Schools became mandatory.[51] Across Canada, over 130 residential schools were church-operated in partnership with the federal government with approximately 150,000 Indigenous children in total attending.[51] Many children were removed far from their families and communities and experienced physical, emotional, and sexual abuse in addition to being subject to malnourishment and neglect. This dark chapter in Canadian history only became publicly uncovered in 1988 through a criminal investigation of sexual abuse by a former dormitory supervisor of children mostly from the NI'akapxm First Nation in British Columbia.[51] In 1989, the first lawsuit for sexual and physical abuse by nine Christian brothers at the Mount Cashel orphanage in St. John's, Newfoundland was filed and compensation was paid to the victims.[66] Breaking the silence turned into positive action as many residential school survivors began filing

lawsuits against the federal government and the churches involved in operating the schools.[67]

However, remembering horrific memories and painful feelings of loneliness, abandonment, and

shame opened up *deep wounds* for many survivors.[68] Four churches did formally apologize in the

late 1980s and early 1990s for the part they played.[67] However, it wasn't until 2008 that the

Prime Minister of Canada publicly apologized for Canada's role in creating residential schools,

which he described as being designed to separate Indigenous children from their families,

communities, languages, and cultures in attempts to "kill the Indian in the child".[69]

The combined systematic efforts of the Canadian government have been described as

attacking Indigenous peoples' interconnected worldview, governance, family, and economic

structure and consequently interrupting knowledge flow between generations.[55] The Truth and

Reconciliation Commission (TRC) recently asserted that Canada perpetuated a *cultural genocide*

on Indigenous peoples.[68] Many have argued that the most profound demoralization was caused

by the destruction of Aboriginal cultures and connections to the land, which undermined

collective meaning making and complex interconnections between clans, communities, and

nature that had been developed over millenia.[58] Indigenous scholars have described social and

psychological disorders as *spiritual problems*—a soul wound—caused by these multi-

generational traumas.[52] As a result, the contemporary use of alcohol and gambling by Indigenous

peoples is dramatically different, as inequitable social and economic circumstances have created

an environment conducive for the development of hopelessness and depressive symptoms for

which alcohol and gambling can be used to help cope with such unpleasant feelings.[37,70]

ADDICTION

Addiction is a social construct with complex emotional, motivational, and cognitive

pathways.[71] Definitions of addiction have shifted from solely involving psychoactive substances

to more encompassing views, such as "a syndrome in which a reward-seeking behaviour has become out of control"(p. 10).[71] The American Society of Addiction Medicine defines it as "a primary, chronic disease of brain reward, motivation, memory and related circuitry."[72] Subjective urges or cravings, harm caused by frequency or intensity of behaviour, dysphoria upon cessation, and unsuccessful attempts to limit or cease the activity are common characteristics shared by addictive disorders.[71,73] The most current version of the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) has revised problem gambling to now be categorized as a behavioural addiction under the substance-related disorders section.[74] This change was made to reflect research that has shown that gambling has similar neurobiological features and processes to those of drugs of abuse.[74,75]

Engaging in addictive behaviours can serve numerous purposes or functions simultaneously, with individual susceptibility involving a large number of potential factors.[71] Stress, chronic anxiety, depression, and low self-esteem are among some of the major risk factors associated with addictive disorders.[71] It is common for addictive behaviours to co-occur as they share a common etiology in terms of their effects: the susceptibility of the individual and conducive environmental conditions.[58] Problem gambling and alcohol use disorders frequently co-occur and are closely intertwined with mental health disorders, which compounds risk and stress.[38]

A large majority of people in Western society consume alcohol and/or engage in gambling. The results are ordinarily unproblematic and can even sustain or enhance an individual's state of wellbeing. However, many forms of addictive disorders are rising globally, with some scholars attributing this to the unrelenting individual competition of free-market society causing people to become socially separated.[58] While most experts have agreed that

addiction involves the interaction between multiple biological, psychological, social, and environmental factors, the role of the social context has largely been overlooked.[32] Most research surrounding addictive disorders has focused on understanding individual pathologies or proximal determinants of addiction such as drinking and gambling frequency.[10,41] This work has significantly improved our understanding of addiction, but has not been able to explain how disparities in addiction emerge and why only a small proportion of people experience harmful consequences. Evidence of similar patterns of disparities in addiction and high-risk behaviours among heterogeneous non-dominate minority groups that have experienced similar experiences of marginalization illustrates that observed disparities are likely *not* due to biological causes, but rather social experiences.[76] This thesis therefore takes a more upstream focus to identifying and acting on the determinants of health across the life course, as problematic use of alcohol and gambling involvement is often indicative of underlying social or health inequities.[4]

SOCIAL DETERMINANTS OF HEALTH

From a public health perspective, the best predictors of health for both individuals and populations are the quality of the environments where one grows up, lives, and works, also known as the social determinants of health.[77] In our society, social gradients are created by social, economic, and political systems, which reinforce one's position in the social hierarchy by affording different levels of power, prestige, and access to resources.[4] Social gradients typically follow a pattern of social stratification according to income, education, occupation, gender, and race/ethnicity.[78] An individual's position in the social hierarchy is referred to as his or her socioeconomic position and influences health through unequal exposure and differential vulnerability to health-compromising conditions, stressors, and risk behaviours.[4] For example, low income predisposes people to material and social exclusion by limiting access to nutrition,

housing, and protection, along with reduced opportunities to participate in cultural, educational, and recreational activities.[3] As a result, unequal experiences of stress accumulate over the life course and manifest physiologically. For example, abnormal levels of cortisol, cholesterol, C-reactive protein, and blood pressure are stress-related risk markers for many chronic diseases.[79] The stress-response system is also closely linked to psychological resources, such as confidence, self-efficacy, optimism, and connectedness.[79] Psychosocial stressors such as experiences of discrimination, feelings of powerlessness, and social comparisons, represent powerful pathways through which disadvantage influences health.[3]

Unique social determinants of health inequities affecting Indigenous populations include the impact of colonization and the subsequent results of forced assimilation, cultural suppression, and residential schools.[57] Experiences of oppression, racism, and discrimination have manifested in unequal access to resources such as education, training and employment, social services, and control over land and resources.[3] Despite recent positive steps, the wellbeing gap between Indigenous and non-Indigenous people in Canada has not narrowed.[64] Educational attainment rates among Indigenous peoples lag behind the rest of the Canadian population, and large income inequalities persist even for Indigenous peoples with the same level of education.[80] According to 2011 census data, 48% of Indigenous Canadians aged 25 to 64 have obtained a post-secondary diploma compared to 65% among the general population.[81] In 2006, Indigenous peoples' median income was 30% less compared to the rest of Canadians, with the only exception being among Indigenous peoples with a university degree.[80] Research continues to demonstrate that these systematic inequities and psychosocial stressors are associated with elevated rates of substance abuse and problem gambling, as they become maladaptive strategies to cope with negative emotions and escape or relieve frustration from life circumstances.[61,82,83]

Despite this endured adversity, many First Nation, Inuit, and Métis people have held onto their culture or are reclaiming traditions, knowledge, values, and are asserting pride in their collective identity and power.[84] Common elements shared among Indigenous peoples include values of communal rights and relationships, expansive concepts of time, the importance of spirituality, and connection to land.[85] In contrast to Western individualistic values, many Aboriginal cultures are socio-centric such that the individual is defined relationally, and wellbeing is a reflection of the family and community surrounding them.[56] Measures of social status and success are tied to actions of reciprocity and generosity that reflect an altruistic approach to wealth.[86] These distinct philosophical differences of health have revealed that the determinants of health set out by Health Canada do not adequately reflect Indigenous worldviews of health as being interconnected and interdependent with the natural world.[87] Thus, a broader ecological approach was the focus of this thesis to help understand more culturally relevant and protective predictors of health and wellbeing among Indigenous peoples.

AN ECOLOGICAL AND LIFECOURSE FRAMEWORK

Over the course of human development, individuals are influenced by different social systems that have fundamental influences on health behaviours and drive health inequities.[88] This thesis integrates the ecological-systems and life course perspectives to explore the impact of interactions across life domains, such as school and work, on addictive behaviours. Both approaches are complementary and congruent with various forms of Indigenous ways of knowing, as they view individual development as taking place in a complex set of interconnected and interdependent systems.[9,87]

The hierarchical nested components of the ecological-systems perspective conceptualizes macro, meso, and micro systems as interacting to influence individual behaviour and health.[6] At

the broadest macro level, public policies and societal values are powerful structures that indirectly impact individuals by regulating how people engage in society and their exposure to material and psychosocial health risks or protection.[3] At the meso level, systems such as one's immediate community, workplace, or school represent influential social systems in which the individual is directly participating in.[6] Critical features include the availability of resources and the levels of interpersonal trust, norms of reciprocity, and mutual aid that facilitate collective action, also known as social capital.[6,89] The micro level considers the importance of the nature and quality of personal social supports, including intimate relationships, friendships, and availability of personal help when needed.[6] Social support is a strong determinant of Indigenous health, as cultural concepts of kinship place strong value on relationships with extended family, community, and the importance of Elders.[90] Embedded at the core is the individual whose health and behaviours are viewed as an embodied biological expression of the material and social world.[91]

The life course concept of *linked lives* is related to the meso- and micro-level concepts of social capital and social support, but adds emphasis to the interdependence of human lives and intergenerational relationships.[50,92] Indigenous concepts such as *Seven Generations* understand that everything in life is related and interconnected, which transcends from one's ancestors and extends to future generations.[85] This philosophy and many other traditional teachings are built on values of community, relationships, and responsibilities to one another for sustained wellbeing. Social ties and relationships with family members, friends, or groups provide both support and control of individual behaviour.[92] This interdependence provides an individual with psychological identity and meaning, but also a vital need for social belonging, also known as psychosocial integration.[58] Social dislocation refers to an enduring lack of psychosocial

integration, and arises from exclusion from dominant society and the inability to fully participate in society.[58] For Indigenous peoples living in urban environments, high levels of discrimination and loss of traditional supports are examples of experiences that may be contributing to feelings of dislocation.[37,93,94] Dislocation has also been developing across generations as a result of residential schools and the unnecessary removal of children from their families causing suffering and unresolved grief, trauma, and violence.[85] Relationships between children and their parents and grandparents were damaged, causing interruption to the transmission of traditional culture and affecting the quality of social supports.[55,95] Today, many Indigenous peoples identify trauma and associated gambling and substance use issues as being linked to residential school experiences and/or intergenerational affects.[96]

The impact of intergenerational trauma can also be seen in the biological, behavioural, and psychosocial pathways that operate across one's life to influence health and behaviour.[5] The aspect of time is central to understanding human behaviour and the mechanisms that operate to relate early conditions in life to later outcomes.[92] Exposure to risk factors and protective factors differentially impact individuals at different stages of development and often accumulate and overlap across other spheres of life over time.[5,97] Childhood and adolescence represent critical stages of development when exposure to risk has significant impact on later health and behaviour. For example, the age of onset of alcohol use or gambling involvement represents a life transition that contributes to the likelihood of experiencing future adverse consequences.[97] Life experiences such as graduating or entering the work force also represent life transitions (i.e., changes in roles and statuses) that are embedded and part of a larger life trajectory. However, inequalities early in life can act like *gravity* by limiting the availability of options for individuals to make healthy life transitions thus sustaining disadvantage across the life course.[77] Additional

shocks such as job loss, injury, or a traumatic life event can cause a multiplying effect across other spheres of life.[98] Current health status and social patterns may therefore be better understood within the larger context of experiences and living conditions over the life course.[99]

In summary, the ecological-systems and life course perspectives together creates a unified framework to explore the impacts of social experiences on addictive behaviour among Indigenous populations. Given the amount of time we spend in school and work and their impacts on health and wellbeing, a primary objective of this thesis was to explore the associations between these environments and addictive behaviour. A second objective was to explore potential mechanisms that might moderate or mediate associations between these social environments and binge drinking and at-risk gambling behaviour among Indigenous youth and adults, respectively.

UNDERSTANDING ALCOHOL USE AMONG INDIGENOUS YOUTH

Adolescence is a critically vulnerable time for the development of risky drinking habits. The human brain is in development until about 24 years of age, with the regions of the brain involved in judgment and decision making last to develop.[100] During this time, the brain is particularly sensitive, and early onset of drinking and alcohol misuse can have irreversible damage.[100] Binge drinking (usually defined as five or more alcoholic drinks on one occasion) on a monthly or more frequent basis is the strongest predictor that someone will experience alcohol-related harm.[10] Immediate harms from binge drinking involve alcohol poisoning along with increased risk of injury, suicide, violence, risky sexual behaviour, and poor decisions due to impaired judgement.[70,100] Binge drinking can also lead to increased risk of alcohol use disorders, dependence, and increased chance of comorbid conditions such as depression.[70,101] A host of long-term negative health effects such as cancer, liver diseases, tuberculosis, cardiovascular

disease, diseases of the gastrointestinal tract, and neuropsychiatric disorders have been linked to heavy alcohol consumption.[102]

Despite the host of potential negative outcomes, consuming alcohol is quite common with 70% of Canadian youth aged 15 to 24 self-reporting alcohol consumption in the past year, and 30% of those youth engaging in binge drinking.[100] The average age of initiation is 13 years old, with trajectories of binge drinking typically increasing across adolescence and peaking between the ages of 18 to 24 years old.[10,13] Adolescents who experiment with alcohol at earlier ages are vulnerable to increased frequency of alcohol use and heavy drinking, with certain risk factors exacerbating the likelihood of experiencing alcohol-related harms.[103] Risk factors identified in the literature include childhood adversities, low socioeconomic status, sensation seeking, low self-control, social behavioural disorders, drinking as a coping strategy, peer drinking influences, poor parent-child relationships, and parental consumption.[90,104–106]

Indigenous youth are suggested to be two to six times more likely to experience alcohol-related harms compared to non-Indigenous youth.[8] Many communities, particularly northern and remote communities, stress that alcohol and drug use is a concern, with 83% of respondents from the 2008-2010 First Nations Regional Longitudinal health Survey (RHS) indicating it as the number one challenge in their community.[95] Data from the 2012 Canadian Community Health Survey (CCHS) and 2012 APS indicate that 40.4% Indigenous youth aged 12-24 engage in moderate- or high-risk binge drinking (i.e., monthly or more often) compared with 35.5% among non-Indigenous youth.[12] Data from the 2008-2009 Youth Smoking Survey (YSS) conducted in schools across all 10 provinces among youth aged 12 to 17 found Indigenous youth initiated use at an earlier age (average 12.5 years old) and those who had tried alcohol were more likely to binge drink (83.4% compared with 73.8% among non-Indigenous youth) and do so more than

once a week (29.8% vs. 19.4%).[13] However, Aboriginal youth also had similar prevalence of

abstinence form alcohol in the past year.[13] Often not discussed is the fact that many Indigenous

youth choose *not* to consume alcohol or do so in moderation. In fact, results from the 2012 APS

revealed a higher prevalence of abstinence among urban Indigenous youth (40.5% vs. 36.1%

among general Canadian population).[13]

To date, limited attention has been placed on understanding the protective factors leading

to reduced alcohol use among this population.[95] A shift in focus to protective factors is needed to

successfully engage, empower, and encourage practices that may be more easily or naturally

motivating to change/strengthen.[107] For example, Rawana & Ames analyzed data from the

National Longitudinal Survey of Children and Youth among urban Indigenous youth aged 12 to

23 and identified that protective factors conferring against heavy drinking trajectories were

higher levels of optimism, attendance of religious services, and participation in weekly

recreational activities.[103] The following exposure variables were examined in this study, as

previous research has demonstrated their protective potential in conferring against binge drinking

in youth.

Exposure Variable 1: School Environment

Educational attainment is a pathway to improved health and economic success and is

considered an important determinant of Aboriginal wellbeing.[108] Results from the 2008/2010

RHS indicate that educational success was associated with good health, higher parental

education, feeling balanced (e.g., physically, emotionally, mentally, and spiritually), not

currently being sexually active, and reduced binge drinking in the past year.[95] A critical element

in promoting academic achievement and overall positive youth development is the school

environment surrounding adolescents.[15]

The school culture and environment, known as the school climate, shapes youth behaviour through relationships, learning, and academic achievement.[18] There is no universal definition of this multidimensional construct; however, many researchers conceptualize school climate as "the shared beliefs, values, and attitudes that shape interactions between students and adults and set the parameters of acceptable behaviours and norms for the school"(p.2).[109] Four interrelated domains have been identified as important measures of school climate: (1) *academic*, (2) *community,* (3) *safety*, and (4) *institutional environment*.[109] The community (quality interpersonal relationships, belongingness, respect for diversity) and safety domains (physical, social and emotional safety, discipline, and order) measure the psychological and social aspects of student functioning.[109] A recent review of the literature concluded that community and safety domains are key determinants of emotional wellbeing, behavioural problems, and risky behaviours such as substance use, and thus were the focus of this thesis.[109]

A wide range of school-level factors (i.e., size, sociodemographic, academic press, classroom culture and practices, level of order versus disorder) play a role in determining student behaviour and progress.[110] Studies among the general population have shown that a positive school climate improves psychological wellbeing, reduces substance use and other risk behaviour, and mitigates the negative impact of poverty on academic success.[18–20] Among Native American students in Arizona, a sense of belonging to school was associated with later initiation of drug use and decreased past month and lifetime use of alcohol even after controlling for school achievement.[111] Longitudinal studies have further demonstrated that a positive school climate is related to postponement of drinking initiation and lower levels of misuse in later years.[19]

While evidence strongly supports the protective role of a positive school climate in reducing alcohol use, limited attention has been placed on how the school environment affects students of different ethnicity, gender, or socioeconomic status.[112] A recent review indicates that ethnicity and social class are important predictors of a student's experience in school.[18] Currie et al. found an inverse association between school connectedness and prescription drug abuse was particularly strong among urban Indigenous youth in Grades 7 to 12 across Canada.[17] Unfortunately, Indigenous youth were less likely to perceive their school environment as positive, with 30% of Inuit, 20% of First Nations and 18% of Métis youth scoring low for school connectedness compared with 13% among non-Indigenous youth.[17] Negative school experiences such as being bullied, not getting along with teachers, feelings of not belonging, not doing well at school, and feeling stressed, were important determinants of youth becoming disconnected from school.[20]

Youth who have the ability or opportunity to draw from resources that may be located in the home or community that provide mentoring, support, or spiritual guidance often demonstrate resiliency.[113] For example, a qualitative study among 14 urban Indigenous youth at the Wabano Centre for Aboriginal Health found that while most youth reported that their urban school environments did not foster a sense of belonging, over half the participants indicated the *best* school experiences were extra-curricular activities outside the classroom which provided experiential learning experiences.[14] Other important experiences Indigenous youth have described are academic achievements, cultural connections with other Indigenous students at their school and social supports which provided a sense of belonging through shared identity.[14,114] Further research examining the relationships between school experiences,

extracurricular activities, and peer relationships are therefore relevant in terms of key health outcomes, such as binge drinking among Indigenous youth.

Exposure Variable 2: Extracurricular Activity

A large portion of adolescent's time is spent in unstructured activities, and engaging in extracurricular activities can provide a number of positive personal and interpersonal developmental experiences.[21,115] The ability to personally choose activities provides *identity exploring* experiences allowing for autonomy and self-directed development.[116] Competencies learnt from involvement include skills related to collaboration, time management, self-discipline/regulation along with access to role models and peer connections that may support student identities, interests, and goals.[117] Results from the 2008/2010 RHS found participation in extracurricular activities was associated with increased levels of personal resources, such as self-esteem, mastery, social support, and ability to cope with stress, among youth living in First Nations communities.[95] The interpersonal and cognitive skills developed through participation also foster school connectedness and academic success, and thus provide an important foundation for success in adulthood.[21,117] Adolescents who participate in extracurricular activities have been found to report higher levels of attachment, engagement, and satisfaction with school.[115,118] Therefore, it is recognized that schools can reduce risk behaviours by ensuring students have opportunities and rewards to take part in pro-social activities.[21,117]

Research on the impact of extracurricular activity involvement has primarily shown a negative relationship between activity participation and substance use for most activity types, with the exception of conflicting evidence regarding the impact of sport participation on substance use.[21] While sports offer many benefits such as physical activity, positive sense of self, peer interactions, and increased academic engagement, findings suggest it may not be protective

for all health risks adolescents face.[116,119,120] A recent review of longitudinal studies found that participation in sports reduced risk of overall illicit drug use; however, involvement in sports was associated with increased alcohol use in 82% of included studies.[21] Evidence regarding participation in prosocial activities (e.g., church, volunteer, community service) and performing arts activities has shown a more clear association with lower levels of alcohol use, suggesting activity-specific effects.[121]

Over the years, the literature has shifted towards ecological models of development to consider aspects of the individual and of their environment along with dimensions of the activity and the role of mediators and moderators of participation.[21] The benefits and meaning of extracurricular activities at different stages of development depend on characteristics of the activity along with factors such as ethnicity, gender, socioeconomic status, peers, and school characteristics.[103,122] Using data from the 1990-1992 National Educational Study, Hoffman investigated the effects of extracurricular activity, school-level factors, and changes in adolescent alcohol use among Grade 10 to 12 students across 940 schools in the United States.[122] Hoffman found a positive association between athletic involvement and alcohol use was stronger for females from lower-socioeconomic-status schools and males from higher-socioeconomic-status schools.[122] Participation in other activities was associated with decreases in alcohol use but only for males. This study was limited by only measuring school-level sociodemographic variables, but provides insight into the role these variables play in the association between extracurricular activity and alcohol use.

To date, few studies have considered the impact of participation in activities on substance use among Indigenous youth. The previously mentioned longitudinal study by Rawana & Ames found participation in weekly activities lead to less-steep increases in frequency of alcohol use

across adolescence and lower levels of heavy drinking among urban Indigenous youth.[103] Participation in at least one weekly recreational activity was associated with lower levels of heavy drinking; however, different types of activities were not examined individually.[103] Gender did not influence initial status or rate of change and was only a significant predictor when other protective factors were not included in the model, suggesting protective factors accounted for the variance explained by gender. Another study, using data from the 2010 Arizona Youth Survey, examined the impact of perceived availability of extracurricular activities and intensity of participation in extracurricular activities among 5,701 Native American adolescents enrolled in the Grades 8, 10, and 12.[123] A 1-item eight-point scale was used to measure the intensity of participation in extracurricular activities (e.g., participation in clubs, organizations, or activities at school) in the past year. Both perceived availability of activities and intensity of participation were protective for substance use, being drunk or high at school, driving or riding under the influence, and selling drugs.[123] The effect of perceived activity availability was particularly beneficial for urban youth, and the protective effect of activity involvement was more salient with age—likely due to substance use increasing over the course of adolescence.

There is also mounting evidence that engaging in cultural and traditional activities contributes positively to emotional and mental health and is associated with reduced alcohol as well as illicit and prescription drug problems among Indigenous peoples.[22–25,107] A study among 401 Native American youth across 205 communities found that cultural pride, religious affiliation, and involvement in spiritual activities were negatively associated with alcohol abuse/dependence symptoms.[25] Currie et al. examined the association between Aboriginal enculturation (e.g., identification, sense of pride, and integration of values and norms of one's Aboriginal heritage culture) and alcohol problems among 60 urban Indigenous university

students at the University of Alberta.[23] Higher levels of Aboriginal enculturation resulted in a significant reduction of alcohol problems. Qualitative findings indicated Aboriginal ceremonies were a key component of cultural practice and helped students cope with stressors, enhance mood, and maintain important social connections.[23] Using a similar measure of enculturation, Whitbeck et al. examined data from 212 Native American children in Grades 5-8 and found that extracurricular activities, enculturation, and self-esteem were positively associated with school success.[124] Currently, there is a limited understanding of how the growing urban Canadian Indigenous youth population engages and derives benefit from involvement in cultural activities.

Finally, beyond the activity-specific benefits of different activities, a recent review suggests engaging in a combination of activities (i.e., breadth) provides more benefit than participation or excessive involvement in only one activity.[116] Activity breadth has been shown to be positively related to wellbeing, academic orientation, and school satisfaction.[21,118] Therefore, using activity breadth has been suggested as a more sophisticated measure of participation, and may align more closely to Indigenous worldviews which often do not see a distinct separation between sport, physical activity, traditional games, and active living.[21,125] *Physical cultural practices* has been suggested as a wholistic term that encompasses all activities that align with Aboriginal cultural understanding.[125] Further research exploring the role of activity breadth among Indigenous youth may provide important evidence of the need for schools to support a range of programs and activities that encourage participation and support positive development.

Mediator: Peer Risk Behaviour

Social relationships in adolescence have strong impacts on emotional health and wellbeing. During this developmental period, peer relationships often begin to supersede parents

as primary influence.[126,127] A meta-analysis conducted in 2003 found that the influence of peer relationships on substance use was larger than the effect for parental influence.[28] Both increasing age and type of substance were found to moderate these associations.[28] However, the quality of the parent-child relationship remains highly influential in an adolescent's quality of life and parents remain a vital influence through their endorsement of substance use behaviours.

While social supports have many health-enhancing effects, there are also health-damaging properties of relationships that assert conformity pressure and social obligations.[99] Research examining the influence of peers (e.g. peer pressure, peer substance use, and affiliation with deviant peers) have found these variables to be some of the most robust and consistent predictors of the onset of substance use and escalation of use along with other risky behaviour.[27,126,128,129] Furthermore, these relationships are relatively consistent across different samples of youth at different stages of development, risk status, and ethnicity.[25,27,126] Some debate surrounds the causal direction of the relationship between peers' substance use and that of adolescents themselves; however, most agree that it operates in a multidirectional or reciprocal manner across adolescence.[130] Both selection forces (i.e., adolescents seek friends who are similar to them) and socialization forces (i.e., peers influence substance use) appear to be at work within a synergistic system influencing developmental outcomes.[112,115,130] Drinking alcohol during adolescence appears to serve as a route to social integration as shown by research demonstrating peer drinking groups had increased social capital (i.e., access, opportunity, and reinforcement) through higher status and internal cohesion with risk-taking increasing as time spent with friends increased.[28,131–133]

Research examining the link between peer relationships (quality of relationship and peer behaviour) and academic behaviours has found that both immediate peer group behaviours along

with aggregated sentiments of students within a school are related to academic achievement and school engagement.[127] A recent systematic review synthesized popular theories to suggest that the school environment influences student health via 4 pathways.[112] The first pathway relates to student commitment to school, which is determined by levels of attachment, opportunities to engage in pro-school activities, and positive reinforcement for their commitment. The second pathway considers how the school environment shapes student's peer commitments through the overall school social ecology (i.e., broader educational policies) and by patterns of differential association (i.e., like-minded students concentrate together causing individuals within peer groups to look more similar over time and in doing so have group values and behaviours reinforced). Students who are disconnected from school are more likely to associate with anti-school peers and form peer-group identities in opposition to institutional values and norms. This is suggested as a highly influential pathway through which the school environment affects behaviours such as aggression and substance use.[112,134] The third pathways considers how student's cognitions are influenced by opportunities to learn from other students as well as education strategies that develop competencies that support health. Finally, the fourth pathways recognizes that students exert their agency in making decisions; however, this is often constrained by the social ties and resources they can draw upon. Thus, the school environment may directly promote or constrain certain behaviours but it is more likely that its influence is a result of a complex causal pathway with indirect effects through peer structures to influence health outcomes.[135]

Despite the extant literature that documents the relationship between peer risk behaviour and adolescent substance use, a limited number of studies have explored the role of the school environment in this association. Using latent growth models, Simons-Morten and Chen found

that substance use was associated with peer substance use across adolescence (Grade 6 to 9) but that school engagement was negatively related to the number of friends who displayed peer risk behaviours.[133] Another longitudinal study among 2,678 Australian youth in Grade 8 found that youth who were socially connected (i.e., someone who knew them well, whom they could depend on and confide in and trust) but reported low levels of school connectedness were more likely to engage in health risk behaviours.[20] It appears that students who do not have rewarding experiences in school are more likely to satisfy their needs by associating with deviant peers.[136]

Several studies have explored peer behaviour as a moderator (i.e., variable that changes the strength a relationship between the school environment and substance use).[30] A longitudinal study by Rudasill et al. examined 328 sixth-graders in the Midwestern United States and found that school support was negatively associated with affiliation with deviant peers, and that over time those who reported more decline in school support were more likely to report increased affiliation with deviant peers.[128] Boys were more likely to report higher affiliation with deviant peers and gender moderated changes in perceptions of school support and affiliation with deviant peers across the school year.[128] The authors concluded that the school environment has an important role in mitigating student's affiliation with peers who display more risky behaviours and, by extension, reducing negative health outcomes. A cross-sectional study among 2,582 Native American and Alaskan Native students aged 11-19 found that as school bonding increased, the effect of peer alcohol use substantially diminished for those younger than 16 who reported using alcohol in their lifetime.[129] However, this interaction between peer use and school bonding was not found among adolescents over the age of 16. For those over 16, peer alcohol use was positively associated, and school bonding was negatively associated with alcohol use.[129]

These studies demonstrate that the relationship between the school environment and peers is dynamic and may be contingent on different factors (e.g. age, gender) across adolescence.

Peer behaviour as a mediator of the relationship between the school environment and substance use (i.e., school environment causes variation in peer behaviour which in turn causes variation in binge drinking) has also been explored in several studies. A longitudinal study among 1,065 middle school students in the United States found that adolescent's involvement with drug-using peers mediated the relationship between poor school attachment and increased alcohol use on three separate scales (i.e., past month use, past month intoxication, and intention to use in the next 2 years), marijuana, and cigarettes.[137] A recent study among 5,992 ethnically diverse students from Wisconsin also found that a positive school connection was associated with reduced frequency of substance use (tobacco, alcohol, marijuana) directly and indirectly through lowered associations with substance using peers.[138] The authors noted some ethnic differences in the link between school connection and peer use suggesting some cultural differences in how school perceptions influence peer associations. Finally, DeWit et al. assessed the frequency of substance use in the past 6 weeks (4-items: alcohol use, binge drinking, tobacco, and marijuana) among 1,000 Grade 9 students in Southwestern Ontario.[136] Using structural equation modeling they found that the effects of the school environment on substance use were completely mediated by low attachment to learning and their close friend's attitudes towards deviant behaviour.[136] They also found both direct and indirect influence of a negative school environment on conduct problems, attention-deficit hyperactivity disorder, and oppositional-defiant disorder.[136]

Overall, these studies point to different elements of how school and peers affect youth outcomes across adolescence. Several studies have similarly explored peers as a mediator

between extracurricular activities and alcohol use. A small study among 98 Australian adolescents aged 15 to 18 found that peer group characteristics mediated the association between team sports and alcohol use (number of times consumed, binge drinking, intoxication) while individual sports were not significantly associated with alcohol use.[115] Fredricks & Eccles examined 498 students in Grades 9 to 12 using data from the 7th Wave of data collection from the Childhood and Beyond Study conducted in Michigan.[120] They found that prosocial peers mediated the relationship between activity participation (i.e., time in school clubs and sports) and school belonging and depression.[120] However, mediation was not shown for self-worth, risk behaviour, or alcohol use.[120] Simpkins et al. examined data from 2 longitudinal studies: Waves 5, 6, and 7 of the same Childhood and Beyond Study ($N = 925$) and the Maryland Adolescent Development in Context Study ($N = 1,338$).[139] They found that prosocial peers mediated the relationship between activity breadth and depression and self-worth in the first study, and between activity breath and adolescent problem behaviours, alcohol use, and depression (for girls only) in the second study. Interestingly, peer risk behaviour mediated the relationship between activity breadth and all indicators of adjustment in the first study, but not in the second study. The authors suggest that methodological differences in study designs along with different geographic locations likely contributed to contextual differences that may partly explain differences found across the two datasets.

In summary, a wide range of studies have examined different ways in which schools, extracurricular activities, and peer characteristics influence adolescent health and behaviour. Evidence supports that peers often mediate the relationship between these meso-level environments (i.e., school environment and extracurricular activity) and substance use to some extent. Outcomes also tend to vary on based on gender, age, ethnicity, and socioeconomic status,

and hence these variables may be viewed as moderators of these relationships. To date, no study has comprehensively assessed the complex relationship between school environment, extracurricular activity and binge drinking among urban Indigenous youth in Canada. Examining potential mediating and moderating variables involved in these associations will help shed additional light on how and why adolescents are affected differently by their school and activity experiences, and how such effects might interrelate and influence binge drinking patterns. Interventions that promote a positive school ethos, provide opportunities for extracurricular activities, and encourage supportive peer relationships are hypothesized to be important areas to target to prevent binge drinking and reduce inequities related to educational attainment.

UNDERSTANDING GAMBLING BEHAVIOUR AMONG INDIGENOUS ADULTS

For this thesis, I also examined gambling behaviour among Indigenous adults. Gambling is a leisure-time activity that has become increasingly popular over the past few decades due to increased gambling approval and legalized gambling opportunities. Gambling is commonly defined as "wagering money or something of material value on something with an uncertain outcome in the hope of winning money or something of material value"(p. 170).[32] Gambling is typically viewed as occurring along a continuum, ranging from social or recreational gambling to problem gambling (PG). For the majority of people, gambling is a social or recreational activity that does not cause adverse impacts and can sustain or enhance an individual's state of wellbeing.[34] However, for a minority of people, PG is characterized by "difficulties in limiting money and/or time spent on gambling which leads to adverse consequences for the gambler, others, or for the community"(p. 124).[140] More severe, maladaptive gambling is identified as pathological gambling.[141] Despite gambling not being physiologically addicting, behaviours such as preoccupation, gambling longer than intended, increased tolerance, and frequent, unsuccessful

attempts to cut down or quit suggest it is a clinical addiction as updated in the DSM-5.[74,140]

Similar to other addictive behaviour, the consequences of gambling can range from relatively

minor to serious or even life threatening.[8]

Common negative aspects of gambling arise from preoccupation with gambling, which

consumes time and money and contributes to negative effects to physical and mental health and

wellbeing.[35,142] A Canada-wide survey found that problem gamblers were twice as likely (22%

vs. 11%) to report poor or fair health compared to non-problem gamblers.[35] Further, a recent

systematic review and meta-analysis among general populations found pathological gambling

had highest comorbid prevalence with nicotine dependence (60.1%), substance use disorder

(57.7%), any mood disorder (37.9%), and any type of anxiety disorder (37.4%).[143] Both the

consequences of gambling and the link to psychological states and co-morbidities suggest a

compounding of risk and stress.[38] Gambling-related public health issues that have been linked to

PG include family dysfunction, domestic violence, substance use disorders, psychiatric

conditions, and suicide, which extend beyond the individual, and consequences can be far

reaching for some groups and/or communities.[141,144]

While gambling has been longstanding in many regions of the world, systematic

evaluation is more recent. Most studies assessing population prevalence of PG have used the

DSM-IV scale, the South Oaks Gambling Screen (SOGS), the Problem Gambling Severity Index

(PGSI), or the more recently developed Problem and Pathological Gambling Measure

(PPGM).[145] This range of instruments has made it difficult to compare prevalence across studies

due to: methodological variations; survey administration differences; and the criterion used to

determine when problem gambling questions are asked.[145] To help resolve this, a meta-analysis

of 190 gambling studies was carried out by Williams, Volberg, & Stevens in which they

quantified the impact of these variations and developed weights to calculate adjusted rates for more valid comparisons.[146] According to the PPGM, the average standardized past year prevalence of PG in adults worldwide was found to be 2.3%, ranging from 0.5% to 7.6% across countries. In Canada, the average prevalence across provinces was 2.4%, ranging from 0.8% in Ontario in 2008 to 6.5% in New Brunswick in 1996.[146]

The prevalence of gambling and gambling-related harms tends to fluctuate over time due to changes in gambling availability, adaptation, and demographics.[147] Certain sociodemographic characteristics, such as ethnicity, being young, male, unmarried, unemployed, less educated, and lower socioeconomic status, have been commonly found to be linked to PG.[35,146] While certain behavioural propensities for impulsivity and risk-taking along with sex differences in decision-making help to explain why male gender and younger age elevate risk for PG;[40,148] it is less clear the underlying causes for ethnic differences in PG.

Most studies to date have found elevated prevalence of gambling participation and PG among Indigenous Canadians.[32,36,95,149] The most recent Canada-wide survey was the 2002 CCHS which found that 18% of Indigenous peoples living outside First Nation communities were at-risk or problem gamblers according to the PGSI, compared with 6% among the general population.[35] A more recent analysis by Williams et al. combined data from five studies conducted between 2004 and 2008 ($N = 29,363$, with 859 Indigenous peoples) and found Indigenous adults had significantly greater past-year participation and engaged in a higher number of gambling games compared to the non-Indigenous sample.[32] Using the PGSI, the combined prevalence of problem and pathological gambling was 3.3 times higher in the Indigenous sample, with a particularly high prevalence for pathological gambling (4.8 times higher).[32] Significant community-level variations in PG were found between sub-samples,

ranging from 7% in the British Columbia lower mainland to 45% on the Blood Tribe in southern Alberta.[32] Large community-level variations in PG ranging from 15% in Calgary to 51% in the town of The Pas, Manitoba were also found in a recent 2012 study among a non-random sample of 1114 Indigenous adults living in 15 Canadian cities.[36] Overall, 15% were classified as at-risk gamblers and 27% were problem/pathological gamblers according to the PPGM.[36] Another study conducted in 2010 in Edmonton among a non-random sample of 371 Indigenous adults also documented a high prevalence with 33% of the sample meeting the criteria for PG based on the PGSI.[37]

While the causes for drastic community-level variations are unclear, it is apparent that Indigenous Canadians are at elevated risk for PG; a phenomenon similarly found among Indigenous populations in countries with common histories of colonization and dispossession such as in the United States[150], Australia[147,151,152], and New Zealand.[153] These groups share common risk factors for PG such as low socioeconomic status, disadvantageous social conditions, younger population, gambling-related risk factors (higher participation, exposure, and early onset of gambling), higher rates of addictions and mental health issues, historical trauma, grief, and stress, which are all conducive to the development of addictive behaviour.[32,36–38,154,155] It has also been suggested that conducive cultural beliefs about luck and superstition, historical gambling norms, and values of reciprocal obligations may also be risk factors that are particular to certain Aboriginal societies.[156,157]

Historically, gaming did have an important inter-tribal function in North American traditional culture as a means of competition and maintaining relationships with other clans and tribes.[60] Traditional games such as lacrosse and bone, stick, or hand games were primarily played for honour and prestige and mainly played a role in redistribution of wealth through trading of

material belongings.[60] Gaming had a spiritual/ceremonial/social meaning, and gambling for personal gain was considered dangerous to individuals and communities.[32,46,82] However, for some Indigenous groups, such as the Australian Aborigines, gaming was not a part of traditional culture, and today we see similar elevated prevalence rates of PG, suggesting the problem is likely not attributable to cultural norms.[60] Rather, it appears that contact with Europeans and the subsequent experiences of colonialism, use of commercial money, and increased social inequality have strongly westernized Indigenous peoples' gambling attitudes, motivations, and practices.[32,60] Volberg & Wray argue that disparities and inequalities in the prevalence of PG among Indigenous and some other racial minorities mirror larger social inequalities and that we need to better understand the social dimensions and determinants of additive behaviour.[158]

Gambling as a way to escape difficult life circumstances or a way to make ends meet is a common theme among these groups. Problem gamblers are often motivated to gamble to win money, reduce boredom, reduce stress, or escape from struggles, pain, and trauma.[33,142,159,160] Among a sample of Indigenous adults in Edmonton, Currie et al. found those who gambled to escape were approximately 9.5 times more likely to be a problem gambler, with gambling to escape being maladaptive regardless of gambling levels or involvement.[37] Findings from two recent Canadian longitudinal studies, the Leisure Lifecycle and Lifestyle Project (LLLP) and the Quinte Longitudinal Study (QLS), similarly found gambling to escape or distract from negative feelings were robust predictors of both increased gambling and PG, as well as a common self-perceived reason for PG.[40,41] Women have been found to be more likely to gamble to forget or escape from problems, or to deal with depressed feelings; whereas, men are more likely to gamble for excitement, ego enhancement, or financial gain.[47,48] Overall, these motivations

highlight that broader issues of employment, social stress, and past trauma are key issues that should be considered in addressing PG.[60,156]

Exposure Variable 1: Job Satisfaction

While a variety of work-related factors can contribute to negative psychosocial outcomes, those who are employed generally enjoy better mental health than those unemployed. The benefits of employment not only include financial resources but more importantly self-worth, stability, support, and connection to social institutions.[161] As previously mentioned, unemployment and lower education are commonly found to be associated with PG.[36,146,162] For Indigenous peoples, the legacy of colonialism has resulted in disproportionately lower participation in the workforce and educational attainment. In 2006, Indigenous Canadians of working age (25 to 64 years) experienced higher rates of unemployment (34.2% vs. 18.4% among non-Indigenous population) and disturbing levels of income inequality, except among those with a university degree.[80,163] While the gap in unemployment and income between Indigenous and non-Indigenous Canadians appears to be narrowing, at this rate it could take an estimated 63 years to achieve income equality.[80]

It is well documented that lower-income people live and work under more stressful conditions and work environments.[3] Given that PG is closely tied to stress and socioeconomic inequality, occupational functioning has been suggested as a possible contributor to PG that requires further attention.[34] Occupational functioning relates to measures of job stress and job satisfaction. Job satisfaction and work stress are distinct but important dimensions of the work environment.[42] Good employment that is sustainable and offers a minimum level of quality, living wage, opportunities for development, work-life balance, and protection from adverse working conditions is protective for health.[77] A meta-analysis examining psychosocial work

stressors found that effort-reward imbalance, low social support, and the combination of high

psychological demands and low-decision latitude are risk factors for common mental

disorders.[164] However, a variety of other individual characteristics and job-related factors

determine how each person derives meaning from their work. Ultimately, it appears that

whatever criteria an individual chooses to evaluate their overall satisfaction with their job—

whether income is important to support their family or having a job that is interesting despite low

pay—higher overall satisfaction is strongly associated with reduced mental and psychosocial

problems.[165] A meta-analysis examining job satisfaction and health using data from over 500

studies found that individuals with low levels of job satisfaction were most likely to experience

reduced self-esteem, higher anxiety and depression, and emotional burnout.[165]

Certain occupations and work-related lifestyles such as shiftwork cause more strain and

instability which may provide a more conducive environment for the development of

PG.[34,39,42,166] In Canada, men, non-shift workers, full-time employees, and people with

occupations categorized as white collar are more likely to have low-strain jobs that are more

satisfying.[42] Gender and marital status have been found to play a role, with women reporting

more work stress, and married workers having lower rates of job insecurity and dissatisfaction.[42]

Interestingly, a study using 2008 CCHS data collected in Ontario, Quebec, and Saskatchewan

found marital and working status were associated with lower PG scores among men; however,

working was associated with higher scores for married women.[161] The author suggests that

women and men occupy work-family roles differently and that women may use gambling to

cope with stress associated with managing gendered social roles.[161]

To date, most gambling studies have focused on unemployment and work stress and have

found that problem gamblers report higher work-related problems and stress.[167] In contrast, there

has been little research investigating how job satisfaction is associated with gambling involvement and PG. One study among 26 treatment-seeking pathological gamblers found that job satisfaction was significantly associated with recovery.[168] However, this study is outdated and limited by its small sample size and lack of temporal sequence to discern whether job satisfaction led to recovery or recovery improved job satisfaction. Other studies have explored the economic implications of low-income and job dissatisfaction, or gambling as a motivation to reduce economic difficulties.

Gambling among the economically disadvantaged has been suggested to be caused by job dissatisfaction. The more an individual dislikes their job, the more likely they are gamble to obtain additional income rather than work additional hours or play in hopes of winning big and being able to quit their job altogether.[169] A recent study using data from the 2001 National Epidemiologic Survey on Alcohol and Related Conditions found strong evidence that working at a less desirable job and having issues that were associated with performing work were important determinants of involvement in gambling.[169] A lack of labor market opportunities and the need for additional income were also associated with gambling. While this study is limited as it did not examine those with gambling problems, other studies have also found that individuals with gambling problems are more likely to be motivated to gamble to win money.[41] Qualitative findings from a study among 60 Indigenous Australians revealed those who displayed unhealthy gambling behaviour were motivated by winning money, seeking a large windfall, excitement, and hope or dream of a big win.[159] Gambling peaked near paydays, and often winnings were used to meet daily needs or reciprocate favours, with some respondents expressing that money had lost value because when you have very little, "what have you got to lose?"(p. 29).[159]

Unemployment, low-income, and job dissatisfaction contribute to elevated stress and appear to influence changes in PG over time. Reith & Dobbie explored employment patterns in relation to PG trajectories over time among 50 recreational and problem gamblers in Scotland.[170] They found that those with unstable or insecure employment had fluctuating or increasingly problematic gambling trajectories; whereas those with stable employment had consistent or reduced trajectories of gambling.[170] One man in his 40s described well the connection between job dissatisfaction and gambling saying he became "so focused on it [gambling] in a way that it was drowning out my bad memories of work. It was drowning out my sort of bad personal memories, it was an escape, it was a complete escape route"(p.381).[170] A prominent theme among those with fluctuating or increasing patterns was that changes in gambling behaviour were often triggered by significant life event or changing life circumstances. Examples of common life events were bereavement, caring for sick relatives/friends, losing or changing job, birth of child, and starting or ending a relationship as contributing to more or less gambling involvement.

Exposure Variable 2: Stressful Life Events

Stress is ubiquitous in life and the human body has several stress response systems (physiological, psychological, and behavioural) to modulate and react to stressors. Both the nature of the stressor (i.e., severity, chronicity, physical vs. emotional, predictability) along with a variety of genetic, early experience, cognitive-personality, and emotion-regulation traits are involved in assessing the severity of the event and the individual response.[171,172] Further factors such as gender, timing during life-course development, cultural beliefs, and social support determines individual vulnerability to adversarial effects.[172]

A popular theory for describing differential vulnerability to stress is Lazarus and Folkman's transactional theory of stress and coping.[173] A stressor is defined by the subjective cognitive judgement of the situation that is appraised as threatening, harmful, or taxing of available resources. The coping process involves how the individual manages the demands of the stressor and the ensuing emotions. Problem-focused coping strategies are directed at changing the stressful situation; whereas emotion-focused regulation aims to change the way one thinks or feels about the stress. When the source of stress is chronic or outside an individual's control, negative emotion-focused coping such as relying on gambling to relax, escape, or dissociate may be used.[34,160] For example, certain gambling formats such as Electronic Gaming Machines (EGMs) which have flashing lights and sounds have been described as providing the ideal *oasis* from life stressors through cognitive distraction.[174]

Gambling and stress also have a reciprocal relationship. Gambling that leads to financial problems and social pressures will inevitably cause additional stress, with problem gamblers experiencing high or extreme levels of stress at three times the rate of non-problem gamblers.[35] The number of stressful life events in the past year has been shown to be a robust predictor of current and future PG in several longitudinal studies.[40,41,147,175] An Australia study found that for each additional life event reported in the past year, PGSI score increased by 1.16 (CI: 1.10-1.22) times after accounting for other key sociodemographic variables.[147] Events that were found to be most strongly associated with higher levels of PG were increased arguments with someone close, major change in financial situation, and a major injury or illness to oneself or someone close.

Problem gamblers also appear to have long-term presence of adversities throughout their lives.[176] From a life course perspective, the burden of adversity over one's life has a cumulative effect. Often earlier adversity is not simply a situational event, but rather a long-lasting adversity

that starts in early childhood and continues throughout adolescence and into adulthood. When stress is enduring, constant activation of allostatic systems (nervous, endocrine, and immune) leads to progressive wear and tear on the body, also known as allostatic load, which has long term effects on biological aging and health.[177] Recent work has demonstrated altered stress physiology in terms of hypothalamic-pituitary-adrenal (HPA) axis activity in problem gamblers and risk-taking behaviour.[171,178] Neurobiological data also demonstrate that stress impairs the modulation of the prefrontal circuits involved in executive functions such as self-control and disrupts reward-based decision-making.[148]

Stress response mechanisms and the underlying motivation for engaging in gambling also appear to be different among men and women. Stress tends to elicit risk-taking tendencies in men and risk-aversive or task-focused tendencies in women.[178] Stress responses appear to be more similar between men with higher levels of stress hormones such as cortisol explaining some risky-decision making processes in men.[178] In contrast, women appear to be driven by a wider range of emotions and stress.[179] A 2002 Canada-wide study found that women reported elevated levels of stress and greater negative coping strategies which increased their odds of PG.[48] Women problems gamblers were more likely to report gambling to forget about problems or deal with depressed feelings compared to men.[48] A more recent study among a small sample of at-risk and problem gamblers found that mental health disorders were more significant among women; whereas men tended to cumulate difficulties in social fields, particularly in their professional fields.[176] Overall, it appears that stress is significant for both genders in influencing gambling behaviour; however, the types of difficulties encountered may be different over the life course.

Underpinning much of problematic gambling among Indigenous peoples are the constant stressors emanating from grief, dispossession, racism, and the effects of social inequity.[38,180] As a

result of both structural inequalities and historical trauma, Indigenous people face greater early adversities and traumatic experiences, including high rates of childhood abuse.[154] These experiences contribute to increased vulnerability for a range of psychiatric comorbidities, which have been shown to be positively associated with the onset of PG and severity among the general population.[40,41,45,181,182]

Life Course Variable: Past Trauma

Experiencing childhood trauma is one of the more important factors in the development of PG. Both cross-sectional and longitudinal studies have found that childhood maltreatment is associated with severity of PG and frequency of gambling.[40,41,45,155,181,183] Childhood maltreatment includes many adverse exposures (sexual, emotional and physical abuse, emotional or physical neglect) during the first 18 years of life.[172] Childhood maltreatment experiences can range from mild to severe; can be acute but are often chronic; and exposure to one form of maltreatment increases risk to other forms.[172] These experiences may establish enduring psychological and emotional vulnerabilities leading to heightened risk for psychological disorders.[45] Severe maltreatment during childhood has also been shown to associate with smaller volume of prefrontal cortex, greater activation of the HPA axis, and elevated levels of inflammation.[177] As the number of adverse childhood experiences increases, so does the risk for chronic health conditions, decreased life potential and early death, and engagement in risky health behaviours.[184] The link to PG and other addictive behaviours is thought to be caused by neurobiological changes during critical development causing greater impulsivity and poor decision making, psychological maladjustment in terms of self-identity and feelings of inadequacy, and often maladaptive coping mechanisms for mood regulation.[181]

Unfortunately, adverse childhood experiences are more common than many would expect. In 2012, 32% of Canadian adults reported some form of child abuse (i.e., physical abuse, sexual abuse and/or exposure to intimate partner violence in childhood).[185] Women were more likely to experience sexual abuse; however, men were more likely to experience physical abuse or any kind of abuse.[185] Among Indigenous adults, it is estimated that between 25-50% have experienced childhood sexual abuse alone.[154] It is widely known that high rates of abuse occurred at residential schools which caused suffering across generations (e.g., addiction, homicide, suicide) and unresolved grief.[154] It is estimated that over one-third of Indigenous peoples in Canada have been affected either directly by residential school experiences or indirectly as family or community members linked to survivors.[51] According to the 2008/10 RHS, 20% of Indigenous adults surveyed attended residential school, of which 38.2% reported sexual abuse, 66.9% physical abuse, 73.1% verbal or emotional abuse.[95] Much of this dark history only recently became publicly known in the late 1980s and 1990s. In 1990, the former Chief of the Assembly of First Nations, Phil Fontaine, publicly said "I think what happened to me is what happened to a lot of people. It wasn't just sexual abuse; it was physical and psychological abuse. It was a violation"(p.121).[186]

Few studies have examined the impact of childhood abuse in association with PG among Indigenous populations. In 2010, Dion et al. conducted a literature review of child sexual abuse studies and proposed that PG is a maladaptive coping strategy to avoid abuse-traumatic memories associated with residential school attendance and losses across generations.[46] This work was followed by a study among 358 Indigenous adults from two Aboriginal communities and two semi-urban cities in Quebec between 2009 and 2010.[155] Dion et al. found that 35% of probable pathological gamblers had experienced childhood sexual abuse and 28% had attended

residential school. The risk for PG was almost 3 times higher (CI: 1.20-7.66) among those who experienced childhood sexual abuse and nearly 7 times higher (CI: 2.66-18.30) for those who had attended residential school.[155] Another study examining sexual abuse in childhood among a large representative sample of Inuit peoples living across Greenland found that 24% reported having experienced sexual abuse as a child.[166] For women only, the risk for lifetime PG was 2 times higher (CI: 1.07-3.81) among those who experienced childhood sexual abuse.[166]

The trauma of residential school abuse and its intergenerational effects have caused many Indigenous people to experience symptoms similar to those of post-traumatic stress disorder (PTSD), also known as residential school syndrome.[67,187] It is suspected that exposure to such extreme stress or a traumatic event causes PTSD through altered HPA axis activity causing over-consolidation of memories.[171] Similarities between PTSD and residential school syndrome are identified by a cluster of problems and behaviours due to recurrent intrusive memories, nightmares, flashbacks, anxious feelings, and avoiding anything that reminds the individual of the trauma/event.[187] Many *wounds* have been recently re-opened through the Indian Residential Schools Settlement Agreement compensation processes which required attendees to recount traumatic experiences.[67]

While there is no research to date on the impacts of residential school syndrome and gambling, there is growing literature suggesting that an important correlate of gambling disorders is the presence of traumatic events that frequently manifest as PTSD. A recent study among a community sample of 150 problem gamblers found that those with PTSD experienced greater difficulty with co-occurring psychiatric disorders, negative emotionality, and were more likely to gamble to cope with distressing emotions.[188] Despite clinical definitions of PTSD often involving a particular event, recent research also suggests that ongoing racial discrimination

experienced by Indigenous adults is associated with increased PTSD symptomology and PG severity.[37] Currie et al. found that for each additional situation of racism experienced in the past year, PTSD score increased by 1.12 points.[37] Interestingly, the PTSD avoidance/numbing subscale explained how racial discrimination increased the use of gambling to escape, which in turn, caused a significant increase in PGSI score. Together, these studies and others highlight the impacts that social trauma can have on mental health problems and how problematic gambling can manifest as a maladaptive coping mechanism.

Overall, there is a need for research to look beyond proximal risk factors associated with gambling (e.g., psychopathologies) and better understand how social experiences and stressors may be influencing gambling behaviour among Indigenous populations. Understanding how work and life course experiences impact gambling may have important applications for preventing and/or helping individuals manage their gambling problems.

CONCLUSION

Binge drinking and problem gambling represent important public health issues. Elevated prevalence of addictive behaviours among Indigenous populations are linked to trauma resulting from a devastating history of colonization and the subsequent marginalization that continues to take place today. Despite these inequities, many Indigenous people have demonstrated great resilience and are reclaiming their culture and asserting their collective identity and power.[84] Currently, there is a need for more research to focus on understanding how social experiences contribute to resiliency and improved health outcomes among Indigenous peoples. The objective of this thesis was to investigate the dynamic interaction of risk and protective factors within social environments and identify mechanisms that might moderate or mediate the outcomes of

binge drinking and problem gambling among Indigenous youth and adults, respectively. In summary, the objectives of Paper 1 and Paper 2 are outlined below:

Paper 1: The Influence of the School Environment on Alcohol Use among Indigenous Adolescents (Chapter 3)

1. How do Indigenous youth perceive their school environment in cities?

2. Is participation in extracurricular activities inversely associated with binge drinking?

3. Do associations between school environment, extracurricular activities, and binge drinking vary by education group (i.e., currents students, leavers, completers)?

4. Are these associations moderated by their age, or mediated by the behaviour of their peers?

Paper 2: Life Course Experiences and At-Risk Gambling among a Community Sample of Indigenous Adults (Chapter 4)

1. Does at-risk gambling status change over time?

2. Do group differences in gender, age, and past trauma associate with at-risk gambling behaviour over time?

3. Do changes in job satisfaction or stressful events associate with at-risk gambling behaviour over time?

4. Do group differences moderate the relationship between job satisfaction, stressful events, and at-risk gambling over time?

CHAPTER 3: THE INFLUENCE OF THE SCHOOL ENVIRONMENT ON ALCOHOL USE AMONG INDIGENOUS ADOLESCENTS (PAPER 1)

ABSTRACT

Background: From an ecological perspective, the social contexts within which adolescents interact are strong determinants of behaviour. A positive school environment and engaging in extracurricular activity can improve psychological wellbeing and reduce substance use. For this study, I examined the extent to which these social experiences are associated with binge drinking among Indigenous youth, and how these associations may be mediated by peer behaviour and moderated by age.

Methods: A nationally representative sample of 4,110 First Nations and Métis youth aged 15 to 24 living outside Aboriginal communities in Canada was derived from the 2012 *Aboriginal Peoples Survey* (APS). All analyses were stratified by education group (current students, high school leavers, and high school completers). Associations between binge drinking, school environment, and extracurricular activity were examined using bootstrapped linear regression models adjusted for relevant confounders. Moderated mediation models were examined using the conditional process analysis method.

Results: A positive school environment was associated with reduced peer risk behaviour, which indirectly decreased binge drinking among current students and high school completers. High school leavers were more likely to rate their school experiences as negative, and these negative perceptions were both directly and indirectly associated with increased binge drinking after leaving high school through increased affiliation with risky peers. Among leavers, involvement in a greater range of extracurricular activities had a small indirect protective effect on binge

drinking. Involvement in the arts and clubs/groups were also protective against binge drinking among current students.

Implications: Findings highlight the need for policies and programs aimed upstream that strive to enhance positive school environments for Indigenous youth and that encourage their engagement in extracurricular school activities. These meso-level efforts can positively influence peer relationships and other downstream determinants, thereby reducing binge drinking behaviour.

INTRODUCTION

Alcohol is a psychoactive substance that, although commonly consumed, represents an important public health issue. In 2012, alcohol consumption was responsible for 5.1% of the global burden of disease and 5.9% of all deaths worldwide.[189] Alcohol use is linked to more than 200 forms of disease and injury and is the top risk factor for poor health among Canadians aged 15 to 49.[190]

Among youth, the Canadian guidelines for low-risk drinking suggest no amount of alcohol is safe before the legal age of consumption.[11] Once adolescents reach the legal drinking age, it is recommended that drinking be limited to no more than one or two drinks once or twice per week before age 25, given brain development occurs well into one's early 20s.[11] However, 70% of Canadian youth aged 15 to 24 self-reported alcohol consumption in 2012, and 30% reported binge drinking (consuming five or more drinks on one occasion).[100] Binge drinking is considered the most problematic form of alcohol consumption in terms of health and social implications—both in the short and long term.[11,191] Binge drinking typically peaks between the ages of 18 to 24 as do harms associated with use, such as injury and alcohol poisoning.[189,190] Thus, primary prevention efforts to prevent or delay alcohol use among adolescents remain a priority globally.[190]

The population of focus for this study is urban Indigenous youth in Canada. In 2011, almost half (46%) of the Indigenous population was under the age of 25, compared to less than one-third (30%) of the non-Indigenous population.[12] Despite being a younger population, disparities in health exist over a vast array of health and disease outcomes. In terms of binge drinking, more Indigenous youth choose to abstain from alcohol than their non-Indigenous peers; however, those who do consume alcohol are more likely to begin younger and engage in binge

drinking.[12,13] Understanding the factors influencing the health of this population is important given their growing impact on society and the significant gaps in education and alcohol-related harms between Indigenous and non-Indigenous Canadians.[80,192]

Preventing Binge Drinking using a Theoretical Lens

Research suggests the social context in which adolescents interact are strong determinants of behaviour. From an ecological perspective, behaviours such as binge drinking can be viewed within a complex system of interactions in which the individual is embedded at the centre.[6] The ecological framework for human development, first introduced by Bronfenbrenner in the 1970s, highlights three levels that can be used to organize these interactions.[6] The macro level represents societal structures and values, the meso level considers social formations and community conditions, and the micro level reflects individual interactions and close relationships.[6] At the core, individual-level behaviours are viewed as being constrained, enabled, and shaped by macro-level *structuring* factors, which, in turn, influence the meso- and micro-level environments in which one regularly participates. Within each ecological sphere are a range of risk and protective factors that impact health across the lifespan.[117] This perspective fits well with many Indigenous ways of knowing which similarly view individual health as an embodiment of the social environment, including family, community, nation, ancestors, and the environment.[8,9] An integral part of Indigenous identity and health is the philosophy that all life is interconnected and interdependent with the natural world.[9,87]

The ecological framework also follows the public health view, first introduced by Geoffrey Rose, that individual behaviour can only be understood within the context of one's environment.[193] Macro-level social, economic, and political legacies of colonization have had profound influence on shaping current health inequities and the social realities for Indigenous

youth.[14] The historic trauma and intergenerational impacts of residential schools have strongly

shaped the sense of belonging and wellbeing of Indigenous peoples. Contemporary effects along

with unequal access to educational opportunities are reflected in lower high school attainment

rates (48%), compared to 65% among the general population.[81] An important, and relatively

recent meso-level change in Canada has been the rapid urbanization of the Indigenous

population. Urbanization brings increased educational and employment opportunities for families

but also significant challenges. Many Indigenous youth experience marginalization and

discrimination in urban schools and reduced opportunities to engage in Indigenous ceremonies

and connect with the land.[17,94] Given that education is a particularly important determinant of

Indigenous wellbeing, the focus of this study was to examine the ways in which school-based

social experiences may influence binge drinking among Indigenous youth aged 15-24 living in

cities across Canada.

Influence of the School Environment

At the meso-level, four interrelated domains have been identified as important measures

of school environment: (1) *academic atmosphere*, (2) *community,* (3) *safety*, and (4) *institutional

environment*.[109] This study will examine two of these domains – *community* and *safety* – given

these are most strongly associated with youth behaviour and emotional health.[109] The community

domain represents the quality of interpersonal relationships, feelings of belonging or

connectedness, and respect for diversity.[109] The safety domain refers to the physical and

emotional security students feel along with school rules, norms, and level of disorder.[18] These

domains are also frequently referred to as a positive school environment (i.e., community) and a

negative school environment (i.e., safety) within the literature as well as the 2012 APS survey.[194]

Studies among the general population have shown that a positive school environment improves psychological wellbeing and reduces substance use and other risk behaviour.[18–20] Among Canadian Indigenous youth in grades 7 to 12, the protective effects of a positive school environment were found to be particularly strong in reducing prescription drug misuse.[17] Unfortunately, Indigenous youth were overall more likely to rate their level of school connectedness as low compared to their peers.[17] Negative school experiences of marginalization, racism, bullying, and lack of appropriate cultural supports are examples cited by Indigenous youth that contribute to feelings of being unsafe and unmotivated to learn.[14] Indigenous students also report that they feel the mainstream school environment often does not support their particular learning needs, interests, and values.[114,195–197] Combined with other factors such as poverty, experiences at school have significant impact on educational attainment and wellbeing.[18,197] Thus, the first key objective of this study was to examine how perceptions vary among education groupings (i.e., current students, high school leavers, and high school completers) and in terms of aspects of identity, such as gender and Aboriginal ancestry as these have been shown to have important implications to self-identity and experiences at school.[18,57,112]

Influence of Extracurricular Activities

Beyond school, a large portion of an adolescent's time is spent in unstructured activities. Providing increased support and opportunity for adolescents to engage in extracurricular activities has also been recognized as an important way to reduce risk behaviours.[21,112,117] A recent review of the literature concluded that participation in prosocial activities (e.g., church, volunteer, community service) and performing arts activities tends to be associated with lower levels of alcohol use.[21] Among Canadian Indigenous youth, both participation in at least one

weekly recreational activity and intensity of participation were found to be protective for substance use and other risky behaviours.[103,123]

Participation is also suggested to have a particularly strong influence on disadvantaged or marginalized groups.[115] Participation can enhance collective pride, identity, and sense of belonging, which helps to build self-esteem and resiliency.[116,198] A growing body of research also supports what Indigenous people have long recognized and fought to preserve: Engaging in cultural activities contributes positively to emotional and mental health.[22,199,200] Cultural experiences have also been shown to be associated with reduced alcohol as well as illicit and prescription drug problems.[23,24,90,107] Thus, the second key objective of this study was to examine the association between various activities, including cultural activities, and binge drinking among Indigenous youth.

Meso-level Environments Influence on Binge Drinking

Both meso-level environments being examined in this study (i.e., school environment and extracurricular activities) are intrinsically related. The school culture and community resources often determine the availability of activities, and involvement in those activities helps to build strong bonds to school.[122] Indigenous students have described involvement in activities as important components of educational success, as these experiences fed into the social, emotional, and spiritual components of self and embodied an intrinsic motivation to succeed.[14,196,197] Research indicates that students who participate in a greater number of extracurricular activities (i.e., activity breadth) have higher satisfaction with school and academic orientation and engage in less risky behaviour.[21,118] In fact, activity breadth has been shown to provide more benefit than intense participation in one activity.[21,118] Thus, the third key objective of this study was to

examine the associations between school environment (both positive and negative), activity breadth, and binge drinking.

Micro-level Mediating Factor: Peer Risk Behaviour

At the micro-level, interpersonal relationships within peer groups comprise important aspects of the social ecologies of adolescents. As adolescents age, peers rather than parents begin to take a primary role and factor into one's self-concept, sense of belonging, and engagement with school.[114] Research has shown that the influence of peers (e.g., peer pressure, peer substance use, and affiliation with deviant peers) is one of the most robust and consistent predictors of substance use and other risky behaviour.[27,126,128,129] From an ecological perspective, the meso-level social environments in which youth regularly participate in (i.e., school and extracurricular activities) play a role in shaping the breadth and nature of interpersonal interactions and the social norms within those interactions.[109,133]

The school environment is important in terms of both peer relationships and substance use because students who are disconnected from school are more likely to associate with anti-school peers.[112,136] Students who are disconnected from school are then more likely to engage in behaviours such as aggression and substance use.[112,134] Thus, it is reasonable to hypothesize that the school environment has an important role in mitigating student's affiliation with peers who display more risky behaviour and, by extension, reducing negative health outcomes.[128] More specifically, peers may be thought of as a mediator by explaining the mechanism through which the school environment influences binge drinking. Several studies have explored this relationship and have found that a positive school connection was associated with reduced frequency of substance use through lowered association with substance-using peers, whereas a negative school

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environment was associated with increased alcohol use, including past month intoxication, though close affiliation with deviant peers.[136–138]

The protective influence of extracurricular activity participation on positive academic and psychological outcomes has also been found to be, in part, explained by peer group characteristics.[115,120] However, the evidence is not as conclusive in terms of alcohol use related outcomes. For example, some studies did not find any peer mediating mechanism between extracurricular activity and alcohol use,[139,201] while others have shown that peers mediated the relationships between team sports participation and binge drinking and between activity breadth and alcohol intoxication.[115,139]

Overall, the school environment and activity participation appear to both directly and indirectly influence adolescent binge drinking, through their influence on peer characteristics. Given the significant developmental changes that occur during adolescence, it is also reasonable to investigate whether these relationships are contingent and, hence, moderated by age. The above hypotheses, taken together, form a moderated mediation model (i.e., mediation relationship varies across levels of a moderator). Thus, the fourth key objective of this study was to examine, among each education group, whether associations between school climate domains, activity breadth and binge drinking frequency are mediated by peer risk behaviour and moderated by age.

The Present Study

This study examines the complex relationships between meso- and micro-level modifiable social environments that surround Indigenous youth aged 15 to 24 living in cities and binge drinking behaviour. It was hypothesized that the impact of social variables on binge drinking would vary by educational attainment, given education is a key determinant of health

behaviour. Thus, all analyses were stratified by educational status. Categories included: (1) current high school students, (2) those who did not complete high school (i.e., leavers), and (3) those who graduated from high school (i.e., completers). The analysis was based around the following research questions:

1. How do Indigenous youth living in cities perceive their school environment?

2. Is participation in extracurricular activities inversely associated with binge drinking?

3. Do associations between school environment, extracurricular activities, and binge drinking vary by education group (i.e., currents students, leavers, completers)?

4. Are these associations moderated by age or mediated by the behaviour of peers?

METHODS

Study Design

Data were obtained from the 2012 Aboriginal Peoples Survey (APS).[194] The APS is a national household post-censal survey of Indigenous Canadians 6 years of age and older conducted by Statistics Canada. It was designed to complement the *2011 National Household Survey* (NHS) in Canada, also known as the Census of Population.[194] The APS selected its sample from respondents who reported having either Aboriginal identity or ancestry in the 2011 NHS questionnaire. Individuals were selected to participate using a three-phase or, in some regions, a two-phase design and then further categorized using *stratification-specific domains of estimation*. This was designed to allow for the production of reliable data corresponding to geographical regions for each Indigenous group (i.e., First Nations, Métis, and Inuit) and education group (i.e., students in grades 1-6, students in grades 7-12, high school completers, and high school leavers).

Data were collected using computer-assisted interviewing, both in-person and by phone, between February and July 2012. All respondents were residents of private dwellings. It is important to note that *all persons living in First Nations or Métis communities and certain communities in the Yukon and Northwest Territories were excluded from data collection*. Approximately 80% of youth participants in this study were living in large census metropolitan cities (i.e., total population of at least 100,000, of which 50,000 or more lived in the core).

At the national level, the overall response rate was 76% ($N = 28,410$) among those 6 years and older.[194(p.28)] This study only included respondents aged 15 to 24 years old who identified as First Nations or Métis and personally answered the survey (i.e., it was not completed by their parents). There were 4,110 individuals who met these criteria and provided valid responses to questions about binge drinking frequency. Inuit youth were excluded from the present study given the low sample size. Also, the majority of Inuit youth surveyed lived in remote northern regions whose surrounding environments differ in many ways to that of urban First Nations and Métis youth. This study was exempt from institutional ethics board review at the University of Lethbridge as data were obtained in a de-identified form.

Survey weights. Data were weighted to represent the general household population of First Nations and Métis youth aged 15 to 24 years old living outside Aboriginal communities. The weighting variable was created by Statistics Canada to account for sample design, non-response, and known population totals.[194] A bootstrapping technique using a Fay Adjustment factor of 4 was also applied to capture the variance associated with sampling design and weight adjustments. The Fay adjustment is an important multiplicative factor that helps to control the variability and overestimation of variation that can occur when applying bootstrap weights. For each record, 1,000 bootstrap weights were applied.

Measures

Outcome variable: Binge drinking. As part of the APS, respondents were asked to report whether they had consumed an alcoholic beverage in the past 12 months. A *drink* was defined as one bottle/can of beer, one glass of wine/wine cooler, or one drink with 1.5 ounces of liquor. Those who said "yes" were asked, "How often in the past 12 months have you had five or more drinks on one occasion?" For the purposes of this study, a new variable called *binge drinking frequency* was created. Those coded 0 (never) included youth who did not drink in the past year or who did not binge drink in the past year. This is an appropriate approach, given the denominator for a prevalence estimate includes all in a population and not just those who are at risk. Frequency response options were coded as: 1 = less than once a month, 2 = once a month, 3 = 2 to 3 times a month, 4 = once a week, 5 = more than once a week.

Exposure variables: School environment. School environment was operationalized by Statistics Canada in two different ways. First, *positive school environment* was assessed based on valid responses to at least three of the following four questions pertaining to the *past school year* or *last year of school*, ranging from 1 (strongly agree) to 4 (strongly disagree):

1. Overall, I feel/felt safe at school.

2. Overall, I am/was happy at school.

3. Most students in the school enjoy/enjoyed being there.

4. The school offers/offered parents many opportunities to be involved in school activities.

Second, *negative school environment* was assessed based on valid responses to at least four of the following five questions, ranging from 1 (strongly agree) to 4 (strongly disagree):

1. Racism is/was a problem at school.

2. Bullying is/was a problem at the school.

3. The presence of alcohol is/was a problem at school.

4. The presence of drugs is/was a problem at school.

5. Violence is/was a problem at school.

Responses were reverse scored and averaged so that a higher score reflected a more positive school environment and a more negative school environment. In the present sample, the reliability of each scale was good (Cronbach $\alpha = 0.70$ for positive school environment; Cronbach $\alpha = 0.78$ for negative school environment). To ensure that a positive school environment and negative school environment were not simply the inverse of the other, a Pearson's *r* value was calculated. The result was -0.43 suggesting that the two measures have some co-variance but are not simply the inverse of the other.

Extracurricular activities. Youth participation in five extracurricular activities were examined, including (1) sport or physical activity including taking lessons; (2) art, drama, or music group/club including taking lessons; (3) school group/club, such as student council, yearbook or science club, or group/club outside of school; (4) activities related to First Nations, Métis, or Inuit culture; or (5) volunteering or help without pay in the community. Participation status was coded as "yes," "no," or "not available." For the purposes of this study, each activity was dichotomized into yes or no. An *activity breadth* variable was then created by summing these scores, ranging from 0 (no extracurricular activity) to 5 (wide breadth of extracurricular activity).

Mediating variable: Peer risk behaviour. This mediator was measured using a derived variable created by Statistics Canada. Respondents were asked to indicate *how many* of their

closest friends this school year or in their last year of school, ranging from 1 (none of them) to 4 (all of them):

1. Skip/skipped classes once a week or more.

2. Have/had dropped out of high school without graduating.

3. Have/had a reputation for causing trouble.

4. Smoke/smoked cigarettes.

5. Use/used drugs.

6. Drink/drank alcohol.

If at least five of the six questions were valid responses, a mean score was produced, ranging from 1 (no friends have risk behaviours) to 4 (all friends have all risk behaviours). The Cronbach's α for the present sample was 0.81. Pearson's r correlations between peer risk behaviour and a positive school and negative school environment were weak at $r = -0.26$ and 0.32, respectively.

Covariates. Many possible confounding factors could influence the association between these exposure variables and binge drinking. Research has found that factors such as gender, ethnicity, and social class are important predictors of students experiences in school.[18,112] Thus preliminary analyses examined primary associations separately within each stratum of potential confounding variables (e.g., First Nations vs. Métis). No significant group differences were found, thus covariates were simply controlled for simultaneously through multivariate statistical analysis. Specifically, the following sociodemographic characteristics were assessed and controlled for in the analysis, including age, gender, Aboriginal identity (First Nations or Métis), living inside or outside a census metropolitan area, number of schools attended (four categories, ranging from 1 or 2 schools to 5 or more schools), highest education of either parent (less than

secondary school, secondary school graduate, some post-secondary, and post-secondary graduate), and adjusted household income (seven categories, ranging from \$0 to $\geq$ \$70,000). Household income was collected from parents in the 2011 NHS and an *adjusted household income* variable was derived by Statistics Canada by dividing the household income as reported by parents by the square root of the number of members in the household. This adjustment is done to reflect the increased needs of a household as the number of family members increase, also known as "economies of scale".[202(p.5)] The highest level of education reported by either parent was included as another proxy for social status.

Statistical Analysis

All analyses were conducted on bootstrapped weighted data using Stata 12.[203] Given that a sample of the original dataset was used (i.e., First Nations and Métis youth aged 15 to 24 who personally answered the survey: $N = 4,110$), weight normalization was used to rescale the survey weights assigned to each individual to protect against sample size weighting inflation and preserve the appropriate population distribution.[204] This was done by dividing each respondent's weight by the average weight of the sample. All analyses were stratified by education group, as preliminary analyses revealed significant differences between groups, and survey design sampling estimates were targeted for each of these groups. The statistical significance level was set at $p < 0.05$ level, and the substantive significance (i.e., unstandardized effect size) was set at $B > 0.05$.

Descriptive statistics were first used to examine the characteristics of the study sample and the distribution of binge drinking across the sample. Comparisons of sociodemographic characteristics and binge drinking across education groups were analyzed using Chi-square tests for nominal variables and 1-way analysis of variance (ANOVA) for continuous variables.

Research question 1 examined how perceptions of positive and negative school environment varied across strata (i.e., education group, gender, and Aboriginal identity) using 2-way ANOVA. Gender and Aboriginal identity were set as factors to test for overall differences between education groups. Follow-up pairwise comparisons were conducted using independent sample *t*-test using the Bonferroni correction and Cohen's *d* to examine group differences and corresponding effect sizes.

Research question 2 examined the associations between each activity variable (i.e., sport/physical activities; art, drama or music; groups/clubs; Aboriginal cultural activities; volunteering) and binge drinking using bootstrapped linear regression models and 95% confidence intervals. *Research question 3* examined the associations between extracurricular activity breadth (i.e., total number of activities) and binge drinking, with positive and negative school environment variables added to the regression models. School environment variables and age were mean centered to help with interpretation of the regression coefficients (i.e., redefined 0 point for predictor to be average perception of school environment). These analyses were adjusted for the potential confounding effects of covariates selected *a priori* based on existing literature, including age, gender, Aboriginal identity, census metropolitan area (CMA), number of schools attended, parental education, and adjusted household income. Multicollinearity between the independent variables was examined using variance inflation factors before main effects models were derived. Potential confounders were tested for effect modification before entry into main effects model using loess curves and formal interaction tests.[205] An interaction was deemed present if the difference between the R^2 value of the main-effects-only model and the R^2 value of the model with the product term added was significant using a hierarchical F test.[205] Finally, the presence of multivariate outliers was examined; two outliers were found

among current students and were removed from all regression analyses. Data were not replaced for participants with missing data (8%); these individuals were excluded from the analysis.

Research question 4 built upon the so-called total effect models explored in research question 3 by including peer risk behaviour as a hypothesized mediator (i.e., mechanism that explains how an exposure variable influences binge drinking). The conceptual diagram corresponding to this hypothesized process is shown in Figure 3-1.
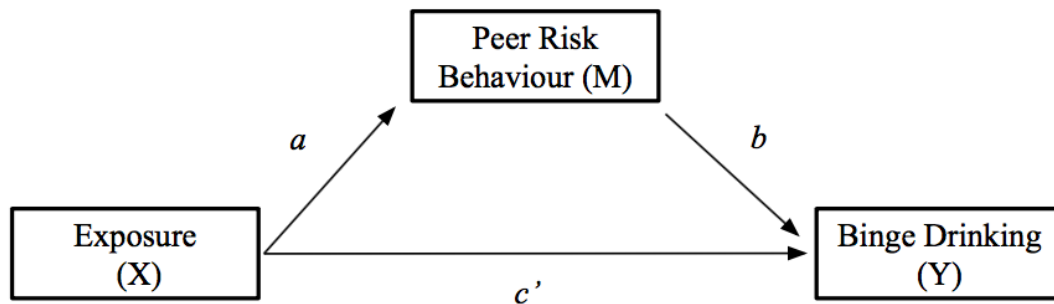
Figure 3-1. Conceptual Diagram of a Simple Mediation Model

Following the steps of the *normal theory method*, a series of regression analyses were carried out to determine the appropriate mediation model for each education group. Typically, the first step involves establishing a significant relationship between exposure variable X and outcome variable Y.[206,207] This step was previously thought to be a precondition of explaining an underlying effect of X on Y (i.e., mediation may be occurring).[30] However, more recent reviews no longer impose this precondition and recommend that this step can be skipped when the exposure variable is distal to the outcome.[30,208] A causal claim based on theory can be argued here that the exposure variables under examination (i.e., school environment and activity breadth) are meso-level and, thus, distal from the individual behavioural outcome: binge drinking.[208] Moving on to the second step then involves determining which X exposure variables account for a significant proportion of the variance in the mediator M, peer risk behaviour (path a coefficients). This step involves treating the mediator M as if it were the outcome variable. In

the third step, the dependent variable Y is regressed on both X and M to determine if M accounts for a significant proportion of the variance in Y (path b coefficients). This step shows that the mediator M affects the outcome variable Y while controlling for X. With the appropriate model established, the direct effect (termed the c' pathway) represents the estimate of $X \rightarrow Y$ when holding constant M.[30] The product of the paths of influence ($a*b$) represents the indirect effect of X on Y through M. Mediation can be said to have taken place when there is a significant indirect effect.[30]

Once mediation models were established for each education group, age as a moderator of model paths was then explored (i.e., estimation and interpretation conditional on age).[30] Moderation and mediation together in a single integrated analytical model is known as a conditional process model as shown in Figure 3-2.[30]
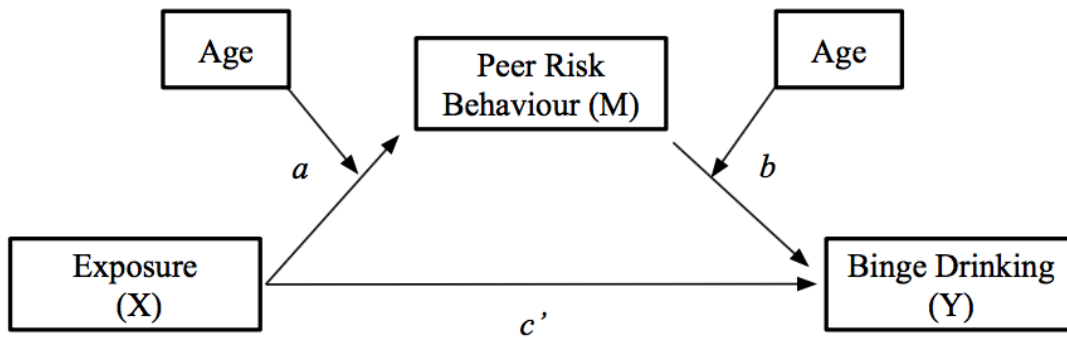
Figure 3-2. Conceptual Diagram of a Conditional Process Model

The conditional indirect effect of X on Y through M remains as the product of paths of influence ($a*b$); however, it now becomes a function of the moderator (i.e., calculated at different values of age). For current students, age was found to moderate the association between a positive school environment and peer behaviour (a pathway); whereas for leavers and completers, age moderated the association between peer behaviour and binge drinking (b pathway). Point estimates for the conditional indirect effects, termed ω, were computed for three

different values of age: (1) mean; (2) mean minus 1 *SD* (i.e., low moderator); and (3) mean plus

1 *SD* (i.e., high moderator). Using the Stata SEM command, a bootstrapping approach was used

to obtain bias-corrected standard errors and 95% confidence intervals based on 1,000 bootstrap

samples to better reflect the sampling distribution of the conditional indirect effects.[207,209]

RESULTS

Sample Characteristics

Characteristics of the sample are outlined in Table 3-1. Please note that tables are

presented at the end of this chapter. Overall, 54.2% of the sample identified as First Nations, and

45.8% as Métis. The average age was 19.62 (*SD* 2.80). The gender composition matched

population estimates at 52% female.[210] Most of the sample (77.9%) lived in an urban CMA (i.e.,

total population of at least 100,000). On average, youth had attended four schools since

kindergarten. The average level of education among parents of youth was some post-secondary

education.

Those who completed high school made up the largest proportion of the sample (51%),

followed by current students (29%) and high school leavers (20%). As shown in Table 3-1, those

who did not complete high school were more likely to be First Nations than Métis, male, and

come from households with lower incomes. High school leavers were also more likely to have

attended five or more schools during their education and to report lower educational attainment

by their parents compared to current students and completers. These differences were statistically

significant.

Binge drinking. As shown in Table 3-1, 60% of current students reported no binge

drinking in the past year. Just over a third engaged in binge drinking less than weekly and would

be considered at moderate risk for alcohol problems and injury.[211] A very small subset of the

sample (4%) engaged in binge drinking weekly or more and would be considered high risk for alcohol problems and long-term diseases caused by alcohol use as well as short-term risk of injury or acute illness.[11,211]

The frequency of binge drinking was significantly lower among current students as compared to high school leavers and completers, likely due to the younger age of those still in school. There was no statistical difference in the frequency of binge drinking between leavers and completers. Approximately 6 in 10 high school completers or leavers binge drank at a moderate-risk level, while approximately 12% and 14% of high school completers and leavers respectively, engaged in levels of binge drinking that put them at high-risk for health problems.

Extracurricular activities. The most common activities reported among all youth were involvement in sports/physical activity and volunteering, with approximately 50% of adolescents reporting participation. About 1 in 5 adolescents reported participation in Aboriginal cultural activities. Current students and high school completers reported significantly greater participation in sports, arts, and volunteering than high school leavers. High school completers reported the highest extracurricular activity breadth ($M = 1.91$; $SD = 1.13$), followed by current students ($M = 1.86$; $SD = 1.43$) and leavers ($M = 1.22$; $SD = 1.26$).

Research Question 1: Perceptions of the School Environment

A series of 2-way ANOVA analyses examined the effect of *education group × gender* and *education group × Aboriginal identity* on differences in perceptions of a positive school environment and a negative school environment. The means and standard deviations for each group are shown in Table 3-2. There were no significant main effects for gender or Aboriginal identity, meaning that school experiences were not significantly different between males versus females or First Nations versus Métis students overall. High school leavers rated their school

environment as less positive compared to current students and completers (Cohen's $d = 0.412$ and 0.576, respectively) and more negative (Cohen's $d = 0.439$ and 0.36, respectively). It is interesting to note that Métis leavers rated their school environment as significantly more negative than First Nations leavers (Cohen's $d = 0.272$).

Research Question 2: Extracurricular Activity and Binge Drinking

A series of bootstrapped linear regression models were used to examine associations between 5 categories of extracurricular activities and binge drinking frequency, stratified by education group. As shown in Table 3-3, the strength of these associations varied considerably between groups. Among current students, age was most strongly associated with binge drinking (average unstandardized effect size, $B = 0.183$). Across each activity, the semi-partial correlation ($sr_i^2 = 0.03$) associated with age indicated that roughly 3% of the total 5% model variance (adjusted R^2) was explained by age. Only two activity variables: (1) involvement in the Arts ($B = -0.161$, $p = 0.048$), and (2) involvement in Clubs/Groups ($B = -0.168$, $p = 0.042$) were associated with small *decreases* in binge drinking among Indigenous youth currently in school.

For those no longer in school (i.e., leavers and completers), gender rather than age contributed most significantly to the prediction of binge drinking. Being male was associated with increased binge drinking and accounted for roughly 6% of the total 10% model variance among leavers (average 0.8 point increase), and 2% of the total 4% model variance among completers (average 0.4 point increase). For completers, there was also a small association between *increased* income ($B = 0.07$) and binge drinking. The only extracurricular activity associated with binge drinking among both groups was involvement in sports or physical activity. Among completers, being involved in sports or physical activities was associated with a small 0.3 point *increase* in binge drinking (1% of the total 5% model variance). Among leavers,

a significant interaction between gender and sports/physical activity was found such that, on average, involvement was associated with a small 0.4 point *increase* in binge drinking for male leavers, whereas involvement was associated with a small 0.37 point *decrease* in binge drinking for female leavers.

Research Question 3: School Environment, Activity Breadth, and Binge Drinking

Extracurricular activity breadth and positive and negative school environment variables were added to regression models to examine associations with binge drinking frequency. As shown in Table 3-4, a positive school environment was *not* associated with binge drinking for Indigenous youth. A negative school environment was associated with more frequent binge drinking, but only among leavers ($p = 0.001$). After controlling for sociodemographic factors and extracurricular involvement, every one point increase in how negatively leavers rated their school environment in their last year of high school was associated with a moderate 0.44 point increase in their current binge drinking. The effect of sociodemographic variables remained important correlates of binge drinking after adjustment for school environment and breadth of involvement in extracurricular activities.

Research Question 4: Conditional Process Analysis

Model set up. A mediation model was used to examine the ways in which associations between school environment, extracurricular activity breadth, and binge drinking may be explained by peer risk behaviour. Much literature has suggested that peers play an important role in all three of these variables among youth in the general population. The moderating effect of age was also explored, and conditional process models were developed to better fit the data. As shown in Figure 3-3, results indicated that among current students the relationship between a positive school environment and peer behaviour was moderated by age ($a_3 = .129$, $p = .005$).
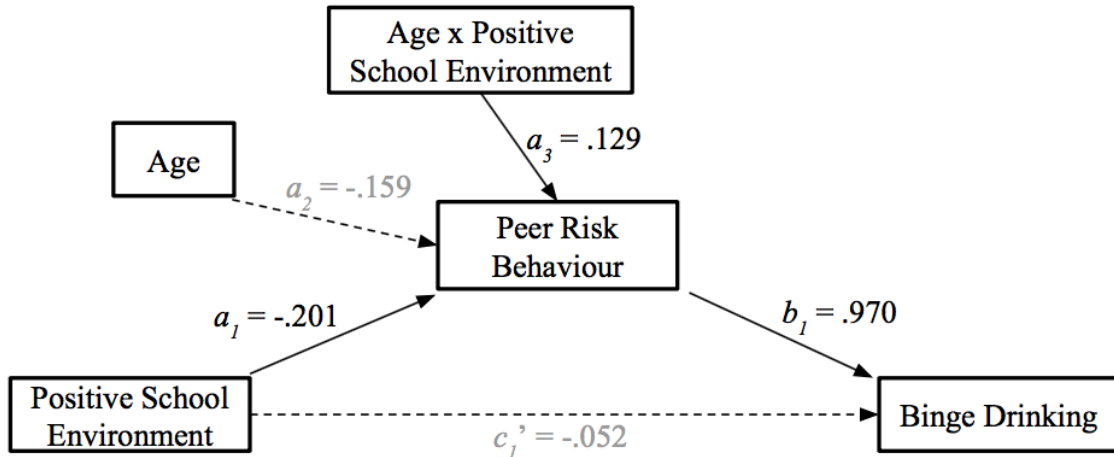
Figure 3-3. Conditional Process Model for Current Students
Note. Black arrows represent significant paths (i.e., $p < 0.05$). Dashed arrows represent nonsignificant paths.

Models for leavers and completers, as shown in Figures 3-4 and 3-5, found that the effect of peer behaviour on binge drinking was moderated by age ($b_3 = -.099$, $p = .037$) and ($b_3 = -.089$, $p = .022$), respectively.
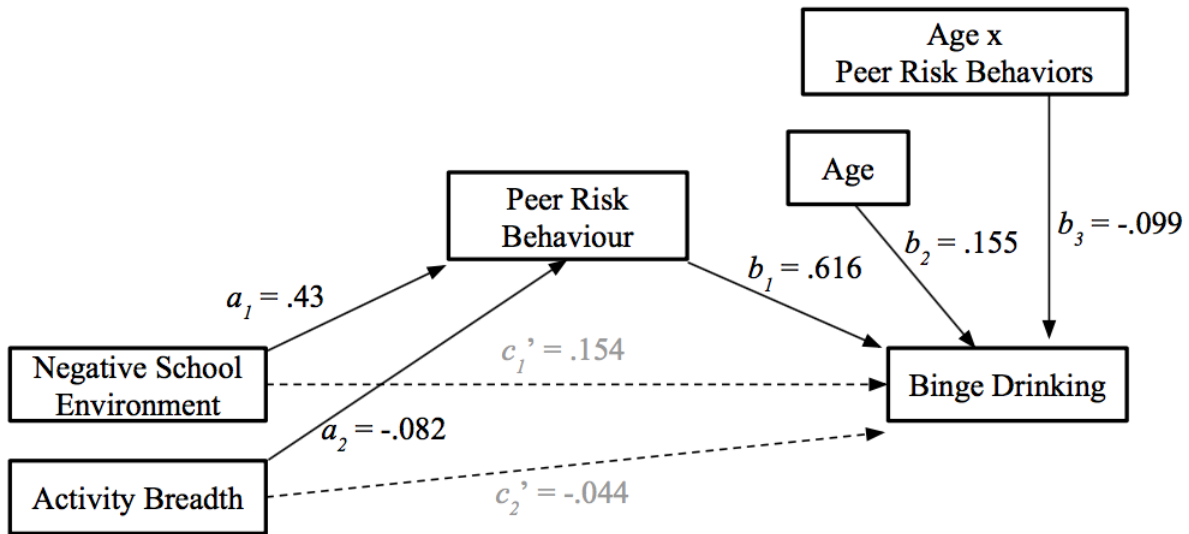
Figure 3-4. Conditional Process Model for Leavers
Note. Black arrows represent significant paths (i.e., $p < 0.05$). Dashed arrows represent nonsignificant paths.
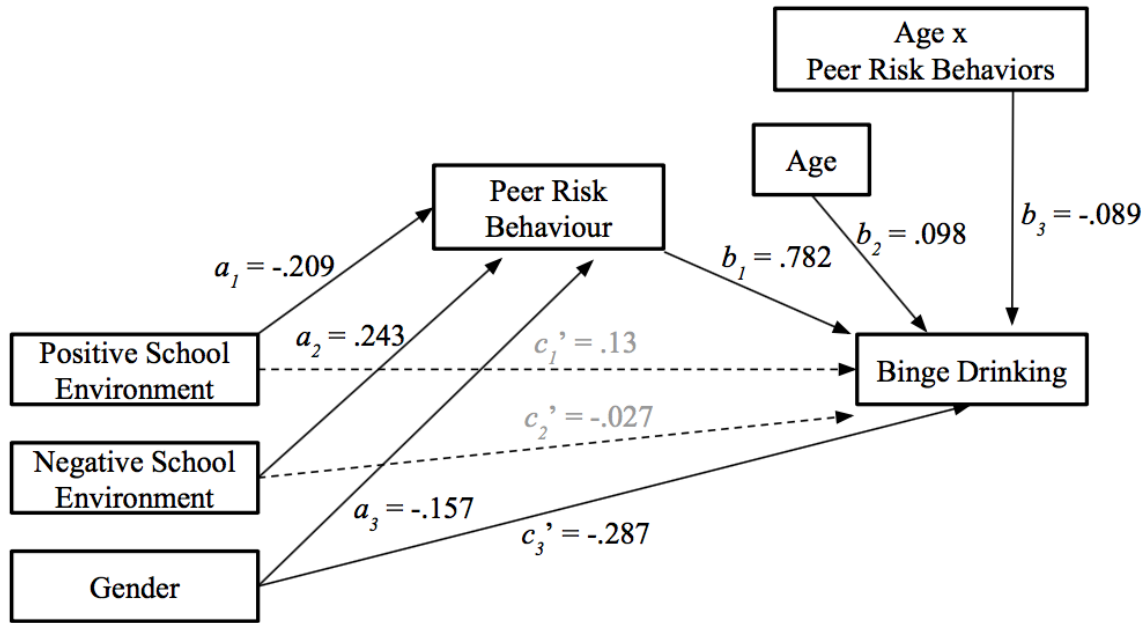
Figure 3-5. Conditional Process Model for Completers
Note. Black arrows represent significant paths (i.e., $p < 0.05$). Dashed arrows represent nonsignificant paths.

Results presented in the first set of columns in Tables 3-5, 3-7, and 3-9 represent the path *a* coefficients, which are the associations between the exposure variables *X* and the hypothesized mediator (*M* = peer risk behaviour) for current students, leavers, and completers, respectively. The second set of columns represent the path *b* coefficients, which are the associations between the same mediator and the outcome variable (*Y* = binge drinking frequency). The path *c'* coefficients represent the remaining direct effect of the *X* variables on *Y* after adjustment for peer behaviour. Tables 3-6, 3-8, 3-10 display the results for the point estimates for the conditional indirect effects tested at mean age, low age (one *SD* below mean) and high age (one *SD* above mean) for current students, leavers, and completers, respectively.

Current students. Every one-point increase in positive school environment was associated with a moderate 0.20 point *decrease* in peer risk behaviour (path a_1) for those aged 16.4 (i.e., association interpreted at centered average age). Reduced peer risk behaviour was, in turn, strongly associated with reduced binge drinking among students ($b_1 = 0.97$, $p < .001$). As

Table 3-6 demonstrates, the more positive the school environment, the less binge drinking they reported engaging in. However, the magnitude of this association decreased with age, becoming statistically insignificant once youth reached 17.5 years of age. Peer behaviour fully mediated the association between a positive school environment and binge drinking; the association between school environment and binge drinking was no longer significant after adjustment for peer behaviour ($c' = -0.05$, $p = 0.67$).

Interestingly, students with more highly educated parents were more likely to associate with peers who engaged in less risky behaviour ($B = -0.07$, $p = 0.007$). However, this did not influence binge drinking independent of its effect on peer behaviour. A weak, but significant, association was found between living in a higher income household and *increased* binge drinking frequency ($B = 0.06$, $p = 0.015$) when peer behaviour was controlled.

High school leavers. Every one-point increase in negative school environment and extracurricular activity breadth was associated with a large 0.43 point *increase* and small 0.08 point *decrease* in peer risk behaviour (path a_1 and a_2; respectively). Increased peer risk behaviour was, in turn, moderately associated with increased binge drinking ($b_1 = 0.62$, $p < .001$). As shown in Table 3-8, a negative school environment indirectly increased binge drinking due to the negative influence of school on peer behaviours. This indirect relationship diminished with age, but still remained significant even among those as old as 23 years ($\omega = .168$, $p = .047$). Conversely, activity breadth indirectly reduced binge drinking as involvement was protective against peer behaviours. The conditional indirect effect was small among those aged 18.5 ($\omega = -.069$, $p = .014$) and became no longer significant by age 23. There was no evidence that a negative school environment ($c_1' = .154$, $p = .265$) or activity breadth ($c_2' = -.044$, $p = .405$) influenced binge drinking independent of their effect on peer behaviour. Unexpectedly, a

positive school environment was found to be associated with *increased* frequency of binge drinking ($B = .317$, $p = .025$) when controlling for peer behaviour. Gender differences were not explained by controlling for peer behaviour ($B = -.760$, $p < .001$).

High school completers. A positive school environment was associated with a small *decrease* in peer risk behaviour ($a_1 = -.209$, $p < .001$); whereas a negative school environment was moderately associated with *increased* peer risk behaviour ($a_2 = .243$, $p < .001$). Also, being male was associated with increased peer risk behaviour ($a_3 = -.157$, $p < .001$). In turn, increased peer risk behaviour was moderately associated with *increased* binge drinking ($b_1 = 0.78$, $p < .001$). As shown in Table 3-10, the conditional indirect effects indicate that a positive school environment ($\omega = -.130$, $p = .001$) and negative school environment ($\omega = .152$, $p < .001$) remained significant even among those as old as 23 years. However, a positive school environment ($c_1' = .130$, $p = .257$) and negative school environment ($c_2' = -.027$, $p = .807$) did not influence binge drinking independent of peer behaviour. Male completers continued to be more likely to binge drinking as they aged. However, a significant direct association ($c_3' = -.287$, $p = .002$) between male gender and increased binge drinking remained when controlling for peer behaviour suggesting other gender mechanisms appear to be playing a role. Finally, increased income was associated with a small increase in binge drinking, after control for peer behaviour ($B = .093$, $p < .001$).

DISCUSSION

This study examined how social environments influence binge drinking behaviour among Indigenous youth living in Canadian cities. Findings indicate the prevalence of high risk (i.e., weekly or more) binge drinking among Indigenous youth is comparable to their non-Indigenous

peers (10.1% vs. 9.5%).[1] However, elevated prevalence of moderate-risk binge drinking (53.7% vs. 46.1%) highlight the need for enhanced efforts to reduce alcohol use within this population.

This research and others highlight that risk and protective factors interact in complex ways across adolescent development. Activity-specific, gender-, and age-related differences revealed unique pathways through which school environments and participation in extracurricular activities were associated with binge drinking patterns among Indigenous youth in different education trajectories (current students vs. high school leavers vs. high school graduates). Overall, Indigenous students in school were less likely to binge drink than high school graduates or leavers likely because they were younger and adolescent development coincides with heightened experimentation with risky behaviour.[212] For those no longer in school, gender rather than age became important with males being were more likely to binge drink. Epidemiologic studies consistently find that males drink more as they are suggested to have more biological and psychosocial risk factors for alcohol use (e.g., aggressiveness, behavioural under-control, sensation seeking, and positive expectancies for alcohol use).[213]

Similar gender traits may also help to explain why sport participation was found to be associated with increased binge drinking among high school graduates and male leavers. Sport participation as a risk factor for substance use has been previously found, leading researchers to hypothesize that sports may encourage a drinking culture (e.g., greater propensity to socialize and attend parties) and risk-taking behaviours, particularly among males.[21,115,122,214] Importantly, findings indicate that increasing opportunities for prosocial activities (arts/drama, clubs/groups) while students are still in school may be an important way to reduce alcohol use. Among high school leavers, engagement in a range of extracurricular activities was associated with reduced

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[1] Because most studies only report binge drinking rates among 'drinkers'; I obtained comparable data from the Nesstar data portal thru Statistics Canada. http://libguides.uleth.ca/c.php?g=256435&p=1710235.

affiliation with risky peers which, in turn, reduced binge drinking. Strong evidence supports that increased opportunities for extracurricular activities improves school connectedness and academic achievement[21,117] and thus may be an important target for intervention, particularly among those disengaged or at-risk of school failure.

The findings from this study also support that efforts to reduce binge drinking and improve educational outcomes among Indigenous youth should focus on improving meso-level school environments.[112,134] Among Indigenous youth in this study, 22% stated racism was a problem at their high school, 33% stated violence was a problem, and 44% stated bullying was a problem, suggesting there is much work to do to ensure urban-based high schools are safe and welcoming places. 20% of Indigenous youth did not complete high school and they were more likely to express these negative sentiments about their school and this was directly associated with moderate increases in binge drinking behaviour years later. Negative perceptions of school were also strongly associated with increased affiliation with risky peers while in school (i.e., causing trouble, skipping school, dropping out of school, or using cigarettes, drugs, or alcohol) which indirectly increased binge drinking among high school leavers. This highlights that peer relationships are a strong proximal risk factor for binge drinking, but that more distal factors like the school environment influence these social relationships. Programs to prevent Indigenous youth from leaving school before graduation may therefore need to simultaneously address negative school environments while promoting positive peer relationships. Ensuring that schools are culturally safe places by addressing both wider systemic educational policies and school environments that are discriminatory as well racism and bullying at the individual-level are needed.[14,93] It is likely that increased negative perceptions may be partly due to high school leavers being more likely to come from a lower income household with lower parental education

and thus living in a more disadvantaged neighborhood with lower quality schools. Further research would benefit from exploring how school-level socioeconomic indicators influence school environments surrounding Indigenous youth and their educational success.

A similar relationship between the school environment and binge drinking was also found among high school graduates. A negative school environment was indirectly associated with increased binge drinking through increased affiliation with risky peers. In contrast, a positive school environment was indirectly associated with decreased binge drinking years later. While previous research has consistently shown that peer influences are a robust predictor of substance use and risky behaviour[27,126,128,129], this study documents that high school peer groups seem to have a lasting influence on future drinking behaviour. It was also shown that male high school graduates were at increased risk of associating with peers engaged in risky behaviour and, in turn, binge drinking. Prevention efforts should therefore address school culture, social influence and positive youth relationships, and normative experimentation with alcohol across adolescence using a gendered perspective.[215] The literature suggests that improving relationships at school, creating learning environments that are enjoyable and reflect Indigenous ways of knowing, and meeting the individual academic needs and aptitudes of each student are important.[216]

Positive experiences in school were also found to mitigate affiliation with risky peers and, by extension, reduce binge drinking among Indigenous students still in school. However, this protective indirect effect of school on peer behaviour diminished with age and became non-significant as students reached graduation (i.e., 17.5 years). A hypothesis might be that with increasing age, peer groups become more solidified and experiences at school become less influential. The practical implications of these findings suggest that prevention efforts should focus on strengthening school bonds during early adolescence when influential peer relationships

are developing. This cross-sectional study lends support to the theoretical and empirical evidence from longitudinal studies that the school environment has an important and causal role in shaping peer groups and their normative behaviours and, by extension, reducing or increasing negative health outcomes such as binge drinking.[19,20,128,133,137]

Limitations

These results are limited by the use of a cross-sectional design, which prevents inferences of causation and temporal sequence. Measuring perceptions at one point in time cannot sufficiently explain patterns of developmental outcomes or unfolding relations between study variables over time.[109] Thus, the conditional process models developed remain a first step in testing these relationships and requires further investigation within a longitudinal design.

Further limitations include the absence of important variables not measured, such as individual characteristics (e.g., coping skills, self-esteem, academic performance), family and community-level variables, perceived discrimination, historical trauma, and quality of social supports available.[11,217] Future research could consider the role colonization has played on the home environment and upbringing of Indigenous youth in terms of parental/caregiver support, nurturing, and possible effects of communal living with extended family or multi-generational households. Future research could also benefit from more careful examination of the nuanced and dynamic qualities of cultural identification and involvement. The lack of protective effect for cultural activity participation may be a result of how culture was operationalized. Cultural identity or traditional spirituality were not assessed, both of which are important mechanisms through which traditional culture is protective against alcohol use and abuse.[23,24,217]

Measurement error was likely introduced by asking participants to recall experiences from their last year in school. Perceptions often become distorted by more recent life events that

serve to reinforce or diminish experiences. Recall bias may have also been introduced as a result of self-reported drinking measures. Drinking quantity and frequency have been estimated to be systematically underestimated by more than 60%.[11] More recent recall periods (e.g., week or month) are advised.[11] Moreover, recent national surveys have modified their measures to better reflect the fact that women process alcohol differently than men, and therefore, rates of binge drinking would likely be substantially higher among females if the four or more drinks per occasion measure were used.[211] Despite these limitations, the strengths of this study included the use of a large representative sample, bootstrap weighted analyses, control for the effects of confounding variables, and conditional process modeling designed to help understand the mechanisms and conditions that influence binge drinking among Indigenous youth.

CONCLUSION

At the individual level, older age and male gender were important correlates of increased binge drinking behaviour among First Nations and Métis youth aged 15 to 24. At the interpersonal micro-level, the number of peers engaged in risky behaviour while in school was strongly associated with increased binge drinking behaviour well into young adulthood. Findings suggest that focusing upstream on improving meso-level school environments would help to address some of the underlying causes of adolescent substance use such as mitigating affiliation with risky peers and school failure. Opportunities to participate in a greater number of activities may be particularly important for youth disengaged from school by mitigating their involvement with risky peers. Specifically, prosocial activities were protective against binge drinking among those currently in school. Further research is needed to understand the specific features of the school environment related to Indigenous student outcomes to allow for the development of targeted interventions.

Table 3-1. Comparison of Sociodemographic Characteristics of the Sample

Characteristic	Current Students (CS) _n_ = 1,170	High School Leavers (HSL) _n_ = 830	High School Completers (HSC) _n_ = 2,110	_Chi^2_ or _F_	_N_	_Post-hoc tests_
Gender				8.5*	4,098	
Male	49.6	54.6	44.8			HSC < HSL
Female	50.4	45.4	55.2			
Aboriginal Identity				7.4*	4,098	
First Nations	54.2	62.3	52.8			HSC < HSL
Métis	45.8	37.7	47.2			
Age						
Mean (_SD_)	16.31 (1.26)	20.75 (2.47)	21.01 (1.77)			
Census Metropolitan				16.7*	4,098	
Outside CMA	28.8	18.1	19.9			HSL, HSC < CS
Inside CMA	71.2	81.9	80.1			
Schools Attended				13.7*	4,055	HSC < HSL
1 or 2 schools	12.8	13.9	14.4			
3 schools	20.2	14.0	25.1			
4 schools	22.9	16.3	20.0			
5 or more schools	44.1	54.1	39.5			
Missing	e	1.70	1.0			
Parental Education				64.9**	3,891	HSL < HSC, CS
<High school	10.4	22.8	7.3			
High school dip.	21.2	27.7	22.9			
Some university/ college/technical	38.5	28.3	38.0			
University/college /technical degree	25.7	12.0	29.8			
Missing	4.2	9.3	2.0			
Household Income				73.2**	4,098	HSL < CS < HSC
< $10,000	9.5	16.3	6.6			
$10,000 – 19,999	19.9	24.4	14.2			
$20,000 – 29,999	17.8	21.2	17.3			
$30,000 – 39,999	19.6	15.6	15.3			
$40,000 – 49,999	14.9	11.0	15.1			
$50,000 – 69,999	13.2	7.8	18.5			
≥ $70,000	5.1	3.7	13.0			
Binge Drinking Freq				187.2**	4,098	CS < HSL, HSC
Never	59.9	28.7	26.0			
< once a month	24.3	23.9	32.4			
Once a month	6.0	12.1	15.4			
2-3 times month	6.0	21.2	14.4			
Once a week	2.3	7.2	7.9			
> once a week	1.6	7.1	4.0			

[e]Suppressed to meet the confidentiality requirements of the _Statistics Act;_
**$p < 0.001$, *$p < 0.05$

Table 3-2. School Environment Mean Scores across Demographic Categories

	Current Students (CS)		High School Leavers (HSL)		High School Completers (HSC)		Main Effects & Interaction Effects F	Post-hoc tests	Cohen's d
	Mean (*SD*)		Mean (*SD*)		Mean (*SD*)				
Positive School Environment	3.1 (0.53)		2.9 (0.52)		3.1 (0.41)			CS > HSL	0.412
								HSC > HSL	0.576
Gender	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	25.91**		
	3.1 (0.54)	3.1 (0.52)	2.9 (0.50)	2.9 (0.54)	3.2 (0.4)	3.1 (0.42)			
Identity	*FN*	*Métis*	*FN*	*Métis*	*FN*	*Métis*	44.02**		
	3.1 (0.48)	3.1 (0.59)	2.9 (0.5)	2.9 (0.54)	3.2 (0.4)	3.1 (0.42)			
Negative School Environment	2.2 (0.62)		2.4 (0.59)		2.2 (0.48)			HSL > CA	0.439
								HSL > HSC	0.360
Gender	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	15.47**		
	2.2 (0.61)	2.2 (0.63)	2.4 (0.57)	2.5 (0.60)	2.2 (0.47)	2.3 (0.5)			
Identity	*FN*	*Métis*	*FN*	*Métis*	*FN*	*Métis*	17.89**		
	2.2 (0.58)	2.2 (0.67)	2.4 (0.55)	2.5 (0.63)	2.3 (0.49)	2.2 (0.47)			
Identity*Negative SE							6.33*	HSL: M > FN	0.272

**$p < 0.001$, *$p < 0.05$

Table 3-3. Bootstrapped Linear Regression Models with 95% Confidence Intervals (CIs) for Binge Drinking by Participation in Different Activities

Variables	Current Students (CA) B (95% CI)	SE	p	HS Leavers (HSL) B (95% CI)	SE	p	HS Completers (HSC) B (95% CI)	SE	p
Sports /Physical	-0.037(0.196,0.122)	0.081	0.650	**0.424(0.007,0.841)**	**0.213**	**0.046**	**0.298(0.096,0.499)**	**0.103**	**0.004**
Age	**0.183(0.105,0.260)**	**0.039**	**<0.001**	0.001(-0.070,0.072)	0.036	0.971	0.017(-0.031,0.064)	0.024	0.485
Gender	0.002(-0.151,0.156)	0.078	0.978	**-0.528(-0.910,-0.145)**	**0.195**	**0.007**	**-0.348(-0.548,-0.147)**	**0.102**	**0.001**
Hhld Income	0.015(-0.033,0.063)	0.024	0.545	0.080(-0.013,0.172)	0.047	0.092	**0.065(0.010,0.12)**	**0.028**	**0.021**
Sport x Gender	-----	-----	-----	**-0.797(-1.410,-0.182)**	**0.314**	**0.011**	-----	-----	-----
	(adj R^2 = 0.0462)			(adj R^2 = 0.1128)			(adj R^2 = 0.0466)		
Arts, Music	**-0.161(-0.319,-0.002)**	**0.081**	**0.048**	0.146(-0.215,0.507)	0.184	0.428	-0.079(-0.291,0.132)	0.108	0.462
Age	**0.179(0.102,0.256)**	**0.039**	**<0.001**	0.018(-0.045,0.081)	0.032	0.573	0.020(-0.028,0.069)	0.025	0.411
Gender	0.022(-0.134,0.177)	0.080	0.786	**-0.782(-1.08,-0.483)**	**0.452**	**<0.001**	**-0.387(-0.588,-0.186)**	**0.103**	**<0.001**
Hhld Income	0.013(-0.036,0.062)	0.025	0.604	0.081(-0.015,0.177)	0.049	0.099	**0.072(0.018,0.126)**	**0.028**	**0.009**
	(adj R^2 = 0.0506)			(adj R^2 = 0.0910)			(adj R^2 = 0.0370)		
Clubs, Groups	**-0.168(-0.329,-0.006)**	**0.082**	**0.042**	-0.207(-0.626,0.212)	0.214	0.333	-0.041(-0.25,0.17)	0.108	0.706
Age	**0.186(0.108,0.263)**	**0.040**	**<0.001**	0.002(-0.071,0.075)	0.037	0.958	0.020(-0.0285,0.068)	0.025	0.422
Gender	0.021(-0.136,0.179)	0.08	0.791	**-0.817(-1.13,-0.50)**	**0.161**	**<0.001**	**-0.389(-0.590,-0.188)**	**0.103**	**<0.001**
Hhld Income	0.017(-0.031,0.065)	0.025	0.486	0.084(-0.012,0.179)	0.049	0.086	**0.072(0.017,0.127)**	**0.028**	**0.010**
	(adj R^2 = 0.0496)			(adj R^2 = 0.0986)			(adj R^2 = 0.0368)		
Cultural Activity	0.114(-0.111,0.341)	0.115	0.320	-0.108(-0.475,0.260)	0.188	0.566	0.020(-0.260,0.299)	0.143	0.891
Age	**0.179(0.104,0.255)**	**0.038**	**<0.001**	0.000(-0.073,0.073)	0.037	0.997	0.019(-0.030,0.068)	0.025	0.446
Gender	0.002(-0.151,0.155)	0.078	0.977	**-0.812(-1.12,-0.502)**	**0.158**	**<0.001**	**-0.390(-0.591,-1.89)**	**0.102**	**<0.001**
Hhld Income	0.015(-0.033,0.064)	0.025	0.537	0.083(-0.013,0.179)	0.049	0.089	**0.071(0.017,0.126)**	**0.028**	**0.010**
	(adj R^2 = 0.0475)			(adj R^2 = 0.0979)			(adj R^2 = 0.0358)		
Volunteering	-0.117(-0.284,0.049)	0.085	0.168	-0.305 (-0.615,0.005)	0.158	0.054	0.030 (-0.170,0.229)	0.102	.771
Age	**0.184 (0.106,0.261)**	**0.039**	**<0.001**	0.003 (-0.068,0.075)	0.037	0.926	0.018 (-0.031,0.066)	0.025	.479
Gender	0.014(-0.141,0.169)	0.079	0.860	**-0.794 (-1.11,-0.483)**	**0.159**	**<0.001**	**-0.395 (-0.597,-0.194)**	**0.103**	**<0.001**
Hhld Income	0.017(-0.032,0.065)	0.025	0.501	0.078 (-0.016,0.173)	0.048	0.105	**0.070 (0.016,0.125)**	**0.028**	**0.012**
	(adj R^2 = 0.0485)			(adj R^2 = 0.1059)			(adj R^2 = 0.0370)		

Models are adjusted for Aboriginal identity, CMA, parental education, total number of schools attended. Significant results are provided **in bold.**

Table 3-4. Bootstrapped Linear Regression Models with 95% confidence intervals (CIs) for Binge Drinking by School Environment and Activity Breadth

Variables	Current Students (CA) (adj R^2 = 0.0653) $F(10, 1070) = 41.85, p < 0.001$				HS Leavers (HSL) (adj R^2 = 0.1091) $F(10, 700) = 50.97, p < 0.001$				HS Completers (HSC) (adj R^2 = 0.0438) $F(10, 1990) = 38.41, p < 0.001$			
	B (95% CI)	SE	β	sr_i^2	B (95% CI)	SE	β	sr_i^2	B (95% CI)	SE	β	sr_i^2
Positive School[a]	-0.239 (-0.504,0.027)	0.135	-0.104	0.009	0.271 (-0.021,0.564)	0.149	0.088	0.007	-0.016 (-0.258,0.227)	0.124	-0.005	0
Negative School[a]	0.100 (-0.075,0.276)	0.089	0.052	0.002	**0.442 (0.174,0.710)**	**0.137**	**0.163**	**0.021**	0.180 (-0.053,0.412)	0.119	0.069	0.004
Activity Breadth	-0.040 (-0.103,0.022)	0.032	-0.047	0.002	-0.078 (-0.194,0.037)	0.059	-0.062	0.004	0.039 (-0.041,0.119)	0.041	0.035	0.001
Age[a]	**0.197 (0.119,0.275)**	**0.040**	**0.200**	**0.039**	0.016 (-0.047,0.078)	0.032	0.023	0	0.014 (-0.034,0.062)	0.025	0.019	0
Gender	0.017 (-0.141,0.175)	0.081	0.008	0	**-0.767 (-1.06,-0.474)**	**0.150**	**-0.256**	**0.060**	**-0.407 (-0.608,-0.206)**	**0.102**	**-0.143**	**0.020**
Aboriginal Identity	0.086 (-0.071,0.245)	0.081	0.040	0	-0.118 (-0.413,0.177)	0.151	-0.039	0.001	-0.094 (-0.284,0.096)	0.097	-0.033	0.001
CMA	-0.051 (-0.256,0.153)	0.104	-0.021	0	0.015 (-0.309,0.339)	0.165	0.004	0	-0.191 (-0.412,0.030)	0.113	-0.054	0.003
# Schools	0.045 (-0.028,0.117)	0.037	0.044	0.002	0.025 (-0.108,0.158)	0.068	0.019	0	0.075 (-0.020,0.170)	0.048	0.059	0.003
Parental Education	-0.070 (-0.160,0.019)	0.046	-0.061	0.003	-0.067 (-0.217,0.084)	0.077	-0.044	0.002	0.042 (-0.065,0.149)	0.055	0.027	0
Hhld Income	0.026 (-0.023,0.075)	0.025	0.040	0	0.073 (-0.020,0.167)	0.048	0.080	0.006	**0.075 (0.020,0.130)**	**0.028**	**0.097**	**.009**
Constant	0.875 (0.523,1.227)	0.180			1.923 (1.356,2.489)	0.289			1.450 (0.991,1.909)	0.234		

Significant results are provided **in bold.**

[a]Variables are mean centered.

Table 3-5. Model Coefficients for the Conditional Process Model for Current Students

Variables		Consequent						
		M (Peer Risk Behaviour)				Y (Binge Drinking Frequency)		
		B (95% CI)	SE	p		B (95% CI)	SE	p
Positive School Environment[a]	a_1	**-0.201 (-0.309, -0.092)**	**0.056**	**<0.001**	c'	-0.052 (-0.290,0.185)	0.121	0.666
Negative School Environment[a]		0.079 (-0.015,0.173)	0.048	0.099		0.020 (-0.135,0.175)	0.079	0.798
M (Peer Risk Behaviour)		-----	-----	-----	b_1	**0.970 (0.790,1.15)**	**0.091**	**<0.001**
Age[a]	a_2	-0.159 (-0.355,0.038)	0.100	0.114		0.415 (-0.028,0.858)	0.226	0.066
Age x Positive SE	a_3	**0.129 (0.040,0.218)**	**0.046**	**0.005**		-0.156 (-0.362,0.050)	0.105	0.138
Activity Breadth		-0.023 (-0.060,0.014)	0.019	0.219		-0.018 (-0.073,0.038)	0.028	0.537
Gender		-0.003 (-0.097,0.090)	0.048	0.945		0.015 (-0.126,0.156)	0.072	0.835
Aboriginal Identity		0.055 (-0.037,0.147)	0.047	0.242		0.027 (-0.116,0.169)	0.073	0.715
CMA		-0.003 (-0.103,0.097)	0.051	0.955		-0.054 (-0.223,0.114)	0.086	0.528
# Schools Attended		0.027 (-0.017,0.072)	0.023	0.228		0.024 (-0.045,0.093)	0.035	0.493
Parental Education		**-0.071 (-0.123,-0.019)**	**0.026**	**0.007**		-0.003 (-0.075,0.068)	0.036	0.930
Household Income		**-0.034 (-0.067,-0.001)**	**0.017**	**0.043**		**0.055 (0.011,0.099)**	**0.023**	**0.015**
Constant		1.25 (0.929,1.57)	0.164	<0.001		-0.088 (-0.738,0.561)	0.331	0.790

*Significant results are provided **in bold.**
[a]Variables are mean centered.

Table 3-6. Conditional Indirect Effect Point Estimates for the Current Students Model

Age		SE_ω	Z	p	95% Bootstrap CI
Positive School Environment	$\omega = b_1\,(a_1 + a_3{*}Age)$				
15.194 (-1 *SD*)	-0.334	0.067	-4.99	<0.001	-0.465, -0.203
16.360 (Mean)	-0.188	0.062	-3.04	0.002	-0.309, -0.067
17.526 (+1 *SD*)	-0.042	0.092	-0.46	0.647	-0.223, 0.139

Table 3-7. Model Coefficients for the Conditional Process Model for High School Leavers

Variables		M (Peer Risk Behaviour)				Y (Binge Drinking Frequency)		
		B (95% CI)	SE	p		B (95% CI)	SE	p
Positive School Environment[a]		-0.017 (-0.135,0.101)	0.060	0.776		**0.317 (0.040,0.594)**	**0.141**	**0.025**
Negative School Environment[a]	a_1	**0.430 (0.324,0.537)**	**0.054**	**<0.001**	c_1'	0.154 (-0.117,0.426)	0.138	0.265
M (Peer Risk Behaviour)		-----	-----	-----	b_1	**0.616 (0.294,0.937)**	**0.164**	**<0.001**
Age[a]		-----	-----	-----	b_2	**0.155 (0.041,0.269)**	**0.058**	**0.007**
Peer Risk Behaviour x Age		-----	-----	-----	b_3	**-0.099 (-0.193,-0.006)**	**0.048**	**0.037**
Activity Breadth	a_2	**-0.082 (-0.136,-0.028)**	**0.027**	**0.003**	c_2'	-0.044 (-0.146,0.059)	0.052	0.405
Gender		-0.037 (-0.180,0.105)	0.073	0.606		**-0.760 (-1.050,-0.468)**	**0.149**	**<0.001**
Aboriginal Identity		0.072 (-0.088,0.233)	0.082	0.377		-0.165 (-0.490,0.159)	0.165	0.318
CMA		-0.079 (-0.222,0.063)	0.073	0.275		0.009 (-0.303,0.322)	0.159	0.953
# Schools Attended		0.036 (-0.023,0.095)	0.030	0.230		-0.006 (-0.132,0.119)	0.064	0.921
Parental Education		-0.018 (-0.087,0.050)	0.035	0.596		-0.060 (-0.201,0.081)	0.072	0.407
Household Income		-0.024 (-0.061,0.014)	0.019	0.212		0.083 (-0.009,0.175)	0.047	0.076
Constant	i_1	0.918 (0.543,1.290)	0.191	< .001	i_2	0.371 (-0.502,1.244)	0.445	0.404

*Significant results are provided **in bold.**
[a]Variables are mean centered.

Table 3-8. Conditional Indirect Effect Point Estimates for the High School Leavers Model

Age		SE_ω	Z	p	95% Bootstrap CI
Negative School Environment	$\omega = a_1 (b_1 + b_3 * Age)$				
18.518	0.360	0.103	3.49	< 0.001	0.158, 0.562
20.762	0.264	0.081	3.26	<0.001	0.105, 0.423
23.007	0.168	0.085	1.99	0.047	0.002, 0.334
Activity Breadth	$\omega = a_2 (b_1 + b_3 * Age)$				
18.518	-0.069	0.028	-2.47	0.014	-0.123, -0.014
20.762	-0.050	0.022	-2.30	0.021	-0.093, -0.008
23.007	-0.032	0.020	-1.62	0.106	-0.071, 0.007

Table 3-9. Model Coefficients for the Conditional Process Model for High School Completers

Variables		M (Peer Risk Behaviour)				Y (Binge Drinking Frequency)		
		B (95% CI)	SE	p		B (95% CI)	SE	p
Positive School Environment[a]	a_1	**-0.209 (-0.301,-0.116)**	**0.047**	**<0.001**	c_1'	0.130 (-0.095,0.354)	0.114	0.257
Negative School Environment[a]	a_2	**0.243 (0.157,0.330)**	**0.044**	**<0.001**	c_2'	-0.027 (-0.246,0.191)	0.111	0.807
M (Peer Risk Behaviour)		-----	-----	-----	b_1	**0.782 (0.605,0.960)**	**0.091**	**<0.001**
Age[a]		-----	-----	-----	b_2	**0.098 0(.018,0.179)**	**0.041**	**0.016**
Peer Risk Behaviour x Age		-----	-----	-----	b_3	**-0.089 (-.165,-0.013)**	**0.039**	**0.022**
Activity Breadth		0.005 (-0.030,0.040)	0.018	0.777		0.035 (-0.040,0.110)	0.038	0.358
Gender	a_3	**-0.157 (-0.235,-0.080)**	**0.040**	**<0.001**	c_3'	**-0.287 (-0.472,-0.102)**	**0.094**	**0.002**
Aboriginal Identity		0.059 (-0.016,0.134)	0.038	0.126		-0.128 (-0.309,0.053)	0.092	0.167
CMA		-0.003 (-0.085,0.078)	0.042	0.938		-0.175 (-0.385,0.035)	0.107	0.102
# Schools Attended		0.030 (-0.007,0.068)	0.019	0.113		0.055 (-0.035,0.145)	0.046	0.228
Parental Education		-0.014 (-0.056,0.029)	0.022	0.531		0.051 (-0.052,0.153)	0.052	0.335
Household Income		-0.024 (-0.046,-0.001)	0.011	0.039		**0.093 (0.043,0.144)**	**0.026**	**<0.001**
Constant	i_1	1.29 (0.971,1.610)	0.163	<0.001	i_2	0.243 (-0.497,0.982)	0.377	0.520

*Significant results are provided **in bold.**
[a]Variables are mean centered.

Age		SE_ω	Z	p	95% Bootstrap CI
Table 3-10. Conditional Indirect Effect Point Estimates for the High School Completers Model					
Positive School Environment	$\omega = a_1 (b_1 + b_3*Age)$				
18.74	-0.205	0.050	-4.11	<0.001	-0.303, -0.107
20.77	-0.168	0.041	-4.10	<0.001	-0.248, -0.088
22.80	-0.130	0.039	-3.31	0.001	-0.207, -0.053
Negative School Environment	$\omega = a_2 (b_1 + b_3*Age)$				
18.74	0.239	0.050	4.75	<0.001	0.141, 0.338
20.77	0.196	0.041	4.71	<0.001	0.114, 0.277
22.80	0.152	0.042	3.61	<0.001	0.069, 0.234
Gender	$\omega = a_3 (b_1 + b_3*Age)$				
18.74	-0.155	0.044	-3.50	<0.001	-0.241, -0.068
20.77	-0.126	0.036	-3.53	<0.001	-0.197, -0.056
22.80	-0.098	0.033	-3.01	0.003	-0.162, -0.034

CHAPTER 4: LIFE COURSE EXPERIENCES AND AT-RISK GAMBLING AMONG A COMMUNITY SAMPLE OF INDIGENOUS ADULTS (PAPER 2)

ABSTRACT

Background: This study examined risk and protective factors for at-risk gambling within a community sample of Indigenous adults in Ontario. Study objectives were to investigate: (1) trajectories of at-risk gambling; (2) group-level differences in trajectories of at-risk gambling based on gender, age, and past trauma; (3) the impacts of changes in job satisfaction and stressful events on trajectories of at-risk gambling; and (4) whether group-level differences moderate the relationship between job satisfaction, stressful events, and at-risk gambling.

Methods: Data were derived from the Quinte Longitudinal Study (QLS) of gambling conducted between 2006 and 2011 in the Quinte region of southeastern Ontario. Participants were 145 employed Indigenous adults. Generalized linear mixed models with within-person centering of repeated measure variables were used to estimate the probability of at-risk gambling (PGSI $\geq$3).

Results: At baseline, 82% of at-risk gamblers reported experiencing a past traumatic event. Unexpectedly, an overall decline in at-risk gambling over the study period was primarily accounted for by those with past trauma. There was some evidence that consistently higher job satisfaction was a protective factor. However, chronically high stress among women was a more significant factor for at-risk gambling. Beyond the impact of a particularly stressful year (within-person change), each additional stressful event, on average, increased the likelihood of at-risk gambling by 3 times among Indigenous women.

Implications: Prevention efforts should consider wider environmental determinants of gambling vulnerability and harm. Interventions should focus on the social realities of Indigenous people experiencing gambling problems, particularly the role of stress and trauma.

INTRODUCTION

Gambling is a popular activity that is for most a pleasurable experience with little consequence. Roughly three-quarters of Canadians adults report past year gambling involvement, with 38% doing so at least once a week.[35] Although most gamble for social or recreational purposes, 5% of the Canadian adult population (approximately 1.2 million people) are at-risk of developing gambling-related problems[35] and 2.4% report having problems.[146] Problem gambling (PG) is characterized by excessive gambling, preoccupation with gambling, impaired control leading to significant adverse consequences, and persistence in excessive gambling despite negative consequences.[41] Harms arising from gambling are varied but can include mental health issues; problems with legal issues, finances and work; and strained relationships and social isolation.[218,219] Beyond the direct health and wellbeing implications associated with PG, harm often extends beyond the individual and consequences can be far reaching for some groups and communities.[144]

Problem gamblers comprise a heterogeneous group. A range of genetic, biological, psychological and environmental factors interact in complex ways to contribute to the etiology and the maintenance of gambling problems.[34,220] However, PG is not randomly distributed throughout populations and gambling-related harms generally follow lines of existing social and health inequality.[147,158] In Canada, the overall prevalence of PG has been estimated to be 3 to 4 times higher among Indigenous populations compared to the general population.[35,156] Depending on the community of focus and sample, prevalence has been found to be as high as 27%[36] or 33%.[37] Other Indigenous groups in countries which share common histories of colonization and dispossession have also been found to have elevated PG prevalence.[150–153] Common risk factors these groups share include lower education, poverty, younger population, earlier onset and

exposure to certain gambling games, and higher rates of unemployment and addiction, which are all conducive to the development of addictive behaviour.[36–38,15538] This study takes a public health approach by considering the role of broader determinants such as work and social stressors in influencing gambling behaviour among Indigenous peoples.

A Life Course Developmental Perspective on Gambling

While prevalence generally remains stable, gambling behaviour at the individual level tends ebb and flow over time influenced by the social environment as well as individual characteristics.[49,170] A life course perspective emphasizes that key mechanisms of change, critical developmental periods and transitions, linked lives, and human agency (individual choices, actions, resources) are central to understanding human behaviour.[7,92] This perspective fits well with many Indigenous ways of knowing which tend to view human development as grounded in a continuum of time, relationships, and collectively lived experiences.[9] For example, the Indigenous concept of *Seven Generations* understands that everything in life is related and interconnected, which transcends from one's ancestors and extends to future generations.[85]

A core component of the life course perspective is the aspect of time.[50] Early life conditions often relate to later outcomes through exposure to risk and protective factors at different stages of development.[5,50] For example, both early exposure to gambling and having a family member with a gambling problem or other addiction are associated with future gambling behaviour.[40,220–222] A main focus of this study was on experiences of childhood maltreatment (i.e., physical, sexual, or emotional abuse) or another traumatic experience as these events have been found to be important factors in the development of PG.[147,188,223] These experiences can establish enduring psychological and emotional vulnerabilities leading to heightened risk for

psychological disorders and PG.[41,45] For some, gambling can be a maladaptive coping

mechanism to escape these traumatic memories or regulate mood.[37,188]

Many Indigenous peoples identify trauma and associated gambling and substance use

issues as being linked to residential school experiences and/or intergenerational affects.[96] It is

estimated that over one-third of Indigenous peoples in Canada have been affected either directly

or indirectly by residential school experiences where high rates of abuse occurred, causing

suffering across generations.[51] A recent study found that the risk for PG was almost 3 times

higher among a sample of Indigenous adults from Quebec who had experienced childhood

sexual abuse, and nearly 7 times higher for those who had attended residential school.[155] The

impact of trauma operates across life through biological, behavioural, and psychosocial pathways

and is important to consider when examining PG among this population.[5]

Employment and the Workplace Environment

Risk factors seldom occur in isolation and early adversities often accumulate and overlap

across other spheres of life over time, acting like *gravity* by limiting the availability of options

for individuals to make healthy life transitions.[98] Transitions such as graduating, finding good

employment, or retiring represent critical points in life which influence emotional, cognitive, and

social development.[49] For Indigenous peoples, the legacy of colonialism has created many

barriers to making healthy transitions. This disadvantage is currently manifested in lower

participation in the work force and disturbing levels of income inequality.[80] As a result, poverty

and employment represent important determinants of PG among Indigenous populations.[36,162]

Moreover, people who work in lower-income jobs are exposed to more stressful conditions and

work environments characterized by insecure employment, low-work control, and low pay.[3]

However, the role of the workplace as a source of adverse and protective health effects in

relation to gambling behaviour has received little attention. The satisfaction derived from one's work (i.e., income, interest in job, independence, relationships) has important implications to self-esteem, depression and anxiety, and emotional exhaustion.[165] A recent study found that working at a less desirable job and having issues performing work were important determinants of involvement in gambling.[169] Unstable employment and job dissatisfaction have also been qualitatively described as negatively influencing gambling trajectories.[170] It appears that motivations to win money or escape the boredom/dissatisfaction with work may be maladaptive coping mechanisms linking work experiences to PG.[170,224] Thus, the role that work satisfaction/dissatisfaction may be playing in overall life stress and changes in gambling behaviour was another main focus of this study.

Life Course Stressors

Life course analysis also examines how past experiences are interwoven with events and transitions that influence behaviour.[49,50] Stressors occur across the life course, with varying degrees of chronicity and severity. S*hocks* such as job loss, injury, or a traumatic life event can cause a multiplying effect across other spheres of life and further compound existing problems.[98] Qualitative accounts have described how stressful events such as bereavement, starting or ending a relationship, or caring for a sick/friend have both initiated a gambling period or reduced activity.[225] A recent longitudinal study found that significant life events in several domains (i.e., change in sleeping habits, accidental injury or illness, retirement) were associated with increased or continuation of risky gambling.[226] It was also found that greater total number of life events were prospectively associated with higher PG severity.[226] Several other studies have also shown that the number of life events across a range of interpersonal, occupational, financial, and legal domains were correlated with the development, maintenance, and relapse of PG.[40,167,227–229]

Factors such as gender, timing during life course development, cultural beliefs, and social support likely all play a role in individual vulnerability to adversarial effects.[228,230] However, it appears that when the source of stress is chronic or outside an individual's control, negative emotion-focused coping such as relying on gambling to reduce stress or dissociate may be used.[227] Stress also impairs judgement and can cause neurobiological changes, with gender explaining some differences in the link between stress and PG.[148,231] Motivations and coping styles tend to vary by gender with women driven by a wider range of emotions and stress and more likely to gamble as a means of forgetting about problems or deal with depressed feelings.[48,179] Given the higher levels of exposure to stress and trauma experienced by Indigenous peoples, the cumulative impact of past year stressful events was another main focus of this study.

The Present Study

Majority of gambling research has focused on individual characteristics and community-level risk factors. However, gambling is fundamentally a social behaviour that is embedded in the environments and social conditions which surround us and change over time.[170] In this context, the focus of this study was to better understand how living and working conditions influence gambling problems. A main goal was to examine how changes in job satisfaction and stressful life events influence change in gambling behaviour over time. From recent longitudinal studies we now have a better understanding of the change and stability in gambling over time; however, little is known about how social factors associate with change and stability, particularly among Indigenous groups. A within- and between- analysis using longitudinal data provides an opportunity to investigate variations over time within individuals as well as variations between individuals. Furthermore, understanding how group differences in age, gender and experiences of past trauma may modify these longitudinal predictors will help shed light on the mechanisms that

may be contributing to problematic gambling in this population. These objectives were addressed through the following research questions:

1. Does at-risk gambling status change over time?

2. Do group differences in gender, age, and past trauma associate with at-risk gambling behaviour over time?

3. Do changes in job satisfaction or stressful events associate with at-risk gambling behaviour over time?

4. Do group differences moderate the relationship between job satisfaction, stressful events, and at-risk gambling over time?

METHODS

Study Design

Data for this study were derived from the Quinte Longitudinal Study (QLS).[40] A total of 4,121 adults aged 17 and older were surveyed annually over 5 years between 2006 and 2011. The sample was recruited via random digit telephone dialing of telephone numbers estimated to be within 70 kilometers of the city of Belleville, Ontario, Canada. Two samples were recruited: A 'general population' sample ($n = 3,065$), and an 'at-risk' sample ($n = 1,056$). Quota sampling was used to fill age and gender cells for the General Population sample to be representative of the demographic profile of the region based on 2001 Census data. Data was not collected within Tyendinaga First Nation located in the Quinte region, 10 kilometers east of Belleville. Questionnaires were mainly self-administered online at home but could also be completed at the QLS Belleville office by computer or paper. Participants were compensated with $180 dollars to participate in all 5 waves of data collection. Response rate to participate in the study was 21%; however, the retention rate of 94% over the 5 years was exceptionally high.

For this study, analyses were limited to participants who self-identified as being Indigenous. Participants were asked "What are the main ethnic or cultural origins of your ancestors?" There were 181 individuals (4.4% of sample) who identified their cultural origin as "Aboriginal, Inuit, or Métis". Given that job satisfaction was a focal exposure variable, the sample was further narrowed to 152 Indigenous adults who were employed for at least two years of the five-year longitudinal study (3.7% of total sample). In addition, 7 individuals were excluded because they did not provide a confirmatory response to past childhood abuse and reported no other past traumatic event. Considering both these exclusions, 145 individuals remained in the analyses. The retention rate within this sample was excellent with 95% of all possible surveys completed and 87% of participants completing all 5 waves of data collection. This study was exempt from institutional ethics board review as data were obtained in a de-identified form.

Measures

Five assessments were conducted on an annual basis. At each assessment, participants were asked to complete a survey about individual, social, and structural factors related to gambling. Demographics and trauma experienced before the study began were assessed at baseline only. Gambling involvement and behaviours, job satisfaction, and stressful life events occurring in the past year were assessed at each of the five time points.

Outcome variable: Problem gambling. Past 12-month gambling behaviour was assessed using the Problem Gambling Severity Index (PGSI). The PGSI is a well-developed tool designed to assess problem gambling in the general population and has been subject to extensive psychometric testing.[146,219] It contains six items focused on negative consequences due to gambling, and three items on behavioural items (i.e., chasing losses and the development of

tolerance to gambling excitement). Those who score 8 or more are defined severe-risk, scores of 3 to 7 define moderate-risk, and scores of 1 to 2 define low-risk gambling.[219] A score of zero indicates no problems with gambling in the past year. In the present study, PGSI scores ranged from 0 to 23 ($M = 0.76$, $SD = 1.71$).

As commonly found in population survey data, very few individuals experienced gambling problems represented by high PGSI scores. This caused the distribution of scores to be heavily skewed and not appropriate to examine as a continuous variable. To ensure a robust analysis, scores were dichotomized to examine those who were moderate and severe-risk gamblers (PGSI score greater than 3) versus those who were low-risk and non-problem gamblers (PGSI score below 3). While this approach has been commonly used in the past, concerns about false positives (i.e., wrongly labeling some participants as problem gamblers) have been raised.[232] That said, a threshold of 3 or more has been shown to demonstrate a robust relationship with indicators of gambling intensity and follows a public health approach considering increasing levels of harm.[233] To avoid inaccurately labelling this heterogeneous group as problem gamblers, those identified as moderate- or severe-risk (PGSI ≥3) were labelled as *at-risk gamblers* in this study.

Exposure variables: Job satisfaction. Job satisfaction was measured using a single item: "In the past 12 months, how would you rate your overall level of job satisfaction?" This item was scored on a 7-point scale (1 = *extremely low*, 4 = *moderate*, 7 = *extremely high*). Using a single-item of overall job satisfaction has been shown to have good concurrent reliability and validity with multi-item scales and significantly correlates with health and work measures.[234] In this study, those who were unemployed, a student, retired, or homemaker in the previous year could indicate 'not applicable' which was treated as a missing value during analysis ($n = 49$).

Stressful life events (past 12 months). An adapted version of the Life Events

Questionnaire[40], a 58-item checklist, asked participants to "check off any events that happened to

you in the past 12 months". The questionnaire items were grouped into six areas of significant

life events: work/school (16 items); family and friends (21 items); property and finances (6

items); legal matters/crime (9 items); health events (5 items); and 1 open ended "other" response.

Examples of events assessed in each area include being fired or retiring, having serious conflicts

with someone close, suffering a significant financial loss, involvement in a lawsuit, or

developing a serious physical or mental illness. The number of events reported were summed

together to provide an overall measure of cumulative stress in the past year.

Past trauma. Two questions were asked at baseline. First, "Were you physically,

sexually, or emotionally abused when you were growing up?" with response options: no, yes, or

prefer not to say. Second, "Have you experienced any other traumatic event prior to the past 12

months that still affects you today?" with response options: no or yes. Those who responded

'yes' to *either* question were coded as 1 (i.e., experienced *at least* one past traumatic event).

Those who said 'no' to both questions were coded 0 (i.e., no past trauma). It is important to note

again that 7 participants answered 'prefer not to say' to child abuse and 'no' to past trauma and

thus were excluded from study as it could not be concluded whether they had experienced *any*

past trauma.

Covariates. Age and gender were assessed as potential confounders and effect modifiers.

Other sociodemographic variables such as education, marital status, and household income did

not contribute to explaining variance in the model and thus were not retained.

Statistical Analysis

All analyses were performed on unweighted data using Stata 13.[235] Descriptive analyses examined the characteristics of the sample and distribution of PGSI scores across study years. Correlations between exposure variables and PGSI total score were calculated using Pearson's correlation coefficient. The statistical significance level was set at $p < 0.05$ level for all tests.

To test whether variations in the odds of being an at-risk gambler could be explained by the exposure variables of interest, multilevel modeling (MLM) was employed. MLM is advantageous because it accounts for the dependency in observations in repeated measures data and can model both individual (random effects) and population characteristics (fixed effects).[236] Within-individual correlation due to repeated measures are handled by allowing each individual to have their own intercept. This is known as a random intercept model and it essentially allows the baseline probability of at-risk gambling to vary across individuals. Longitudinal (i.e., repeated measures) variables can be modeled as random coefficients to examine individual changes/growth over time (i.e., slope of regression line allowed to vary between individuals).

With MLM, the repeated observations (level 1) can be seen as nested *within* individual person-level characteristics (level 2).[236] At level 1, the longitudinal within-individual main effects (i.e., job satisfaction and stressful events) were estimated. At level 2, main effects of differences between-individuals (i.e., age, gender, past trauma) were estimated. Also at level 2, between-subject characteristics can be evaluated as moderators of level 1 effects (e.g., gender influencing the strength or direction of the association between stress and at-risk gambling).

The general approach to the analyses was based on the sequential process of model testing procedures outlined by Hoffman.[237] Models were estimated using generalized linear

mixed models (GLMMs) with binomial error distribution and a logit function given the dichotomous outcome variable (PGSI ≤ 2 = 0; PGSI ≥ 3 = 1). Six models were calculated.

Model 1. The change in probability of at-risk gambling over the course of the study was modeled using time of measurement (unit in years) as a continuous predictor. Both fixed and random effects of time were examined.

Model 2. Time-invariant group-level variables (age, gender, and past trauma) were examined as level 2 between-subject predictors of probability of at-risk gambling.

Model 3. Interactions between time and group-level variables were assessed to explain any variation between individuals in changes in probability of at-risk gambling over the course of the study. Significant interactions were retained in subsequent models.

Model 4 & 5. Past year job satisfaction and the number of stressful life events were assessed, respectively. These longitudinal predictors were person-mean-centered and decomposed into their within- (level 1) and between-person (level 2) components. The between-person (level 2) component captures the extent to which each individual deviates from the sample mean across the five assessments (i.e., participant's average job satisfaction and number of stressful events). The within-person (level 1) component captures a participant's deviation from his or her own mean across time (i.e., centered on the individuals' mean). This method renders level 1 and 2 variables uncorrelated, meaning that their effects do not compete in the model and each variable measures the total possible effect at each level.[237] A contextual effect measures the difference between the within-person and between-person components.

Model 6. Examined cross-level interactions among longitudinal predictors (i.e., level 1 and 2 effects of job satisfaction and stressful life events) and group-level variables. Only significant interactions were reported.

The overall fit of the different models were evaluated using the Akaike's Information Criterion (AIC) and the -2 log likelihood statistics, with the lower the value, the better the fit of the model to the data.[236] Comparison of nested models were calculated through the difference in -2 log likelihood over the difference in degrees of freedom using an ordinary chi-square distribution. All GLMMs were conducted using the Stata 13 GLLAMM procedure[238], using adaptive quadrature with 30 quadrature points to estimate the log likelihood and random effects. Maximum likelihood estimations with robust standard errors and 95% confidence intervals were used to evaluate whether key exposure variables were significant.

Missing Data. An important problem with many longitudinal data sets is the occurrence of dropouts. Fortunately, missing data in multilevel modeling poses less of a problem as models do not require the same number of observations for each subject and all cases remain in the analysis.[236] In a mixed model analysis with repeated measures, the missing data are assumed to be missing at random (MAR) provided the Maximum Likelihood estimation is used.[236,239] With MAR, the amount of data missing may depend on other variables in the model as some characteristics may be associated with an individual missing a year or dropping out.[236] When the amount of missing data is low, its influence can be examined by divided the sample into two groups: (1) participants without any missing data over the study period; and (2) those with missing data at one or more of the repeated measurements.[239] These groups were compared regarding the values of PGSI score and job satisfaction at the baseline measurement.

Two analyses were performed to examine the impact of missing data: (1) participants with complete data were compared with participants with missing data at one or more measurement periods regarding PGSI score at year 1; and (2) participants who responded to the job satisfaction question 'not applicable' due to being unemployed, student, retired or

homemaker were compared with participants who were employed for each year of the survey regarding the value of job satisfaction at year 1. A Mann Whitney U-test found no significant difference between PGSI scores at baseline between those who had completed all 5 assessments versus those with missing data, U = 2012.0, p = 0.690. Similarly, an independent samples t-test found no significant difference at baseline in job satisfaction between those who were employed every year of the study (M = 4.82; SD = 1.1) compared to those who were either unemployed, a student, retired or homemaker for one of more years (M = 4.64; SD = 1.18), t(134) = 0.926, p = 0.356. Similar results were found for all other years. Overall, it appears that missing data did not influence key study variables.

RESULTS

Sample Characteristics

Characteristics of the sample at baseline are outlined in Table 4-1. Please note that tables are presented at the end of this chapter. The average age at baseline was 37.6 (*SD* = 11.3, range = 17-70 years). According to 2011 Census data, this is younger than the median age of 43.5 years for residents of Belleville, Ontario[240] but similar to the median age of 38.1 for residents of the Mohawks of the Bay of Quinte.[241] The sample included approximately 30% more women than men which is higher than the actual percentage of registered females from the metropolitan of Belleville (52.5%).[240] The majority of participants were married or common-law (66.2%), currently employed full-time or part-time (79.3%), and had completed a post-secondary degree, diploma or technical certificate (41.4%).

At-risk gamblers. At baseline, 11.7% of participants were at-risk gamblers. Statistical testing indicates that at-risk gamblers were more likely to report having experienced a past traumatic event that still affects them (64.7%) compared to participants without gambling

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problems. 82% of at-risk gamblers reported experiencing either a past traumatic event or childhood abuse at baseline.

      Bivariate correlations. Zero-order correlations among exposure variables and problem gambling total score were examined across aggregated scores. All correlations were less than 0.7, indicating that multicollinearity was not an issue.[242] Individual categories of stressful life events were also included to better understand the types of events most frequently reported and correlated with other study variables. As shown in Table 4-2, participants reported on average 3.3 stressful events per year; with one work or school related event and 1.5 friends or family related events on average. Increasing age was associated with an increasing number of stressful events reported, particularly within work/school and friends/family domains. Those with higher job satisfaction reported a lower number of stressful events and were less likely to report stress at work/school or stress related to health in particular. As expected, the total number of stressful events was associated with increased problem gambling score. Finally, female gender was positively associated with past trauma, indicating that women were more likely to report experiencing childhood abuse or another traumatic event.

Research Question 1: At-Risk Gambling Status and Change over Time

      Problem gambling severity was first examined across study years according to PGSI categories: No-risk (score 0); low-risk (score of 1 or 2); moderate-risk (score of 3 to 7); and severe-risk (score greater than 8). Baseline prevalence of problem gambling is shown in Table 4-1. As shown in Table 4-3, the prevalence of at-risk gambling (PGSI $\geq$3) declined during each year of the study. Across the study, approximately 8.2% of participants were at-risk gamblers. However, at the individual-level there was considerable fluctuation in gambling status. For example, of the 29 individuals who were at some-point an at-risk gambler, only 4 (13.8%)

remained in this category for 5 consecutive years. Non-problem gamblers were the most stable group with half of participants remaining non-problem gamblers in every year observed. Almost a third of participants (31%) met the criteria for low-risk gambling. Although some low-risk gamblers subsequently became moderate- or severe-risk gamblers at some point in the study (9%), a much more common route was transitioning back to recreational/no-risk gambling.

Multilevel Analyses: Testing Between- and Within-Person Change. The overall decline in gambling scores implied a potential linear trajectory, thus growth models were used to fit the data. An empty means, random intercept "null model" was first run to estimate the level of variation at the within- and between-individual level, referred to as the intra-class correlation. This is useful for conceptualizing the level of repeatability in at-risk gambling status within-individuals as well as providing a baseline for model fit.[239] Using a logistic distribution-specific variance, the intra-class correlation indicated that 76% of the variance in mean at-risk gambling status was *between* individuals, and 24% was due to *within* individual variation over the course of the study.

Change in Probability of At-Risk Gambling. Model 1 as shown in the first column of Table 4-4, indicates that the fixed linear effect of time was significant and negative. This confirms an overall decrease in the odds of at-risk gambling over time. Each year, the probability of at-risk gambling declined at a rate of 0.6 (i.e., multiplicative rather than additive). A random linear time slope was also tested to see if allowing each individual to have their own slope trajectory significantly improved model fit. A likelihood ratio test indicated a random effect for year was not significant ($p = 0.34$) suggesting no variation in at-risk gambling change over time *between* individuals.

Research Question 2: Group Differences

Model 2 examined associations between past trauma and gambling, adjusted for age (centered at the mean age of 38) and gender. As shown in the second column of Table 4-4, statistical significance was not reached and the width of the confidence intervals suggests a bigger sample was needed for adequate power to examine these associations.

Model 3 examined group-level changes over time in at-risk gambling. As shown in the third column of Table 4-4, the only significant interaction retained was between time and past trauma. Indigenous adults who reported experiencing either childhood abuse or another traumatic event had higher problem gambling scores at baseline. However, the negative interaction term indicates that those with past trauma had a 55% (= 100% (0.453 -1)) *decrease* in the odds of being an at-risk gambler each year. In comparison, Indigenous adults who reported no past trauma had an 11% (= 100% (0.889 - 1) decrease in the odds of at-risk gambling each year which was not significant. This indicates that the overall decline in at-risk gambling was explained by those who reported past trauma at study baseline. No systematic differences in at-risk gambling change were associated with age or gender.

Research Question 3: Influence of Job Satisfaction and Stressful Events

Model 4 examined associations between job satisfaction and gambling. The intra-class correlation for job satisfaction (as calculated from an empty means, random intercept model) indicated that 35% of the variance in mean job satisfaction was *between* individuals, and 65% was due to *within* individual variation over time. As shown in the first column of Table 4-5, between-person (level 2) job satisfaction was significantly associated with at-risk gambling. For every one-point increase in an individual's average job satisfaction, there was a 70% decrease in the odds of being an at-risk gambler (*OR* = 0.30, 95% CI [0.10, 0.86]). There was some evidence

to suggest that variability in at-risk gambling status was better accounted for by between-person differences in job satisfaction than within-person differences (contextual effect, $p = 0.054$).

Model 5 similarly examined associations between stressful life events and gambling. The intra-class correlation indicated that 40% of the variance in stressful life events was due to *between* individual differences, and 60% was due to *within* individual variation over time. As shown in the second column of Table 4-5, job satisfaction was no longer significantly associated with reduced probability of at-risk gambling ($p = 0.12$), suggesting stress likely plays a more important role. Specifically, Indigenous adults with higher average stress (level 2 between-person effect) were at increased odds of at-risk gambling. For each additional event reported, the odds of at-risk gambling *increased* by 94% ($OR = 1.94$, 95% CI [1.17, 3.20]). The contextual effect highlights a large difference in the between- and within-person effects of stressful events.

Research Question 4: Group Differences in Job Satisfaction and Stressful Events

Random slopes for the within-person effects of job satisfaction and stressful events were explored but did not improve model fit based on a likelihood ratio test ($p = 0.92$ and $p = 0.20$; respectively). Model 6 therefore explored whether job satisfaction and stressful events varied systematically as a function of other predictors (i.e., age, gender, past trauma). Only interactions between number of stressful events and gender were found to improve model fit (likelihood ratio test = 6.24, $p = 0.044$). As shown in the third column of Table 4-5, stressful events did not significantly impact the probability of at-risk gambling for men. For women, every additional stressful event in a particular year above average (level 1 within-person effect) was associated with a 23% *decrease* in the probability of at-risk gambling ($OR = 0.77$, 95% CI [0.62, 0.96]). However, for women with high average stress (level 2 between-person effect), each additional event *increased* the likelihood of at-risk gambling by 2.3 times (95% CI [1.45, 3.66]). Figure 4-1

illustrates the difference in the between- and within-person effects of stress for men and women. The difference determined by the contextual effect ($OR = 2.99$, 95% CI [1.75, 5.10]) indicates that higher overall stress among women (i.e., cumulative or chronically high over time) was moderately associated with at-risk gambling beyond the impact of a particularly stressful year (within-person changes). In other words, given two women who have the same level of stress in a particular year, the woman reporting one more stressful event averaged across all measurement occasions will be 3 times more likely to be an at-risk gambler. A large difference in the between- and within-effects of stress was also found between men and women ($OR = 4.29$, 95% CI [1.18, 15.63]).
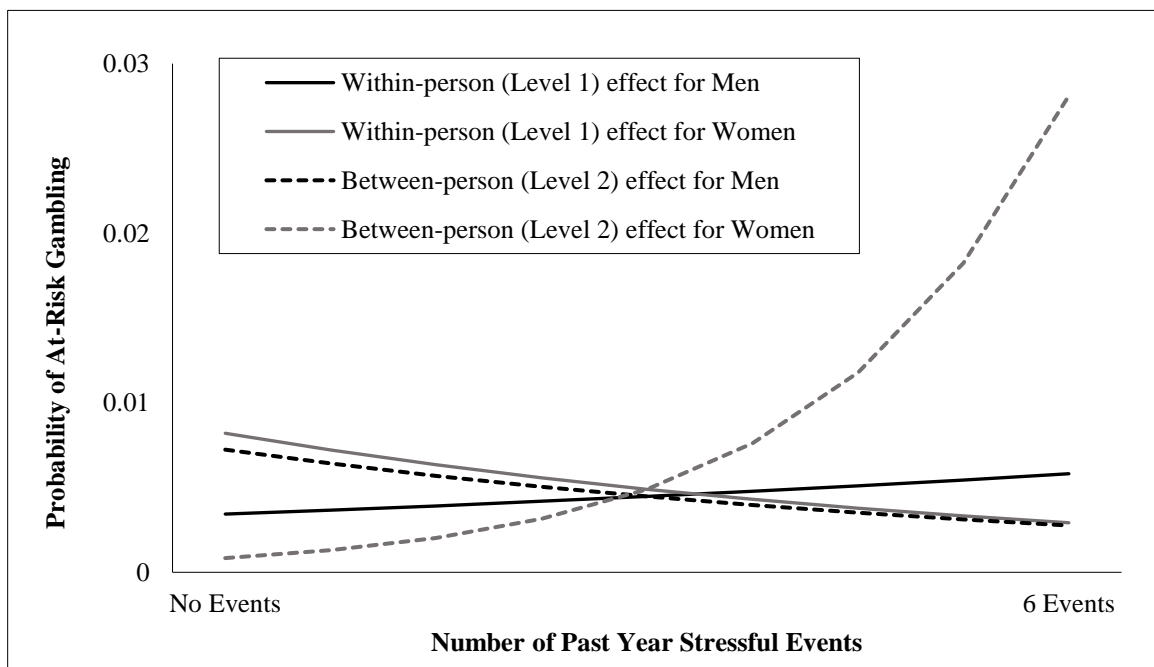
Figure 4-1. Effects of Stressful Life Events on At-Risk Gambling by Gender

DISCUSSION

This study extends the literature on psychosocial stressors and gambling among Indigenous adults through the use of prospective longitudinal data. The main objectives were to examine the cumulative effects of trauma, stress, and job satisfaction and their influence on at-

risk gambling behaviour among a community sample of Indigenous adults in the Quinte region

of Southeastern Ontario. The influence of gender and age in these associations were also

examined as gambling behaviour has been shown to be vary across the life course with some

gender-specific differences.[47–49]

Changes in at-risk gambling status over the course of the study was first examined.

Results are consistent with trends found more generally across the entire QLS sample[40] and

previous longitudinal studies[146,243] demonstrating an overall decline in problem gambling. The

prevalence of moderate- and severe-risk problem gambling scores (i.e., at-risk gambling)

decreased over time (11.7% in year 1 compared with 4.5% in year 5). A conversion factor of

0.58 is suggested for the purposes of comparing PG prevalence given that a PGSI 3+ cut-off was

used.[146] Thus, the baseline prevalence of PG (6.8%) was elevated among this sample but only

marginally higher (2.6%) than the average Canadian prevalence of 2.4% five years later.[146] Over-

selection of at-risk individuals has been suggested as a possible reason for the elevated baseline

PG prevalence among the QLS sample.[40] Whereas, study involvement could have caused

increased self-reflection of gambling behaviour leading to reduced PG prevalence over time.[40]

Age, gender, and past trauma were not significantly associated with at-risk gambling.

However, an unexpected finding was that the overall decline in at-risk gambling across the study

was primarily accounted for by those who experienced a past traumatic event. At the start of the

study in 2006, 82% of at-risk gamblers reported experiencing past trauma. By study conclusion

in 2011, this reduced to 50%. It may be that trauma is confounding the association between

another factor and decreasing gambling severity. However, it is interesting to note that the timing

of this study coincided with the Indian Residential Schools Settlement Agreement (IRSSA)

process which was approved in May 2006 and implemented in September 2007.[68] This

agreement was put in place to address elements of the legacy of residential schools including

compensation for all eligible former students as well as additional compensation for those who

suffered abuse while at residential school. While recognized as a positive step forward, many

described the process of recounting horrific memories as re-opening deep wounds and painful

feelings.[68] However, a mandate of the IRSSA was the creation of the Truth and Reconciliation

Commission of Canada (TRC). A main goal of the TRC was to give residential school survivors

a chance to tell their stories so that they could begin to heal from their trauma.[65] Statement

gathering initiatives included conferences, healing sessions, talking circles and individual

interviews. These were conducted across Canada between 2009 and 2011 (i.e., near the end of

study data collection). For Indigenous adults in this sample, the closest TRC events occurred in

Toronto (April 2011) and Ottawa (February 2011). While the role these initiatives may have

played in participants gambling behaviour remains unknown, findings of the TRC and the high

proportion of at-risk gamblers in this study reporting past trauma highlight that trauma is an

important issue that needs to be addressed among this population. Holistic approaches which

understand the social realities of Indigenous peoples including potential trauma from residential

schooling and colonization should therefore be used in assessing and treating Indigenous

patients.[155]

    Some novel findings were found in terms of the role of job satisfaction and stressful life

events on at-risk gambling. By examining within- and between-person effects of job satisfaction

and stressful life events, differences in average scores across the study period versus within-

individual variations were explored. Those who reported, on average, more job satisfaction (level

2 between-person effect) were at reduced odds of at-risk gambling. For every one-point increase

in overall job satisfaction, a 70% reduction of in the odds of being an at-risk gambler was found.

Interestingly, being more satisfied in one's work that usual (level 1 within-person effect) did not associate with reduced odds of at-risk gambling. Thus, job stability appears to be a more important predictor in at-risk gambling, a finding also found in a study among Scottish gamblers.[170] Efforts to improve educational attainment, job opportunities, and working environments may therefore hep to reduce problematic gambling behaviour.

Employment and income represent important domains of stress in life, therefore, it was not surprising that those who experienced more stressful life events rated their job satisfaction lower. Moreover, those who reported a greater number of stressful events, on average, were at increased odds of at-risk gambling. This supports previous research that found problem gamblers tend to have a long-term presence of adversities throughout their lives and gambling is often motivated by these stressors.[176] It has also been shown that both exposure to stress (i.e., acute versus chronic) and vulnerability to its adverse effects are gender-specific.[178] Interestingly, Indigenous women who reported more stress in a year than usual (level 1 within-person effect) experienced a small decrease in their odds of at-risk gambling. This suggests that exposure to acute stressors may be a deterrent or pre-occupy time available for gambling. In contrast, Indigenous women exposed to more chronic or elevated stress across the study were at increased odds of at-risk gambling. After controlling for within-person variations in stress, each additional stressful event overall increased the likelihood of at-risk gambling by 3 times among Indigenous women. A previous study found that Canadian women report more stress and greater negative coping strategies such as gambling to forget about problems or deal with depressed feelings compared to men.[48] Mental health disorders have also been shown to be more significant among women problem gamblers[176] highlighting the need for gender-specific prevention and treatment approaches which take into account personal histories, life stressors, and mental health factors in

the development of problematic gambling. Treatment approaches should also focus on teaching adaptive emotional coping skills and encouraging social supports to help deal with life events.[167,174] For example, a recent randomized controlled trial found that a 8-week stress management program among pathological gamblers resulted in significant improvements in stress, depression and anxiety symptoms, and an increase in life satisfaction.[244]

Limitations

Several limitations to this study need to be discussed. First, the study's small sample size, particularly the small number of individuals who engaged in at-risk gambling, limited the statistical power, thus potentially attenuating the current findings. Second, self-reported data could be subject to recall and social desirability bias. Life stressors may have been underestimated as people tend to remember important or major events but not minor events. Other studies have used more rigorous methods such as mixed narrative approaches and life history calendars.[176] As well, a closer examination of the sequence of events, severity and meaning ascribed to each event, and developmental timing would shed more light on the relationship between stress, trauma, and gambling. Third, while this study was longitudinal in nature, it remains difficult to tease apart the temporal and causal directions of the relationship between stressors and at-risk gambling as stressful life experiences may be a consequence of gambling or another underlying factor that also influences the risk for at-risk gambling. Fourth, limitations of using a lower cut-off of three or greater on the PGSI to define problematic gambling have been well documented, including the issue of false positives.[232] Future studies would benefit from considering gambling expenditure and frequency in addition to PGSI scores.[232] Finally, although the goal was to examine relationships between work and stressors among Indigenous adults, the sample was obtained from a small region of Ontario, which may

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limit the generalizability of the findings. It would be beneficial to further explore these associations with a more diverse Indigenous sample.

CONCLUSION

Gambling is a complex social behaviour with involvement and subsequent consequences changing across the life course. To date, little is known about how social factors associate with change and stability in problematic gambling behaviour, particularly among Indigenous groups. The results of this study confirm that the role of trauma remains an important consideration in assessing and treating problem gambling behaviour among this population. While other proximal predictors such as gambling frequency are strong determinants of PG, a more upstream preventative approach is needed to understand gambling behaviour within the context of life course experiences influenced by broader ecological levels. Some evidence was found that higher overall job satisfaction was associated with reduced at-risk gambling and therefore may be a target for intervention. However, consistently high levels of stressful events experienced by women was the strongest predictor of at-risk gambling behaviour. Intervention and prevention efforts that focus on structural conditions and reducing health inequities would likely help to reduce gambling among those who use it as an escape from other life problems. Further research is needed to better understand the role of social and cultural contexts within which individuals develop gambling problems.

Table 4-1. Characteristics of Sample at Baseline[*]

Characteristic	Total Sample N (%)	At-Risk Gamblers n (%)
Total sample	145 (100)	17 (11.7)
Gender		
Male	53 (36.6)	4 (23.5)
Female	92 (63.4)	13 (76.5)
Age		
17 - 24	23 (15.9)	1 (5.9)
25 - 34	35 (24.1)	4 (23.5)
35 - 44	47 (32.4)	5 (29.4)
≥ 45	40 (27.6)	7 (41.2)
Mean (*SD*)	37.6 (11.3)	40.4 (9.5)
Marital Status		
Never married	25 (17.2)	3 (17.6)
Married/Common-law	96 (66.2)	10 (58.8)
Widow/Divorced/Separated	24 (16.6)	4 (23.6)
Education		
<High school diploma	17 (11.7)	3 (17.6)
High school diploma	35 (24.1)	4 (23.5)
Some university/college/technical	33 (22.8)	3 (17.6)
University/college/technical degree	60 (41.4)	7 (41.2)
Employment		
Employed full/part-time	115 (79.3)	13 (76.5)
Unemployed/disability leave/maternity	17 (11.7)	3 (17.6)
Student	5 (3.4)	0 (0)
Retired or homemaker	8 (5.5)	1 (5.9)
Household Income		
< $20,000	18 (12.4)	1 (5.9)
$20,000 – 39,999	47 (32.4)	5 (29.4)
$40,000 – 59,999	31 (21.4)	5 (29.4)
$60,000 – 79,999	28 (19.3)	4 (23.5)
≥ $80,000	21 (14.5)	2 (11.8)
Physically, sexually, or emotionally abused growing up		
No	88 (60.7)	10 (58.8)
Yes	52 (35.9)	7 (41.2)
Prefer not to say	5 (3.4)	0
Any other traumatic event that still affects you today		
No	97 (66.9)	6 (35.3)
Yes	48 (33.1)	11 (64.7)
Baseline PGSI Score		
No-risk (score 0)	95 (65.5)	
Low-risk (score 1 or 2)	33 (22.8)	
Moderate-risk (score 3 to7)	14 (9.7)	
Severe-risk (score 8+)	3 (2.1)	

[*]Numbers are based on unweighted data. At-risk gamblers: (PGSI ≥3).

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Gender	1										
2. Age	0.12	1									
3. Past Trauma	0.24**	0.13	1								
4. Job Satisfaction	-0.06	0.09	-0.03	1							
5. Total Stressful Events	0.12	-0.39**	0.17*	-0.24**	1						
6. Work/School Events	0.07	-0.38**	0.11	-0.25**	-0.76**	1					
7. Friends/Family Events	0.17*	-0.37**	0.16	-0.16	0.84**	0.40**	1				
8. Property/Financial Events	0.05	-0.09	0.04	-0.12	0.64**	0.40**	0.40**	1			
9. Legal/Crime Events	-0.15	-0.15	0.09	-0.14	0.48**	0.23**	0.28**	0.40**	1		
10. Health Events	0.15	0.00	0.17*	-0.18*	0.43**	0.18*	0.26**	0.34**	0.32**	1	
11. PGSI Total Score	0.15	0.01	0.11	-0.16	0.18*	0.14	0.14	0.04	0 .21*	0.07	1
Mean	--	37.60	--	4.64	3.31	1.14	1.52	0.36	0.14	0.11	0.76
Standard Deviation	--	11.32	--	0.88	2.12	0.90	1.13	0.36	0.31	0.24	1.71

Note. All variables are averaged across time-points.

$*p < 0.05$, $**p < 0.01$

Table 4-3. Transition of Participants' Gambling Status across Study

	PGSI category	No-risk	Low-risk	Moderate-risk	Severe-risk	Total (%)	
				Year 1			
Year 2	No-risk	75	16	2	0	93 (67.4)	89.1
	Low-risk	11	13	6	0	30 (21.7)	
	Moderate-risk	6	3	4	0	13 (9.4)	10.9
	Severe-risk	0	0	1	1	2 (1.5)	
	Total	92	32	13	1	138	
Year 3	No-risk	79	24	4	0	107 (78.1)	92.0
	Low-risk	6	8	5	0	19 (13.9)	
	Moderate-risk	3	1	2	1	7 (5.1)	8.0
	Severe-risk	1	0	2	1	4 (2.9)	
	Total	89	33	13	2	137	
Year 4	No-risk	80	23	3	0	106 (78.5)	94.0
	Low-risk	6	8	6	1	21 (15.6)	
	Moderate-risk	3	0	2	1	6 (4.4)	5.9
	Severe-risk	0	0	2	0	2 (1.5)	
	Total	89	31	13	2	135	
Year 5	No-risk	81	25	3	0	109 (81.3)	95.5
	Low-risk	6	6	7	0	19 (14.2)	
	Moderate-risk	1	0	2	1	4 (3.0)	4.5
	Severe-risk	0	0	1	1	2 (1.5)	
	Total	88	31	13	2	134	

Note: White cells on the diagonal represent those who remained in the *same* PGSI category in that year; light grey cells represent those who *decreased* their PGSI category in that year; and dark grey cells represent those who *increased* their PGSI category in that year.

Table 4-4. Group-Level Predictors of the Probability and Change of At-Risk Gambling

Variables	Model 1 Change over Time			Model 2 Group-level Main Effects			Model 3 Group-level Moderators of Change		
	Estimate (SE)	OR	*p*	Estimate (SE)	OR	*p*	Estimate (SE)	OR	*p*
Intercept	**-4.448 (0.814)**	**0.012**	**<0.001**	**-5.883 (1.284)**	**0.003**	**<0.001**	**-6.630 (1.400)**	**0.001**	**<0.001**
Time	**-0.520 (0.156)**	**0.594**	**0.001**	**-0.518 (0.156)**	**0.596**	**0.001**	-0.117 (0.233)	0.889	0.615
Age[a]				-0.026 (0.040)	0.975	0.525	-0.026 (0.041)	0.974	0.525
Gender (M = 0, F = 1)				1.513 (1.020)	4.541	0.138	1.568 (1.045)	4.800	0.133
Past Trauma				0.794 (0.930)	2.212	0.393	1.765 (1.074)	5.841	0.100
Time x Trauma							**-0.674 (0.317)**	**0.510**	**0.034**
Slope for Trauma							**-0.791 (0.219)**	**0.453**	**<0.001**
Model Variance									
Scale Factor	1			1			1		
Residual Variance	12.639 (5.207)			11.982 (4.929)			12.570 (5.189)		
Model Fit									
Number of Parameters	3			6			7		
-2LL	-145.5			-143.5			-141.2		
AIC	297.0			298.9			296.3		

OR: Odds Ratio (=exp(estimate)); SE: standard error. Significant results are provided **in bold.**
[a]Variables are mean centered

Table 4-5. Longitudinal Predictors of the Probability and Change of At-Risk Gambling

Variables	Model 4 Main Effects of Job Satisfaction			Model 5 Main Effects of Stressful Life Events			Model 6 Cross-level Interactions		
	Estimate (SE)	OR	p	Estimate (SE)	OR	p	Estimate (SE)	OR	p
Intercept	**-5.411 (1.336)**	**0.006**	**<0.001**	**-5.243 (1.336)**	**0.005**	**<0.001**	**-5.406 (1.372)**	**0.004**	**<0.001**
Time	-0.188 (0.258)	0.828	0.446	**-0.189 (0.260)**	**0.828**	**0.467**	-0.154 (0.267)	0.857	0.565
Age[a]	-0.028 (0.041)	0.972	0.500	0.030 (0.047)	1.031	0.514	0.025 (0.047)	1.025	0.599
Gender (M = 0, F = 1)	1.020 (1.006)	2.774	0.311	0.283 (1.042)	1.327	0.786	0.092 (1.095)	1.096	0.933
Past Trauma	1.863 (1.077)	6.442	0.084	1.466 (1.100)	4.330	0.183	1.679 (1.136)	5.361	0.139
Time x Trauma	-0.662 (0.358)	0.516	0.064	**-0.783 (0.375)**	**0.457**	**0.037**	**-0.905 (0.399)**	**0.404**	**0.023**
Slope for Trauma	**-0.850 (0.255)**	**0.427**	**0.001**	-0.972 (0.281)	0.378	0.001	**-1.059 (0.301)**	**0.347**	**<0.001**
Job Satisfaction									
Within-person (level 1)	-0.154 (0.236)	0.857	0.515	-0.164 (0.246)	0.849	0.504	-0.214 (0.253)	0.807	0.398
Btwn-person (level 2)	**-1.204 (0.539)**	**0.300**	**0.026**	-0.833 (0.538)	0.435	0.122	-0.898 (0.562)	0.407	0.110
Contextual (level 1 vs 2)	-1.050 (0.545)	0.350	0.054	-0.668 (0.591)	0.512	0.258	-0.684 (0.612)	0.505	0.264
Stressful Life Events									
Within-person (level 1)				-0.159 (0.103)	0.853	0.120			
For Men							0.133 (0.215)	1.142	0.537
For Women							**-0.260 (0.127)**	**0.771**	**0.041**
Gender Difference							-0.392 (0.252)	0.675	0.119
Btwn-person (level 2)				**0.661 (0.256)**	**1.936**	**0.010**			
For Men							-0.229 (0.523)	0.796	0.662
For Women							**0.836 (0.291)**	**2.307**	**0.004**
Gender Difference							1.065 (0.576)	2.900	0.065
Contextual (level 1 vs 2)				**0.820 (0.284)**	**2.271**	**0.004**			
For Men							-0.361 (0.585)	0.697	0.537
For Women							**1.096 (0.332)**	**2.992**	**0.001**
Gender Difference							**1.457 (0.659)**	**4.293**	**0.027**
<u>Model Variance</u>									
Scale Factor	1			1			1		
Residual Variance	11.132 (4.794)			11.070 (4.776)			11.226 (4.892)		

Model Fit

Parameters	9	11	13
-2LL	-125.9	-120.4	-117.3
AIC	269.7	262.8	260.6

OR: Odds Ratio (=exp(estimate)); SE: standard error. Significant results are provided **in bold.**
[a]Variables are mean centered

CHAPTER 5: GENERAL DISCUSSION AND CONCLUSIONS

Frequent binge drinking and problem gambling share many of the same risk factors and have an etiological connection. The ecological and life course perspectives were used in this thesis to understand alcohol use and gambling behaviour as embedded within a range of social and environmental contexts across human development. A main focus was on the school and work environment surrounding Indigenous youth and adults. Education and good employment are important determinants of Indigenous health as they represent pathways to improved health and wellbeing. However, Indigenous Canadians on average are exposed to greater levels of risk in these environments as a result of their social and economic position in society.[245] This is a result of over a century of federal policies designed to systematically strip Indigenous peoples of material, cultural, social, and political resources.[3] Both the ecological and life course perspective help to demonstrate how socioeconomic position is a proxy for inequitable opportunities and resources; ultimately shaping and constraining individual choices and behaviour.[3,246] It is through this lens that we can better understand how inequities in alcohol and gambling problems between Indigenous and non-Indigenous Canadians have developed, as well as potential paths forward.

The purpose of this chapter is to summarize my thesis findings within the 'Health Impact Pyramid'[247] and to consider these findings in light of the Truth and Reconciliation Commission of Canada (TRC) Calls to Action.[65] Paper 1 focused on alcohol use among Indigenous youth who were current students, high school graduates, and those who did not complete school. The extent to which school environments, extracurricular activities, and peers were associated with binge drinking in these populations was examined. Paper 2 explored gambling behaviour among a community sample of Indigenous adults. The extent to which age, gender, past trauma, job satisfaction, and stressful life events were associated with at-risk gambling was examined

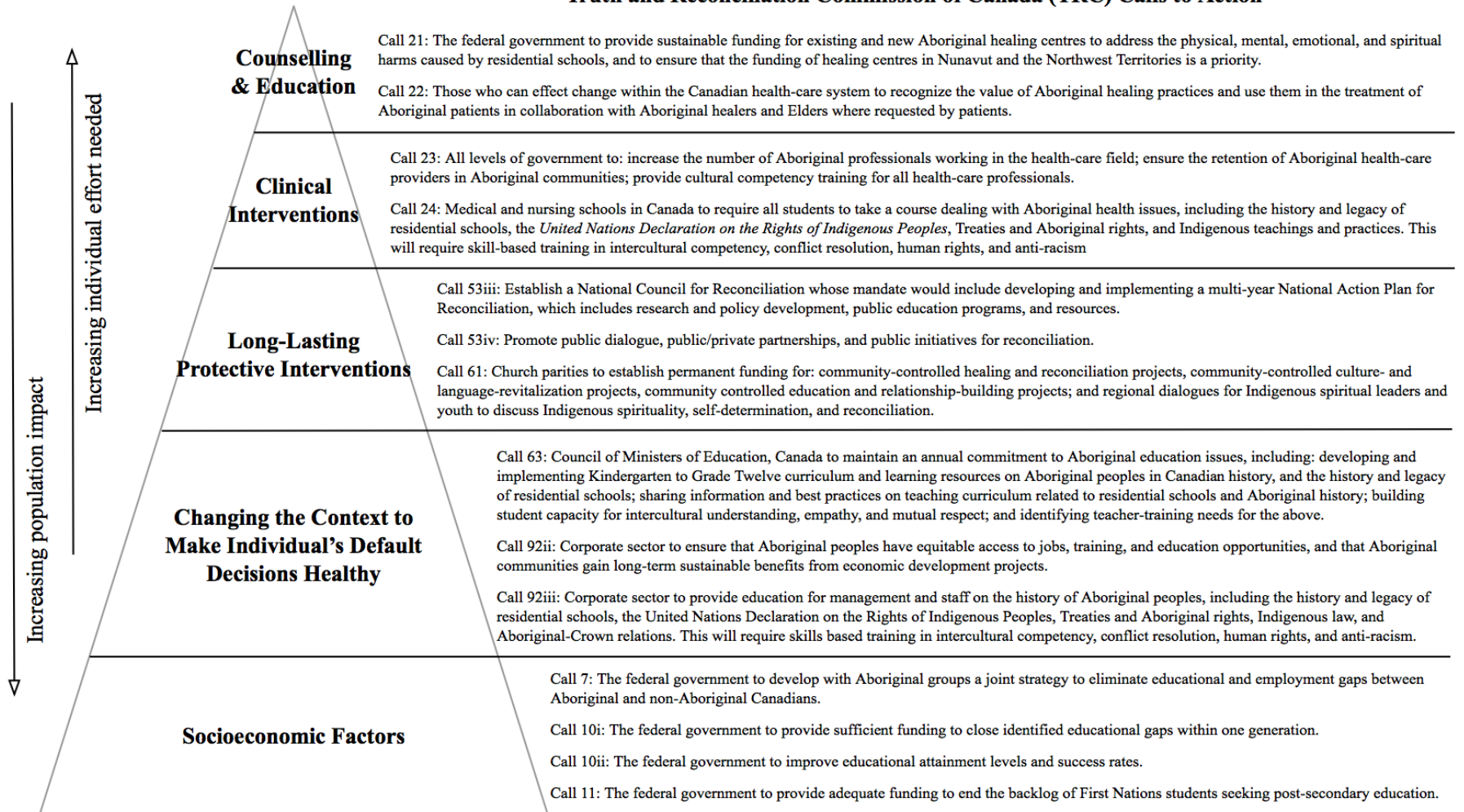**Truth and Reconciliation Commission of Canada (TRC) Calls to Action**

Increasing individual effort needed

Increasing population impact

Counselling & Education

Call 21: The federal government to provide sustainable funding for existing and new Aboriginal healing centres to address the physical, mental, emotional, and spiritual harms caused by residential schools, and to ensure that the funding of healing centres in Nunavut and the Northwest Territories is a priority.

Call 22: Those who can effect change within the Canadian health-care system to recognize the value of Aboriginal healing practices and use them in the treatment of Aboriginal patients in collaboration with Aboriginal healers and Elders where requested by patients.

Clinical Interventions

Call 23: All levels of government to: increase the number of Aboriginal professionals working in the health-care field; ensure the retention of Aboriginal health-care providers in Aboriginal communities; provide cultural competency training for all health-care professionals.

Call 24: Medical and nursing schools in Canada to require all students to take a course dealing with Aboriginal health issues, including the history and legacy of residential schools, the *United Nations Declaration on the Rights of Indigenous Peoples*, Treaties and Aboriginal rights, and Indigenous teachings and practices. This will require skill-based training in intercultural competency, conflict resolution, human rights, and anti-racism

Long-Lasting Protective Interventions

Call 53iii: Establish a National Council for Reconciliation whose mandate would include developing and implementing a multi-year National Action Plan for Reconciliation, which includes research and policy development, public education programs, and resources.

Call 53iv: Promote public dialogue, public/private partnerships, and public initiatives for reconciliation.

Call 61: Church parities to establish permanent funding for: community-controlled healing and reconciliation projects, community-controlled culture- and language-revitalization projects, community controlled education and relationship-building projects; and regional dialogues for Indigenous spiritual leaders and youth to discuss Indigenous spirituality, self-determination, and reconciliation.

Changing the Context to Make Individual's Default Decisions Healthy

Call 63: Council of Ministers of Education, Canada to maintain an annual commitment to Aboriginal education issues, including: developing and implementing Kindergarten to Grade Twelve curriculum and learning resources on Aboriginal peoples in Canadian history, and the history and legacy of residential schools; sharing information and best practices on teaching curriculum related to residential schools and Aboriginal history; building student capacity for intercultural understanding, empathy, and mutual respect; and identifying teacher-training needs for the above.

Call 92ii: Corporate sector to ensure that Aboriginal peoples have equitable access to jobs, training, and education opportunities, and that Aboriginal communities gain long-term sustainable benefits from economic development projects.

Call 92iii: Corporate sector to provide education for management and staff on the history of Aboriginal peoples, including the history and legacy of residential schools, the United Nations Declaration on the Rights of Indigenous Peoples, Treaties and Aboriginal rights, Indigenous law, and Aboriginal-Crown relations. This will require skills based training in intercultural competency, conflict resolution, human rights, and anti-racism.

Socioeconomic Factors

Call 7: The federal government to develop with Aboriginal groups a joint strategy to eliminate educational and employment gaps between Aboriginal and non-Aboriginal Canadians.

Call 10i: The federal government to provide sufficient funding to close identified educational gaps within one generation.

Call 10ii: The federal government to improve educational attainment levels and success rates.

Call 11: The federal government to provide adequate funding to end the backlog of First Nations students seeking post-secondary education.

Figure 5-1. Frieden's Health Impact Pyramid[247] Adapted to Include Selected TRC Calls to Action[248]

TRC CALLS TO ACTION & FRIEDEN'S HEALTH IMPACT PYRAMID

Announced in 2006, the Indian Residential Schools Settlement Agreement (IRSSA) was created to consolidate thousands of lawsuits against the federal government into a class action lawsuit and provide compensation to residential schools survivors.[68] In 2008, the TRC was established as one of five main components of the IRSSA. The TRC was tasked to document and preserve the experiences of residential school survivors.[68] The TRC travelled the country to hear from more than six thousand witnesses, most of whom attended residential school. The purpose of the commission was to reveal the truth about the past as well as guide and inspire a process of truth, justice, and healing.[68] A main conclusion of the TRC was that "reconciliation not only requires apologies, reparations, the relearning of Canada's national history, and public commemoration, but also needs real social, political, and economic change"(p.184).[68] The concrete actions needed to make these changes were summarized into 94 recommendations.

Figure 5-1 conceptually illustrates Friedens's five-tier pyramid[247] which has been adapted to include relevant TRC Calls to Action.[65] A main focus of this thesis was on the lower tiers in Frieden's pyramid which focus on interventions that have the greatest population-level health impact.[247] Interventions in the top tiers of the pyramid are designed to help individuals rather than populations, and often require more individual effort to improve health. On their own, top tier interventions tend to have a low population health impact given limitations in long-term individual behaviour change without changes in social and structural systems.[247] However, lower tier interventions are often more challenging as they require the most political/public sector effort to change policies and systems and/or population-level behavioural norms.[193] Health policies focused on poverty or harm reduction, laws about wearing seat belts, and restrictions on where individuals can smoke are examples of lower tier interventions that were at first

controversial but eventually became accepted as a social norm. These societal-level changes tend to offer less benefit to the individual but great benefit to the population as a whole.[193] The Health Impact Pyramid and TRC Calls to Action will be used to frame key findings from this thesis.

Tier 1: Socioeconomic Factors

Currently, 70% of urban Indigenous households report incomes that fall below the national average in Canada.[249] A large body of evidence highlights the role that socioeconomic circumstances play in at-risk behaviour.[4] This research points to the importance of working upstream to address socioeconomic inequities in society. Macro-level policies and programs that tackle socioeconomic determinants, rather than the at-risk behaviours themselves, have been shown to alter individual choices across a spectrum of at-risk behaviours.[3,91] However, instituting these changes requires action and resources from decision makers. TRC Calls to Action 7, 10, and 11 call on the federal government to eliminate the education and employment gap between Indigenous and non-Indigenous Canadians, provide sufficient funding to close these gap and improve success rates, and funding for Indigenous students seeking post-secondary education.[65]

Closing the educational gap. Results from this thesis support the need to address the educational gap between Indigenous and non-Indigenous students. As highlighted in Paper 1, 20% of urban-based Indigenous students in this national sample did not complete high school. This is significantly higher than the national average of 11% in Canada.[108] Results also underscore that access to good schools can influence educational success rates and at-risk behaviours. Indigenous youth who did not complete high school rated their school environment more poorly than other youth, and those negative perceptions were a direct risk factor for increased binge drinking. Indigenous youth who did not complete high school were also more likely to come from lower income households with lower parental education, highlighting the

role that socioeconomic context can have on educational success. Efforts are needed to address socioeconomic determinants of Indigenous youth high school completion, such as household income and access to quality education, to reduce at-risk behaviour in young adulthood. Such efforts would also improve their ability to compete for satisfying jobs in the workforce.

Closing the employment gap. The life course perspective demonstrates how advantage in one sphere of life, such as good education or employment, translates to other spheres of life.[50] Previous research has identified risk factors that predispose individuals to engage in maladaptive gambling behaviour include disadvantageous social conditions, poverty, low occupational status, stress, and social exclusion.[32,38] Findings from this thesis indicate that higher job satisfaction was associated with fewer stressful events in other domains of life, and both of these variables were associated with reduced at-risk gambling among Indigenous adults. This suggests that job satisfaction may be an important indicator of socioeconomic status and gambling behaviour. Improving educational attainment, both at the secondary and post-secondary level, as well as addressing systemic discrimination in the workforce (i.e., income disparities) are needed to improve job satisfaction and reduce stress among Indigenous peoples. As Perry Bellegarde, the National Chief of the Assembly of First Nations, wrote "Our future belongs to the youth and we are the guardians. We must ensure that they have access to an education that meets the highest standards and provides expertise in modern technologies combined with the wisdom of our ancestors so they can walk confidently in both worlds"(p.219).[65]

Tier 2: Changing the Context to Make Default Decision Healthy

A large body of literature supports the impacts that the environment has on individual choice.[247] Improving socioeconomic conditions and making meso-level improvements within schools or the workplace can produce conditions for which healthier choices are easier and

require less effort to benefit from.[247] For example, improving the school environment has been shown to reduce at-risk behaviours, prevent school drop outs, and mitigate the negative impact of socioeconomic context on academic success.[18] A main focus of this thesis was to examine some of the mechanisms (i.e., mediators) and the conditions (i.e., moderators) through which these social environments may be influencing behaviour.

School environment and binge drinking. The Centres for Disease Control has consolidated evidence-based strategies to enhance school environments in ways that are positive and protective against multiple at-risk behaviours for youth.[16] Although the typical strategy in schools is to attempt to reduce at-risk behaviours directly through educational campaigns, results from a growing number of studies suggest greater impacts can be achieved by enhancing protective factors within the school environment, that help youth avoid these behaviours and stay in school.[18] A relatively easy and effective way to build self-esteem, identity, and increase student engagement is through extracurricular activities.[21,112,117] Findings from Paper 1 support that schools can reduce binge drinking through providing opportunities for pro-social activities such as arts, drama, music, and clubs/groups. Evidence was also found that opportunities to participate in a variety of activities (i.e., breadth) may be particularly important for youth at-risk of dropping out, by positively influencing the type of friends they regularly engage with.

The findings of this thesis further add to the literature by demonstrating that perceptions about the school environment influenced Indigenous youth's engagement in binge drinking while they were students, and years later as young adults. In this study, a *positive school environment* was characterized as the extent to which students felt safe, happy, enjoyed learning, and saw opportunities for their parents to be involved in the school. A *negative school environment* was characterized as the extent to which students experienced racism, bullying, violence and believed

alcohol and drugs were used at school. Results across the full sample indicate that having more friends who engaged in risky behaviour (i.e., skipping class, causing trouble, smoking, using drugs and alcohol) was a strong predictor and *mechanism* through which the school environment influenced binge drinking. A positive school environment was associated with reduced binge drinking among current students and high school graduates through peer relationships. In other words, Indigenous youth who perceived their school environment positively had less friends who engaged in risky behaviour. This in turn, decreased the amount of binge drinking they engaged in. In contrast, a negative school environment was associated with increased binge drinking among youth who were no longer in school by increasing the number of friends they engaged with who took part in risky behaviour. Among high school graduates, males were more likely to binge drink and this was partly due to their increased propensity to have more friends who engaged in risky behaviour.

These findings highlight that peers are an important determinant of binge drinking behaviour and increased efforts to promote positive relationships are needed. As evidenced by reviews conducted by the Centres for Disease Control, a robust way to influence peer norms and decrease binge drinking among Indigenous students would be to focus on decreasing the extent to which they experience racism, bullying, and violence in urban schools; and increase the extent to they feel safe, happy, and connected to their school.[193] School-level initiatives that have been shown to improve health and academic outcomes include: improving the physical and emotional safety at school; enhancing the classroom learning and teaching environment; and encouraging healthy student-teacher relationships and parent-school-community ties.[18] An important component is ensuring that teachers have the necessary skills, supports, and resources to teach in a way that fosters constructive dialogue and mutual respect.[68] TRC Call to Action 63 is important

as it seeks commitment from provinces to implement Indigenous curriculum which teaches the history and legacy of residential schools, incorporates Indigenous ways of knowing, and builds student capacity for intercultural understanding, empathy, and mutual respect. This would help to address colonial imperatives, lack of social supports, and experiences of marginalization at school that have been qualitatively described as undermining Indigenous student success.[14]

Stress, work, and gambling. Stress has been shown to be an important determinant of gambling behaviour, as motivations to escape or cope with stress through gambling are maladaptive.[37,39–41] While certain amounts of stress across life are expected, those who experience more chronic and severe stress are more likely to be problem gamblers.[35] Results from Paper 2 indicate that cumulative stress across all life domains was the most important predictor of at-risk gambling among Indigenous adults. However, the relationship between stress and gambling was not the same for men and women. For men, the number of stressful events experienced in the previous year did not influence their gambling behaviour. For women, having a particularly stressful year was associated with a small reduction in at-risk gambling. A hypothesis could be that acute stress (i.e., abnormally high stress) may discourage gambling due to a lack of time, energy, or money that is being occupied to deal with other issues at hand. In contrast, women reporting more chronic or elevated stress across the study were nearly 3 times more likely to be an at-risk gambler. This aligns with other research that both exposure to stress and gender-specific coping styles play a role in gambling behaviour.[48]

Like peer relationships among adolescents, it is difficult to alter how adults respond to stress. Living and working conditions strongly influence individual exposure to stress as well as the resources to manage stress. Good employment is important as it provides financial resources, self-esteem and purpose, support, and connection to social institutions.[161] As evidenced by study

findings, Indigenous adults who were overall more satisfied at work reported experiencing less stress, particularly related to work/school and friends and family. Higher overall job satisfaction was also associated with a small reduction in at-risk gambling among Indigenous adults, highlighting that job stability and consistency are important. Therefore, effort would be better spent on improving psychosocial work characteristics such as the work culture, relationships, wage, job demands, and control over work to lower stress and reduce motivations to gamble.[164] TRC Calls to Action 92ii and 92iii call on the corporate sector to provide more equitable access to jobs, training, education opportunities for Indigenous peoples, as well as skill-based training for management and staff on intercultural competency, conflict resolution, human rights, and anti-racism. These are important measures that organizations can take to improve living and working conditions for their employees.

Tier 3: Long-Lasting Protective Interventions

The third tier of the pyramid represents one-time or infrequent protective interventions that reach people as individuals rather than collectively.[247] A common example of a long-term protective intervention is immunizations. This level of intervention was not really the focus of this thesis nor many of the TRC Calls to Action. However, changing socioeconomic and environmental contexts brings attention to the need for public reconciliation. Programs and resources to facilitate reconciliation could be viewed as a long-term protective intervention as they would ultimately need to reach and engage individuals. Using the example of immunization, reconciliation could be conceptualized as enhancing the social immunity to protect those more vulnerable in our society by creating more inclusive and supportive environments. TRC Calls 53 and 61 seek to establish a National Action Plan for reconciliation, promote public dialogue through reconciliation initiatives, and acquire funding for community programs and projects.

Such initiatives could help shift power and political processes to create social space for

Indigenous peoples, and by doing so, empower individuals to be active agents of change.[250]

Tier 4: Clinical Interventions

Moving up the pyramid represents a shift from focusing on the underlying impediments

to healthy behaviour (i.e., root causes) to relying more on individual agency for change.[193]

Ongoing clinical interventions, such as screening or medical treatment, are secondary and

tertiary prevention measures which seek to reduce harm and increase wellbeing. Efforts to

identify and provide appropriate care for those who may be at risk for adverse health outcomes

are important given the elevated prevalence of moderate-risk binge drinking (i.e., a few times a

month) and at-risk gambling found among Indigenous youth and adults, respectively.

Binge drinking interventions. Results from Paper 1 highlight that screening and

prevention efforts should begin early in adolescence and consider the role of gender. Adolescent

development coincides with heightened experimentation with risky behaviour so it was not

surprising that binge drinking increased with age among Indigenous youth still in school. For

those no longer in school, gender rather than age became important with older males binge

drinking more frequently. High school graduates and males who did not complete high school

and were involved in sports were also more likely to binge drink. This suggests that interventions

should take into consideration some of the biological and psychosocial risk factors for alcohol

use (e.g., sensation seeking, positive expectancies for alcohol use).[213]

Alcohol screening and brief interventions have shown some promising results in reducing

levels of consumption and alcohol-related harm among adolescents.[251] Limitations however exist

as individuals must be willing to engage with health care professionals. A barrier for some

Indigenous peoples may be a reluctance to seek care due to previous experiences of racism and

discrimination.[37,252] TRC calls 23 and 24 are important measures that can be taken to improve clinical care access, adherence, and effectiveness. These calls advocate for more Aboriginal health professionals, cultural competency training for all health-care professionals, and skill-based training in medical and nursing schools on intercultural competency, conflict resolution, human rights, and anti-racism. Providing cultural competency training has been shown to improve patient/client health outcomes, particularly in health care access and ultization.[253]

Gambling interventions. Increased efforts have been made to increase public awareness and create mechanisms for the early identification of problem gamblers; however, very few people with gambling-related problems ever seek treatment.[188] Even the best clinical care only treats a small portion of problem gamblers, and even fewer of those individuals successfully refrain.[41] Screening, diagnosing, and treating problem gambling is often further complicated by the heterogeneity in characteristics and motivations that define problem gamblers.[220] That being said, one of the more robust predictors of problem gambling is childhood abuse or past trauma.[41,45,181] Findings from Paper 2 could not adequately examine this relationship due to small sample size; however, the proportion of at-risk gamblers reporting past trauma was high and alarming (82% in year 1 which reduced to 50% by year 5). This finding and those from TRC statement gathering process underscore the need for medical practitioners to be adequately trained to treat Indigenous patients and the potential role trauma may be playing in their health.

Tier 5: Counselling and Education

Counselling can be very effective when delivered at the individual level through one-on-one interactions with a clinical professional.[193] Therapies that identify and address various problems, underlying issues, and comorbidities (e.g., depression, anxiety) are important to enable people to function and cope effectively in their daily lives.[143,228] Trauma linked to residential

school experiences and/or intergenerational effects continues to be a major challenge for many Indigenous peoples and communities as they struggle to deal with violence and other social stressors.[51] TRC calls 21 and 22 emphasize the importance that culturally and experientially appropriate treatment and healing centres are made available for Indigenous peoples, particularly for those struggling with physical, mental, emotional, and spiritual harms caused by residential school.

The health impact pyramid however demonstrates that interventions at this level have the lowest population impact.[247] Unfortunately, educational initiatives tend to be the most frequently used tool to change public behaviour because they are easy to initiate, relatively inexpensive, and often believed to be effective by the lay public.[247] While it is important to educate people on risk factors to increase consumer awareness, attempts to elevate education to a population level often prove disappointing.[247,254,255] This level of intervention is often criticized as being superficial and short-term as money and effort needs to continue indefinitely because new high risk individuals will continue to emerge (i.e., does not address incidence).[193,256] Simply encouraging people to change their behaviours without taking into account the social and economic barriers to change is not effective.[256] Inadvertently, this can even add to a public discourse that stigmatizes specific groups in society as biologically, behaviourally, and/or socially flawed.[257] For example, an expensive mass education campaign in Montana intended to discourage methamphetamine use through graphic advertising of disturbing images of meth addicts over a two-year period was shown to have no effect.[255] Interviews with recovering addicts indicated that the campaign negatively affected them though increased stereotyping, stigma, and differential treatment.[258] Therefore, caution should be exercised on putting too much emphasis on public education alone.

CONCLUSION

Findings from this thesis highlight the multiple ecological levels and life course experiences that impact health behaviours such as binge drinking and gambling among Indigenous populations. In this final chapter, I have argued that effective interventions are needed that address both the broader social and environmental contexts in which these behaviours take place, and the need for improved access to counselling and treatment services. Interventions at each level are important in reducing at-risk behaviours, however, those aimed at the base of the pyramid have larger population impact, and usually at a lower cost.[247]

Thesis findings and TRC Calls to Action support that closing the educational and employment gaps between Indigenous and non-Indigenous Canadians is essential. This requires increased funding and commitment from the federal government to improve our education systems. Improving school environments would act in multiple ways to reduce addictive behaviours. For example, by enhancing protective factors within the school environment, Indigenous youth will be more likely to stay in school, less likely to associate with peers taking part in risky behaviour, and less likely to engage in binge drinking. Educational success will then translate to better employment opportunities, job satisfaction, less exposure to adverse social stressors, and reduced motivation to gamble. TRC Calls to Action that seek school curriculum changes, increased teacher training, equitable access to jobs and other opportunities, and staff training in intercultural competency are necessary to ensure that school and work environments are equitable and inclusive. Broader reconciliation initiatives are also needed to help repair broken relationship and empower Indigenous peoples. Finally, our health-care systems need to be culturally safe and recognize the value of Indigenous healing practices to effectively treat

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those needing care. Particular attention should be given to the potential role of trauma and other stressors in the lives of Indigenous patients.

In conclusion, the TRC outlines a comprehensive strategy that targets all levels of Frieden's health impact pyramid. Implementing all 94 actions will be important to maximize synergy and ensure long-term success.[247] Of critical importance, is the engagement of many different sectors with involvement of Indigenous peoples and organizations in all stages of planning, implementation, and evaluation.[245] Research will continue to be a vital component to this work through ongoing assessment of progress and trends across many indicators. This will help to keep the government accountable and educate Canadians on what contributes to healing and transformative change.[68]

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