

An Analysis of Social Support and the Health of the On-Reserve Nova Scotia Mi'kmaq
Population

by

Vanessa Perry

Submitted in partial fulfilment of the requirements
for the degree of Masters of Science

at

Dalhousie University
Halifax, Nova Scotia
April 2010

© Copyright by Vanessa Perry, 2010



Library and Archives
Canada

Published Heritage
Branch

395 Wellington Street
Ottawa ON K1A 0N4
Canada

Bibliothèque et
Archives Canada

Direction du
Patrimoine de l'édition

395, rue Wellington
Ottawa ON K1A 0N4
Canada

Your file *Votre référence*
ISBN: 978-0-494-63626-8
Our file *Notre référence*
ISBN: 978-0-494-63626-8

NOTICE:

The author has granted a non-exclusive license allowing Library and Archives Canada to reproduce, publish, archive, preserve, conserve, communicate to the public by telecommunication or on the Internet, loan, distribute and sell theses worldwide, for commercial or non-commercial purposes, in microform, paper, electronic and/or any other formats.

The author retains copyright ownership and moral rights in this thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without the author's permission.

AVIS:

L'auteur a accordé une licence non exclusive permettant à la Bibliothèque et Archives Canada de reproduire, publier, archiver, sauvegarder, conserver, transmettre au public par télécommunication ou par l'Internet, prêter, distribuer et vendre des thèses partout dans le monde, à des fins commerciales ou autres, sur support microforme, papier, électronique et/ou autres formats.

L'auteur conserve la propriété du droit d'auteur et des droits moraux qui protègent cette thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

In compliance with the Canadian Privacy Act some supporting forms may have been removed from this thesis.

While these forms may be included in the document page count, their removal does not represent any loss of content from the thesis.

Conformément à la loi canadienne sur la protection de la vie privée, quelques formulaires secondaires ont été enlevés de cette thèse.

Bien que ces formulaires aient inclus dans la pagination, il n'y aura aucun contenu manquant.


Canada

DALHOUSIE UNIVERSITY

To comply with the Canadian Privacy Act the National Library of Canada has requested that the following pages be removed from this copy of the thesis:

Preliminary Pages

Examiners Signature Page (pii)

Dalhousie Library Copyright Agreement (piii)

Appendices

Copyright Releases (if applicable)

TABLE OF CONTENTS

| | |
|---|-------------|
| LIST OF TABLES..... | vii |
| LIST OF FIGURES..... | viii |
| ABSTRACT | ix |
| LIST OF ABBREVIATIONS AND SYMBOLS USED | x |
| ACKNOWLEDGEMENTS | xi |
| CHAPTER 1: INTRODUCTION | 1 |
| 1.1 THE CANADIAN ABORIGINAL POPULATION | 1 |
| <i>Diversity of Aboriginal Peoples in Canada</i> | <i>1</i> |
| <i>A Brief History of Aboriginal Peoples in Canada.....</i> | <i>1</i> |
| <i>Aboriginal Health in Canada.....</i> | <i>2</i> |
| 1.2 THE NOVA SCOTIA MI'KMAQ POPULATION | 3 |
| <i>A Demographic Profile of the Nova Scotia Mi'kmaq Population</i> | <i>3</i> |
| <i>The Health of the Nova Scotia Mi'kmaq Population.....</i> | <i>7</i> |
| 1.3 PURPOSE AND OBJECTIVES OF THE RESEARCH..... | 9 |
| CHAPTER 2: LITERATURE REVIEW AND THEORETICAL FRAMEWORK..... | 11 |
| 2.1 RATIONAL FOR STUDY | 12 |
| 2.2 THE SOCIAL ENVIRONMENT | 13 |
| <i>The Social Determinants of Health.....</i> | <i>13</i> |
| <i>Social Support.....</i> | <i>15</i> |
| <i>Associations between Social Support and Health.....</i> | <i>16</i> |
| <i>Social Support and Health Among Canadian Aboriginal Populations.....</i> | <i>17</i> |
| 2.3 CONCEPTUAL MODELS OF SOCIAL SUPPORT AND HEALTH..... | 18 |
| <i>Conceptual Model.....</i> | <i>19</i> |
| 2.4 VARIABLES OF INTEREST | 21 |
| <i>Social Support Measures</i> | <i>21</i> |

| | |
|--|-----------|
| <i>Health Outcomes</i> | 22 |
| <i>Upstream Determinants</i> | 22 |
| <i>Health Behaviours</i> | 25 |
| CHAPTER 3: METHODS | 26 |
| 3.1 DATA SOURCE..... | 26 |
| 3.2 VARIABLES OF INTEREST..... | 30 |
| <i>Social Support Measures</i> | 30 |
| <i>Health Outcomes</i> | 32 |
| <i>Upstream Determinants</i> | 32 |
| <i>Health Behaviours</i> | 35 |
| 3.3 ACCESS TO DATA..... | 36 |
| 3.4 ETHICS..... | 37 |
| 3.5 COMMUNITY CONSULTATION..... | 37 |
| 3.6 METHODOLOGICAL APPROACH..... | 38 |
| <i>Descriptive Statistics</i> | 39 |
| <i>Classification Tree Analysis</i> | 39 |
| <i>Simple Regression Analysis</i> | 41 |
| <i>Multiple Regression Analysis</i> | 41 |
| <i>Structural Equation Models</i> | 42 |
| CHAPTER 4: DESCRIPTIVE ANALYSES | 43 |
| 4.1 RESULTS..... | 43 |
| <i>Descriptive Statistics</i> | 45 |
| <i>Classification Tree Analysis</i> | 50 |
| <i>Simple Regression Analysis</i> | 61 |
| 4.2 DISCUSSION..... | 69 |
| <i>Principal Findings in Relation to Other Research</i> | 69 |
| <i>Variables Identified for Multiple Regression Models</i> | 72 |

| | |
|---|------------|
| CHAPTER 5: MULTIPLE REGRESSIONS & STRUCTURAL EQUATION MODELS | 74 |
| 5.1 RESULTS | 75 |
| <i>Multiple Regression Determinants of Health Models</i> | <i>75</i> |
| <i>Multiple Regression Confounding Effects Models</i> | <i>77</i> |
| <i>Structural Equation Modeling of Self-Rated Health</i> | <i>80</i> |
| <i>Structural Equation Modeling of Emotional Health</i> | <i>84</i> |
| 5.2 DISCUSSION | 88 |
| <i>Multiple Regression Determinants of Health Models</i> | <i>89</i> |
| <i>Multiple Regression Confounding Effects Models</i> | <i>90</i> |
| <i>Structural Equation Modeling of Self-Rated Health</i> | <i>91</i> |
| <i>Structural Equation Modeling of Emotional Health</i> | <i>92</i> |
| <i>Reliability & Validity of Structural Equation Models</i> | <i>93</i> |
| CHAPTER 6: CONCLUSION | 94 |
| 6.1 PRINCIPAL FINDINGS | 94 |
| 6.2 STRENGTHS AND LIMITATIONS | 95 |
| 6.3 POLICY IMPLICATIONS AND FUTURE RESEARCH | 96 |
| REFERENCES | 97 |
| APPENDIX 1: RESEARCH AGREEMENT WITH UNSI | 105 |
| APPENDIX 2: ETHICS APPROVAL FROM MI'KMAW ETHICS WATCH | 110 |
| APPENDIX 3: ETHICS APPROVAL FROM DALHOUSIE REB | 112 |

LIST OF TABLES

| | |
|---|----|
| Table 3.1 Variables of Interest | 30 |
| Table 3.2 Construction of Residential School History Variable | 34 |
| Table 3.3 Construction of Cultural Attachment Variable | 35 |
| Table 3.4 Scoring for Drug Use Variable | 36 |
| | |
| Table 4.1 Summary of Community Characteristics | 44 |
| Table 4.2 Weighted Analysis of Variables by Gender | 46 |
| Table 4.3 Weighted Analysis of Variables by Age Category | 48 |
| Table 4.4 Weighted Simple Regression Analysis of Social Support Variables | 62 |
| Table 4.5 Summary of Results of Table 4.4 | 64 |
| Table 4.6 Weighted Simple Regression Analysis of Health Outcome Variables | 66 |
| Table 4.7 Summary of Results of Table 4.6 | 68 |
| | |
| Table 5.1 Determinants of Health Model of Self-Rated Health | 76 |
| Table 5.2 Determinants of Health Model of Emotional Health | 76 |
| Table 5.3 Confounding Effects Model of Self-Rated Health | 78 |
| Table 5.4 Confounding Effects Model of Emotional Health | 79 |
| Table 5.5 Goodness of Fit Indices for Self-Rated Health Models | 81 |
| Table 5.6 Goodness of Fit Indices for Emotional Health Models | 85 |
| Table 5.7 Standardized Path Coefficients for Emotional Health, Model 1 | 86 |
| Table 5.8 Standardized Path Coefficients for Emotional Health, Model 2 | 88 |

LIST OF FIGURES

| | |
|---|----|
| Figure 1.1 Map of Nova Scotia Mi'kmaq Communities by Tribal Council | 3 |
| Figure 2.1 Berkman and Glass Model of the Social Environment | 19 |
| Figure 2.2 Conceptual Model 1 | 19 |
| Figure 2.3 Conceptual Model 2 | 20 |
| Figure 2.4 Conceptual Model 3 | 20 |
| Figure 2.5 Final Conceptual Model | 21 |
| Figure 3.1 Overall Methodological Approach | 38 |
| Figure 4.1 Classification Tree of Affection and Intimacy | 51 |
| Figure 4.2 Classification Tree of Tangible Support | 53 |
| Figure 4.3 Classification Tree of Emotional Support | 54 |
| Figure 4.4 Classification Tree of Positive Social Interaction | 55 |
| Figure 4.5 Classification Tree of Overall Support | 56 |
| Figure 4.6 Classification Tree of Self-Rated Health | 58 |
| Figure 4.7 Classification Tree of Reported Medical Conditions | 59 |
| Figure 4.8 Classification Tree of Emotional Health | 60 |
| Figure 5.1 Confounding Effects Models of Social Support and Health | 74 |
| Figure 5.2 Self-Rated Health, Model 1 | 80 |
| Figure 5.3 Self-Rated Health, Model 2 | 82 |
| Figure 5.4 Self-Rated Health, Model 3 | 83 |
| Figure 5.5 Emotional Health, Model 1 | 84 |
| Figure 5.6 Emotional Health, Model 2 | 87 |

ABSTRACT

Using the 2002/2003 cycle of the First Nations Regional Health Survey (RHS) from Nova Scotia, which is implemented and owned by the Union of Nova Scotia Indians, this research 1) estimated the influence of social support as a determinant of health among Nova Scotia Mi'kmaq communities and 2) theorized the pathways connecting social support to health outcomes.

Data was first examined descriptively using un-weighted classification trees and weighted simple regression. Structural equation modeling and weighted multiple regressions tested confounding pathways, confounding effects, and the determinants of health.

Social support was found to be an important determinant of fair or better self-rated health (OR=1.10 $p<0.05$) and of good emotional health (OR=1.06, $p<0.05$) with every unit increment of the social support scale. The final pathway models illustrated social support as a mediator between social determinants of health such as cultural attachment, relationship status, age, and gender and health outcomes.

LIST OF ABBREVIATIONS AND SYMBOLS USED

ACEWH: Atlantic Centre of Excellence for Women's Health

AFN: Assembly of First Nations

APS: Aboriginal Peoples Survey

CFI: Comparative Fit Index

CHR: Community Health Representative

CI: Confidence Interval

CIHI: Canadian Institute for Health Information

CIHR: Canadian Institutes for Health Research

CMM: Confederacy of Mainland Mi'kmaq

FNIHB: Health Canada's First Nations & Inuit Health Branch

HPAIED: Harvard Project for American Indian Economic Development

INAC: Indian and Northern Affairs Canada

MHRG: Mi'kmaq Health Research Group

MOS: Medical Outcomes Survey

NAHO: National Aboriginal Health Organization

NFI: Normed Fit Index

NNFI: Non-Normed Fit Index

OCAP: Ownership, Control, Access, and Possession

OR: Odds Ratio

PHRU: Population Health Research Unit

RCAP: Royal Commission on Aboriginal Peoples

RHS: First Nations Regional Health Survey

SAS: Statistical Analysis Software

UNSI: Union of Nova Scotia Indians

WHO: World Health Organization

WHO-MEKN: WHO Measurement and Evidence Knowledge Network of the Commission on Social Determinants of Health

ACKNOWLEDGEMENTS

Throughout the journey of this thesis and degree I have been supported and encouraged by many wonderful people.

Many thanks to my thesis committee, Swarna Weerasinghe and Fred Wien, who oversaw this work and to Sally Johnson at the Union of Nova Scotia Indians for her support and advice.

This research was funded by the Atlantic RURAL Centre and the Canadian Institutes for Health Research and supported by the Department of Community Health and Epidemiology at Dalhousie University

Copyright: First Nations Information Governance Committee, Assembly of First Nations – (2010). Users are forbidden to copy the data and re-disseminate them, in the original or a modified form, without the express written permission of the First Nations Information Governance Committee of the Assembly of First Nations. Information on the availability and use of RHS data can be obtained at www.rhs-ers.ca

Source: Based on the First Nations Regional Longitudinal Healthy Study (2002/2003). The Assembly of First Nations (First Nations Information Governance Committee), and The Union of Nova Scotia Indians. All computations, use and interpretation of these data are entirely those of the author.

CHAPTER 1: INTRODUCTION

1.1 THE CANADIAN ABORIGINAL POPULATION

The 2006 census revealed that the total Aboriginal population in Canada was 1,172,790. This represented a 45% increase from 1996 and confirmed it as a rapidly growing population (Statistics Canada, 2008). This population is expanding at an even faster rate in Atlantic Canada and although the proportion of those living in urban areas is quickly growing, the majority of status-First Nations people still live in rural regions, primarily in reserve communities (Statistics Canada, 2008).

Diversity of Aboriginal Peoples in Canada

There is much diversity among Aboriginal Peoples in Canada, which includes people of First Nations, Inuit, and Métis descent. First Nations people comprise approximately 65% of the Aboriginal population and include those who are status and non-status. Those who are status are registered under the Federal Indian Act and are accorded certain rights and benefits. The First Nations population encompasses fifty culturally and linguistically distinct groups (CIHI, 2004). The Inuit make up approximately 5% of Canada's Aboriginal population and are found in fifty-five, often remote, communities in the North. The Métis are a group culturally and linguistically distinct from First Nations and Inuit who arose from intermarriage of First Nations and Europeans. This group comprises approximately 30% of the Canadian Aboriginal population (CIHI, 2004).

A Brief History of Aboriginal Peoples in Canada

Before the arrival of Europeans in North America, there were thousands of autonomous Aboriginal bands in what is today Canada. In Nova Scotia and the Maritimes, the predominant band was the Mi'kmaw Nation. Exact population numbers prior to the settlement of Europeans are difficult to determine. However it is indisputable that an extremely large proportion of the Aboriginal population was lost due to war and

the arrival of European diseases for which First Nations people did not have immunity. Treaties between the Canadian government and First Nations were signed between 1871 and 1930 and often secured government title to land and resources occupied by First Nations peoples and limited the latter to specific areas of land often in remote, swampy, non-arable sites (Waldram et al, 2006). It is through these treaty agreements that First Nations peoples obtained the right to healthcare and other social services from the federal government. The government's Indian Agent from whom members of the community had to obtain permission to leave often controlled life on reserves (Knockwood, 2001). Official government policy was to assimilate Aboriginal people into Western society and banning traditional ceremonies, limiting traditional ways of life, and removing children from their families were common practices. The establishment of residential schools further strengthened the hold of the government and religious institutions over First Nations peoples (Waldram et al, 2006). These schools, for example the Shubenacadie School in Nova Scotia, seriously damaged the culture and well-being of First Nations peoples and the fallout is still felt in communities today (Knockwood, 2001).

The latter half of the twentieth century saw increasing economic independence and moves towards self-determination by First Nations bands. The 1996 Royal Commission on Aboriginal Peoples (RCAP) released its final report condemning the historical treatment of Aboriginal Peoples and proposing a complete restructuring of the relationships between Aboriginal peoples, the Canadian government, and Canadian society (RCAP, 1996). Recently many First Nations bands have taken control of health, social services, and education through transfer agreements, often with the cooperation of provincial governments (Waldram et al, 2006).

Aboriginal Health in Canada

The health of Aboriginal peoples in Canada has consistently been shown to be poorer than that of the general population as evidenced by higher rates of obesity, heart disease, diabetes, high blood pressure, tuberculosis, injuries, and suicide (CIHI, 2004). However, these outcomes vary amongst the Aboriginal population depending on a number of factors including geography, Aboriginal identity (Inuit, Métis, or First

Nations), and whether domiciled on or off reserve. An example of this diversity in outcomes can be seen in the prevalence of diabetes, which varies by identity, status, language family, and cultural area (Waldram et al, 2006).

In general, the Canadian Aboriginal population tends to be younger with lower education, income, and health status when compared to the general Canadian population (Waldram et al, 2006). But, the considerable regional and intercommunity variation makes it difficult to apply national-level analyses to specific communities.

1.2 THE NOVA SCOTIA MI'KMAQ POPULATION

A Demographic Profile of the Nova Scotia Mi'kmaq Population

Two different Tribal Councils represent the thirteen First Nations Mi'kmaq bands in the province: The Union of Nova Scotia Indians (UNSI) and the Confederacy of Mainland Mi'kmaq (CMM) (Figure 1.1).

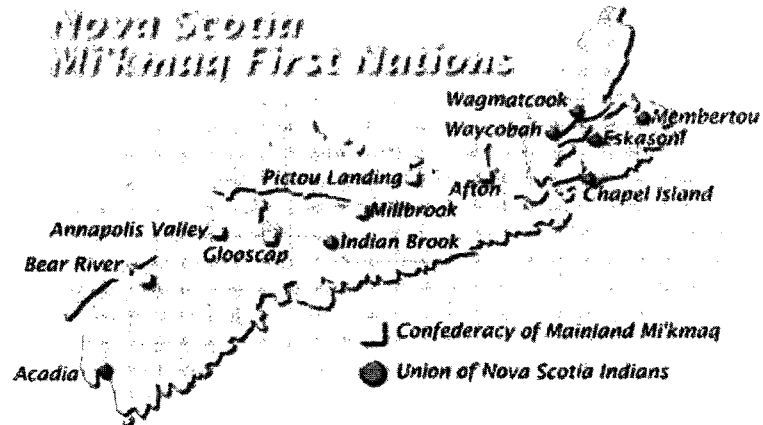


Figure 1.1. A Map of Nova Scotia Mi'kmaq Communities by Tribal Council. Retrieved from the Confederacy of Mainland Mi'kmaq: <http://www.cmmns.com/SixCommunities.php>.

Among the communities there is wide variation in population size with all but two of the communities having populations of less than 1,500 (MHRG, 2007). Additionally,

there is diversity in the availability of health and social services available within each community and the distance of the community to an urban centre.

These communities present unique social, economic, historical, and demographic living conditions compared to the rest of Nova Scotia. These are important elements to consider as they link to health outcomes through the accepted social determinants of health (WHO/MEKN, 2007). In an analysis of the 1991 Aboriginal People's Survey, Wilson and Rosenberg found that variables that were statistically significant in relation to health were similar to determinants commonly found to be associated with the health of the general Canadian population (2002). There are however, some determinants specific to First Nations communities including measures of cultural attachment and residential school attendance.

Reserves can be challenging places to live, as they are often isolated from the rest of society. This isolation can lead to community and family tensions from the insular environment and limited employment prospects (McIntyre et al, 2001). Simply living on reserve or in a rural area with a high proportion of the population identifying as Aboriginal is a risk of having lower health outcomes (Lavergne, 2009; Wilson & Rosenberg, 2002). However, a positive aspect of living on reserve is that there are close family ties that encompass the whole extended family and a sense that the whole community is your home (McIntyre et al, 2001).

In the 2006 census 24,175 individuals in Nova Scotia identified with at least one Aboriginal group, and of these 12,425 reported being registered Indians (Statistics Canada, 2009b). It should be noted that although the census can provide a sense of the demographics in First Nation communities there is a high rate of underreporting that results in sometimes-inaccurate results. For example, the 2006 Census reports 425 registered Indians in the Chapel Island First Nation however Indian and Northern Affairs Canada which is more accurate source reports 626 registered individuals as of September 2009 (Statistics Canada, 2009b; INAC, 2009).

The adult Aboriginal-identified population in Nova Scotia is predominantly young with the 2006 census revealing a median age of 29.5 compared to a median of 48.1 for the rest of the province (Statistics Canada, 2009a & 2009b; MHRG, 2007). Of the

population of registered individuals 47% were male and 53% were female (Statistics Canada, 2009b). Gender roles have been found to be stricter on reserve than off however it is accepted that these can be overcome by economic circumstances (McIntyre et al, 2001). This young population is also predominantly single with 42.6% of the population above 18 identifying as such (MHRG, 2007; Statistics Canada, 2009b). This is of note because being married has been associated with higher health in the Canadian Aboriginal Population (Wilson & Rosenberg, 2002).

Both the 2002/2003 RHS and 2006 Census revealed low income rates and low rates of employment in Mi'kmaw communities (MHRG, 2007; Statistics Canada, 2009b). In 2005 Aboriginal-identified households had a median income of \$38,183 compared to \$46,605 for the rest of Nova Scotia (Statistics Canada 2009a & 2009b). The Nova Scotia Aboriginal median income is even lower than that of the Canadian Aboriginal population which has a median household income of \$43,261 (Statistics Canada, 2009b). Lower income has been associated with lower health within the Canadian Aboriginal population (Wilson & Rosenberg, 2002). Poverty and its associated concerns such as food security, housing conditions, and access to services are a major concern especially as income is one of the most predominant social determinants of health.

One of the effects of such a young population is a higher pressure to find jobs and housing and to find relevant services (MHRG, 2007). This can be a challenge when living in an isolated area with limited employment prospects (McIntyre et al, 2001). About 44% of the population works for pay and about half of the population are on a type of social assistance (MHRG, 2007). This is important to consider as having employment increases one's odds of good health in this population (Wilson & Rosenberg, 2002).

One barrier to employment can be education. There are clear gender differences in educational attainment in this population with more women than men completing high school or a higher degree –greater than half of Mi'kmaq women and only 38% of men (MHRG, 2007). This becomes especially clear in relation to university education where women outnumber men (Statistics Canada, 2009b; MHRG, 2007). The one educational area where there are a higher proportion of men than women is in the trades (Statistics Canada, 2009b).

Housing conditions in this population are also a concern with more than a third of homes requiring major repairs (MHRG, 2007). Results from the 2006 Census do not however suggest that overcrowding is as much a concern in this population as it is in other First Nations communities in Canada (Statistics Canada, 2009b).

There is a great amount of pride among adults and youth in their Mi'kmaw heritage (McIntyre et al, 2001; MHRG, 2007). Despite the negative impact of residential schools on culture and language almost three quarters of Mi'kmaq adults state that traditional cultural events and spirituality are very or somewhat important in their lives (MHRG, 2007). There continues to be consumption of traditional foods in the communities and the practice of sharing such food is common (MHRG, 2007). The focus on traditional food is important, as much literature has focused on the connection between the rise in store-bought packaged food and the prevalence of diabetes (Garro, 1995). Despite this, Wilson and Rosenberg found a negative association between traditional food consumption and self-rated health in the Canadian Aboriginal population (2002). It was theorized that this was confounded by poverty where low income families or individuals who could not afford store-bought food supplemented their diet by increasing the amount of traditional foods in their diet (Wilson & Rosenberg, 2002).

The Mi'kmaq language has also shown itself to be resilient and 44% of Mi'kmaq adults use it in everyday life (MHRG, 2007). However, despite these positives, much of the traditional knowledge and practices rests with adults and need to be passed down through the generations. For example, only about a quarter of adults use traditional medicines, and there is inconsistent access to traditional healers in the communities (MHRG, 2007).

Depending on the community, local government may have complete or partial control over health services. Due to non-status individuals using provincial or private services and status individuals using First Nations and Inuit Health Branch (FNIHB) or band services, intricate cost sharing agreements are created with provincial governments (Waldram et al, 2006). Due to the range of sizes of the Mi'kmaq communities in Nova Scotia there is a range of levels of service and of band control over these services, sometimes resulting in confusion and difficulty accessing health care (Tripartite, 2005).

There have, however, been some interesting and encouraging projects such as the Eskasoni Health Centre and movements away from the traditional fee-for-service model of paying physicians (Tripartite, 2005). Initial results from the 2002/2003 cycle of the First Nations Regional Health Survey (RHS) suggest that the majority of on-reserve adults in Nova Scotia believe that their health care is on par with that of the general population but health outcomes still display some troubling differences (MHRG, 2007).

The Health of the Nova Scotia Mi'kmaq Population

According to a report by the Atlantic Centre for Excellence in Women's Health (ACEWH) young people living on-reserve in Nova Scotia discussed poor health as part of the context of living on reserve (McIntyre et al, 2001). Analysis of health care use in the largest community, Eskasoni in Cape Breton, from the late 1990's revealed higher rates of diabetes, cardiovascular, infectious, and respiratory disease admissions than the rest of the Cape Breton and Nova Scotia populations (Webster et al, 2004).

Less than half of respondents on the 2002/2003 cycle of the RHS identified their health as excellent or very good (MHRG, 2007). The most prevalent chronic conditions in this population are similar to that of the general Nova Scotia population however there is a significantly higher prevalence of diabetes in the Mi'kmaq population – 20% versus 6% in the general population and a higher rate of injuries among the Mi'kmaq population (MHRG, 2007). Additionally, the burden on disease within these communities appears to fall more on women than on men (MHRG, 2007). When asked what makes them healthy, Mi'kmaq individuals tended to reflect broader determinants of health including being content, having a good diet, having social support, and having life in balance (MHRG, 2007).

Mi'kmaq adults have very high rates of smoking – almost 60% of adults smoke daily – however this may be changing. Smokers in this population begin smoking at a very young age and data has shown a drop in youth smoking rates (MHRG, 2007). While alcohol consumption rates for the adult Mi'kmaq population are lower than for the general Nova Scotia population, the rate of binge drinking among those who do drink is worryingly high (MHRG, 2007). There are also relatively high rates of drug use and

risky sexual practices, though these are found predominantly in the young adult population and drop off with increasing age (MHRG, 2007).

The top health priorities identified in a study for the Mi'kmaq-Nova Scotia-Canada Tripartite Forum were mental health and addictions/substance use (Tripartite, 2008). These were identified based on community engagement sessions, web-based youth surveys and web-based health system/professionals surveys. This high level of concern surrounding mental health was also apparent in the results of the 1996 cycle of the RHS that revealed that young Mi'kmaq women experienced high levels of stress (McIntyre et al, 2001). This was followed up with a study by the ACEWH that compared young teenage men and women. Compared with men, women described having continuous and multiple stressors. The most common sources of stress among men and women were family problems and school problems. Only young women discussed pregnancy, violence, and abuse and only young men mentioned drug and alcohol abuse (McIntyre et al, 2001).

Results from the 2002/2003 cycle of the RHS revealed that 80% of adult Mi'kmaq women sought help for emotional problems in the past twelve months compared with 60% of adult Mi'kmaq men (MHRG, 2007). This is consistent with the finding that more women than men felt sad, blue, or depressed for two or more weeks in a row in the past twelve months (MHRG, 2007). Suicide, an often-discussed concern within Aboriginal health in Canada, has also affected these communities and within the previous year over a quarter of adults reported losing a close friend or family member to suicide (MHRG, 2007).

Health and healing in Canadian First Nations populations is not limited to the physical and mental health conditions discussed above. The concept of health in Canadian First Nations populations is more holistic than the traditional biomedical approach taken by many Western-trained health professionals. Although there is diversity in how various First Nations groups traditionally view health, it is often considered "in terms of balance, harmony, holism, and spirituality rather than in terms of the Western concepts of physical dysfunction and disease within the individual" (pp. 267) (Shah, 2004). A popular model of this is the Medicine Wheel, which contains four

directions representing components of health: physical, mental, emotional, and spiritual (Shah, 2004; Waldram et al, 2006). The objective is to achieve balance between the four components. Additionally, the concept of health included not only the health of the individual, but also that of the entire community. As a result, health often has a relational aspect to it, involving how an individual relates to others in the context of the social norms of the community (Waldram et al, 2006). For example in a study of attitudes towards the rising prevalence of diabetes in a Southern Manitoba Anishinaabe community, Garro (1995) found that the disease was not viewed just from a medical perspective but was placed in a historical and collective context in which it was not just an individual responsibility but one of the whole community.

This holistic approach to health is consistent with the WHO definition of health: “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (WHO, 1948). The anthropological disease-illness model is useful for examining this idea (Helman, 1981; Kleinman et al, 2006). In this model disease is abnormalities of the structure and function of the body’s organs and systems. It is measurable and represents a deviation from normal processes that are universal (Helman, 1981). Illness is the subjective experience of an individual and people close to them of an ill-health event. This can include how they perceive the origin and significance of the event, how it affects behaviour and relationships, and steps taken to remedy the situation (Helman, 1981). This study will examine measures of both disease and illness.

Waldram, Herring, and Young (2006) declare, “The health of any human population is the product of a complex web of physiological, psychological, spiritual, historical, sociological, cultural, economic, and environmental factors” (pp. 3). This determinants approach to health is very much in-line with the First Nations concepts discussed above.

1.3 PURPOSE AND OBJECTIVES OF THE RESEARCH

The purpose of this thesis is to explore one of the pertinent factors that determine the health of a population, specifically social support, and to investigate its pathways to

health in the on-reserve Nova Scotia Mi'kmaq population. The objectives of this thesis were:

- To describe the influence of social support as an upstream and downstream determinant of health, and
- To theorize the patterns connecting social support to health and health behaviours.

The specific research questions to be addressed are:

1. What are the social, cultural, and economic level upstream factors contributing to the social support of the Nova Scotia Mi'kmaq population?
2. What are the relationships between social support and health as indicated by self-rated health, reporting a medical condition, and emotional health?
3. What is the relationship between social support and health behaviours?

CHAPTER 2: LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Interest in the social determinants of health has been growing since the mid-twentieth century and a series of government reports have led to a debate on social approaches to health and the healthcare system. In 1974, the Lalonde Report in Canada, raised concerns about the determinants of health beyond the healthcare system itself (Lalonde, 1974). Four years later the Declaration of Alma-Ata was made at the International Conference on Primary Health Care declaring the right of health for all (WHO, 1978). In the 1980's the Ottawa Charter for Health Promotion revitalized the public health movement by discussing the broader determinants of health and calling for international action in promoting health and eliminating inequities (WHO, 1986). The recent Senate report, *A Healthy, Productive Canada: A Determinant of Health Approach*, emphasizes a social determinants approach that is external to the healthcare system (Senate, 2009). Also, frameworks such as the Evans and Stoddart model (1990) are built upon three major pillars of health, the social, physical, and genetic environments and healthcare is considered to be an intermediate component that connects those pillars to health and well being. Although frameworks approach health in a different ways, together they are relatively exhaustive in their investigation of the social determinants of health with the possible exception of the role of culture and context (Wilson & Rosenberg, 2002).

The field of social epidemiology emerged in tandem with this health promotion movement in an attempt to address the question of “who and what is responsible for population patterns of health, disease, and well-being as manifested in present, past, and changing social inequalities in health?” (Krieger, 2001). For example, although social status is widely accepted as determinant of health there are a number of hypotheses theorizing the causal pathways leading to good health.

The WHO's Measurement and Evidence Knowledge Network of the Commission on Social Determinants of Health declared that such determinants must be read through a lens which “deals with its salience, meaning, and relevance in particular local contexts” (WHO/MEKN, 2007). First Nations communities in Nova Scotia live in different

historical, political, economic, historical, and social contexts than the rest of the provincial population and it is therefore important to account for this in health research.

This research project serves a dual purpose: (1) to better understand the social determinants of health by deriving culturally validated data to complement the wealth of existing qualitative data; and (2) to provide Mi'kmaw communities with useful information. The results of this research project are intended to be used to aid in the development of policy and program initiatives and may also serve as a basis for analysis of further cycles of the First Nations Regional Health Survey (RHS).

2.1 RATIONALE FOR STUDY

It is generally acknowledged that being a First Nations person increases one's risk of negative health outcomes, however living in a rural predominantly Aboriginal community has a similar effect regardless of ethnic identity (Lavergne, 2009; Wilson & Rosenberg, 2002). Despite this it is often difficult to get accurate data from First Nations communities for a number of reasons. Research using provincial databases often excludes this segment of the population as there is often no valid indicator to de-aggregate status-First Nations individuals from the rest of the provincial population. Also, population survey data is often aggregated to the national level, which prevents understanding of regional subtleties.

It is therefore important to create partnerships and involve First Nations people and organizations in the collection, analysis, and interpretation of data and to recognize the principles of OCAP: Ownership, control, access, and possession. The First Nations Regional Health Survey (RHS) embraces all of these principles in addition to utilizing culturally validated measures and method of data collection.

Of the two types of studies, qualitative and quantitative, epidemiologic quantitative studies often examine determinants of health and their outcomes and thereby allow identification of inequalities in health. These types studies have only recently begun to incorporate culturally relevant measures and measures of cultural attachment. Qualitative studies are often more anthropological and focus on the relationship between

culture and health but small sample sizes limit their generalizability (Wilson & Rosenberg, 2002). The need for research that goes beyond descriptive epidemiology (Willows, 2005) and determinants of health approach (Wilson & Rosenberg, 2002) to incorporate culturally appropriate measures (Iwasaki et al, 2006) has been emphasized.

This thesis research will use a culturally-validated quantitative approach to examining the role of social support and other social determinants of health in the Nova Scotia Mi'kmaq Population using secondary data analyses of the 2002/2003 cycle of the RHS, a population health survey which in Nova Scotia is implemented and owned by the Union of Nova Scotia Indians. The RHS was culturally-validated through consultation with diverse stakeholders, two rounds of formal field testing, and upholding one of the guiding principles of the survey's design which was that it would be culturally valid to First Nations peoples (HPAIED, 2006).

2.2 THE SOCIAL ENVIRONMENT

The Social Determinants of Health

The social determinants of health attempt to address how various pathways enable social conditions to affect health and can contribute to a wider understanding of health outcomes (WHO, 2007). For example, a recent Canadian study on the determinants of Aboriginal status, income, and place suggested that such determinants are proxies for opportunities, resources and constraints which result in unequal opportunities in life thus affecting one's health (Frolich et al, 2005). Measurement of these determinants can provide the basis for action that can impact these determinants and therefore health outcomes (WHO/MEKN, 2007).

Challenges to measuring the social determinants of health include a lack of precision in specifying causal pathways, merging the causes of health improvement with the causes of health inequities, and the impact of contextual interpretation of evidence and on the concepts used to gather evidence (WHO/MEKN, 2007). Principles that can help to move measurement of social determinants forward include taking an evidence-based approach, being methodologically diverse, clarifying causal pathways, taking both

a structural and dynamic approach to understanding social systems, and explicating potential bias (WHO/MEKN, 2007).

There are four basic theories modelling the association between the social determinants and health outcomes.

- The **Materialist/Structuralist** model that theorizes that determinants, for example income levels, modulate access to resources which allow an individual to cope with the stressors of life (WHO/MEKN, 2007).
- The **Psychosocial** theory which believes that psychological stressors can alter one's susceptibility to pathogens or directly impact one's health. Cumulative stress that impacts one's allostatic load can also wear down one's ability to respond to illness (Krieger, 2001; WHO/MEKN, 2007). This theory does not pay much attention to where such stressors or buffers to them originate or how they are distributed.
- The **Social Production of Health** model introduces the 'upstream' and 'downstream' approach to addresses the economic and political determinants of health that often create structural barriers to living healthy lives (Krieger, 2001; WHO/MEKN, 2007).
- The **Eco-Social** theory describes a multi-level dynamic perspective (Krieger, 2001). The goal of this theory is to generate a "set of integral and testable principles to guide inquiry" (Krieger, 2001). Investigation using this model focuses on how environments, both social and physical, interact with biology and how "individual's 'embody' aspects of the contexts in which they are living and working" (WHO/MEKN, 2007).

This thesis research focuses on the role of the social environment, in particular social support, as a determinant of health and will embrace the social production of health model. The concept of one's social environment encompasses a variety of aspects including social cohesion, social networks, social support, and social capital. These concepts are measured at both individual and community levels (Hsieh, 2008).

Social Support

The idea of the determinant of interest in this research, social support, is relatively intuitive however there are numerous attempts at conceptualizing and measuring it. In the 1980's and 1990's sociologists and social epidemiologists thought of social support in relation to stress. House (1981) describes social support as acting as a buffer against stress as well as having a direct positive influence on health. In this scenario stress is a potential confounder in the association between social support and health. But there are a number of factors that have been identified as confounders of this association including socio-demographic characteristics (age, sex, income, and education), mobility or activity limitations, family size, social participation, rurality, community size, and household size. Also, there are First Nations-specific determinants of health such as cultural attachment, residential school attendance and community self-determination which could act as confounders of the association between social support and health (Broadhead et al, 1983; Richmond et al, 2007; House, 1981; Wright, 2006).

Social support itself is a dynamic entity and can be examined from numerous angles. It can be enacted or perceived, institutional or intimate, general or problem-specific, emotional, tangible, or informational. Although this presents a number of measurement challenges, this diversity of support is something to be embraced (Barrera, 1986). Consensus in the literature is that there can be great differences between what one perceives to be the support available to them and the enacted support that occurs in times of need (Barrera, 1986; Sherbourne & Stewart, 1991). It has been suggested that in relation to general health outcomes, perceived support is more imperative because of its psychosocial effects upon the individual in question (Barrera, 1986). Also, need confounds enacted support and may not reflect the amount of support available to a person on a regular basis (Sherbourne & Stewart, 1991).

The types of support that one receives can be from friends, family, organizations, and official programs to name a few. An example of institutional support in Canadian First Nations communities is the system of Community Health Representatives (CHRs) who act as liaisons between community members and the healthcare system and are

involved in public health programming as well as a number of other initiatives that can vary by community (Tripartite, 2005; Waldram et al, 2006).

In the Regional Health Survey, participants were asked whether various types of support were available when needed and answered on an ordinal scale. This is a measure of general, perceived support and can be categorized into four groups: Positive social interaction, emotional support, tangible support, and affection and intimacy or into one variable indicating overall support. This categorization is based on the Medical Outcomes Study (MOS) Social support Survey (Sherbourne & Stewart, 1991) and the work of Richmond et al (2007).

Associations between Social Support and Health

Various studies have examined how characteristics of in an individual's social support are shaped by one's social integration or social networks (House, 1981; Berkman & Glass, 2000). The predictors of social support can generally be broken into three categories: Characteristics of individuals, properties of relationships, and social and cultural conditions (House, 1981). The latter is the lone measurable category in this research. Social and cultural conditions can enable or deter the giving and receiving of social support and include socio-economic status, cultural attachment, relationship status, and geographic location (House, 1981; Berkman & Syme, 1979; Wright, 2006).

At the individual level, our social relationships regulate our thoughts, feelings, and behaviours that, in turn, shape our health. At the community level, shared values and cultural beliefs normalize how our social supports are organized and what our expectations are of them. Therefore, although we cannot necessarily separate the individual and community factors influencing one's social support, it is important to credit the complexity involved (Richmond et al, 2007).

In a qualitative study of support in Canadian First Nations communities, the small size of many of the communities involved resulted in blurred lines between institutional and intimate support (Richmond, 2007). Many CHRs discussed having difficulty getting time off away from their jobs of providing support, even when 'off the clock'.

Additionally, the small size of the communities involved in this study may blur the accepted association between social integration and support. In a small community in a post-colonial context, one may see high integration but low support (Richmond, 2007).

Social Support and Health Among Canadian Aboriginal Populations

There have been a number of both qualitative and quantitative investigations into the determinants of health among Canada's First Nations population. In many of these studies social support has been identified as a buffer against stress and negative health (Giles et al, 2008; Iwasaki et al, 2006; Newbold, 1998). For example, in a study of Canadian First Nations communities in the 1990's Newbold (1998) identified nine determinants of health including income and social status, the presence of absence of social networks, the state of the physical environment, and biological/genetic endowment (Newbold, 1998). And in a more recent study involving Conne River, a Mi'kmaq community in Newfoundland, non-health professional participants identified social support as contributing to a healthy lifestyle, positive attitude, and healthy diet leading to improved health (Giles et al, 2008). Additionally, health professionals from the Ontario Mohawk community of Akwesasne identified higher social support as directly impacting and lowering diabetes rates (Giles et al, 2008).

Despite this, there have been few quantitative studies specifically examining the relationship between social support and health among Canadian Aboriginal populations. In an analysis of the 2002 cycle of the Aboriginal Peoples Survey, Richmond et al (2007) categorized social support into the four previously described aspects: positive social interaction, emotional support, tangible support, and affection and intimacy. Multivariable logistic regressions were modeled with self-rated health as the dependent variable. For women, high emotional support, positive social interaction, and tangible support were positively and significantly associated with good health. High affection and intimacy were however significantly associated with lower odds of good health. For men, only emotional support demonstrated a significant association with good health in which high emotional support increased the odds of good health (Richmond et al, 2007).

These results highlight the fact that social support does not always have a positive influence on health. Negative associations such as the one observed by Richmond et al (2007) have been observed in populations where there are high levels of support but in which it has a negative effect upon identity formation. For example, populations with high rates of intimate partner violence and among gangs have demonstrated this negative type of association (Richmond et al, 2007; Hsieh, 2008).

It is difficult to draw too many conclusions from the study by Richmond et al (2007). As discussed above, there is very wide diversity within the Canadian Aboriginal population and it is not appropriate to generalize these findings to any sub-population or specific community. Despite this, the research discussed above along with others investigating the social environment and health of First Nations communities in Canada (Mignone & O'Neil, 2005; Chandler & Lalonde, 1998) does however highlight the important role of the social environment in determining health within these communities.

2.3 CONCEPTUAL MODELS OF SOCIAL SUPPORT AND HEALTH

The pathways connecting social support and health are found at both national and individual levels. In the field of international development Amartya Sen (2000) proposed two pathways for nations to increase the longevity of their citizens. The first is the route that led to increases in life expectancy in the “Asian Tigers” including South Korea, Hong Kong, Taiwan, and Singapore. This involves improvements to the economic stability and success of these countries. The second pathway Sen calls ‘support-led’ in which programs of social support through health-care and other social services lead to improvements in the health of the population (Sen, 2000).

This support-led pathway can be studied at an individual level. Berkman and Glass (2000) created a theoretical model in which to connect the social environment to health. In this model cultural, socio-economic and political contexts shape one’s social networks or level of social integration. These networks and their characteristics influence social support. This in turn impacts health through three pathways: Behavioural, psychological, and physiological (Berkman & Glass, 2000). The Berkman and Glass model is useful in defining terms relating to the social environment and conceptually

placing them on the theoretical pathway (Figure 2.1). It is important to note that as important as it is to understanding social structures, they are very dynamic structures as society is always in a state of flux (WHO/MEKN, 2008).

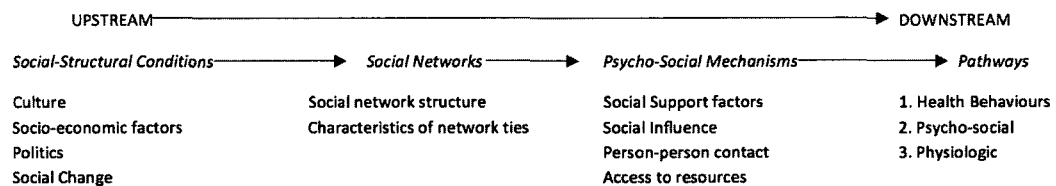


Figure 2.1. Berkman and Glass model of the social environment (2000).

Borrowing on the knowledge of such pathways, the following models were developed to combine social support and health within a population health framework.

Conceptual Model

As demonstrated in the literature, social support is associated with health and a variety of upstream determinants that are potential confounders in this association (Figure 2.2). All such associations have the potential to act in two directions. As this is a cross-sectional research study it is not possible to address the directionality of the associations. For example, positive social support can improve health through improvement in health behaviours. However, negative health outcomes might increase one’s social support as the need for assistance increases. Also, social status is a well-recognized upstream determinant of health though those in ill health may drop in social status due to increased economic burdens from illness.

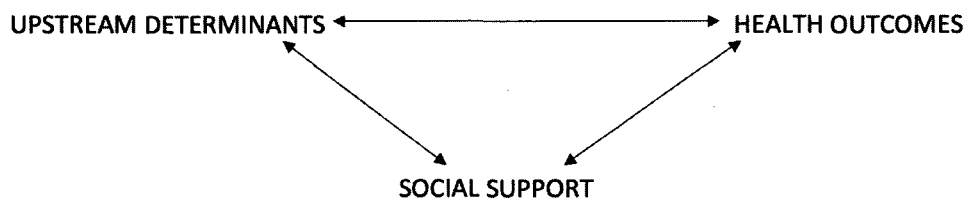


Figure 2.2. Conceptual Model 1.

Of the pathways through which social support can influence health: Psychological, physiological, and behavioural (Berkman & Glass, 2000), health

behaviours can be further investigated using data from the RHS. Although social support factors may influence health directly through physiological or psychological changes, they may also have an impact upon an individual’s health behaviours and lifestyles such as their diet, physical activity, substance use, and sexual health behaviours, which in turn have an impact upon their health (Figure 2.3).

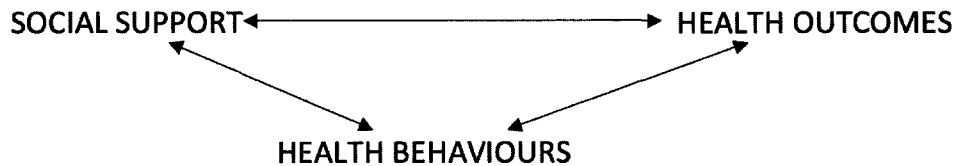


Figure 2.3. Conceptual Model 2.

The role of other upstream determinants of health must also be considered and have been incorporated into the model for this research (Figure 2.4). This allows for the direct and indirect associations between social support and health to be investigated while maintaining the categories conceived of in the Assembly of First Nations’ Cultural Framework for the RHS (AFN, 2007).

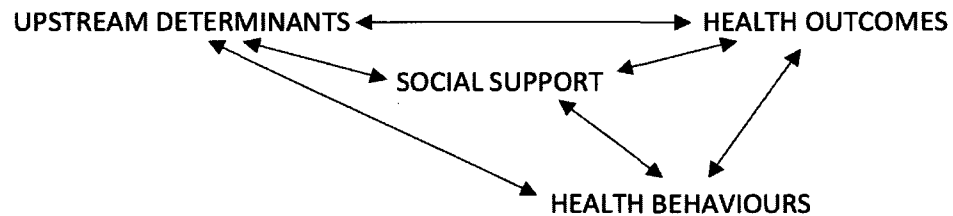


Figure 2.4. Conceptual Model 3.

In order to make the final model more culturally appropriate it has been converted into a circular figure similar to the medicine wheel featuring the four sacred colours of the Mi’kmaw Nation (Figure 2.5).

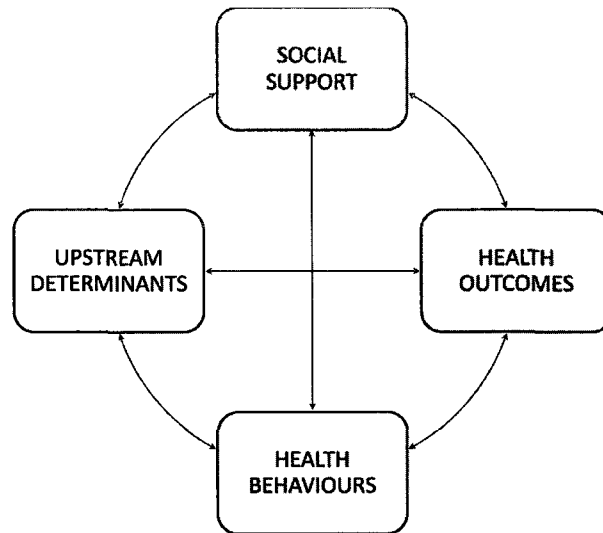


Figure 2.5. Final Conceptual Model.

Province-level analyses of these relationships will provide knowledge for the Mi'kmaw Nation and its communities in designing policy intervention programs, in directing further research, and in better understanding the associations between social support and health in their communities.

2.4 VARIABLES OF INTEREST

As demonstrated in the conceptual models above, variables for analysis were divided into four categories: Upstream determinants, social support measures, health outcomes, and health behaviours. The variables selected are discussed below.

Social Support Measures

The RHS adult questionnaire utilized an abbreviated version of the Medical Outcomes Study (MOS) Social Support Survey, which is commonly found among population health surveys and was adapted by the NAHO for use with this population. The MOS Social Support Survey was originally published in 1991 and was designed to investigate the perceived ability to access social support factors when needed. Four functional support scales were identified: positive social interaction, emotional support, tangible support, and affection and intimacy. The twenty-item questionnaire

demonstrated high convergent and discriminant validity of the four scales. All four scales had Alphas >0.91 and were stable over time. Additionally, they were distinct from measures of social networks and health measures (Sherbourne & Stewart, 1991).

Health Outcomes

Self-reported health, number of reported medical conditions, and emotional health were the aspects of health that were modeled in this study.

Self-reported health was used to represent overall health. It is considered to be a reliable indicator of overall physical and psychological health status and is considered to successfully cross cultural lines (Idler & Benyamini, 1997; Shields and Shooshtari, 2001). Despite these findings there is still some concern as to the proper interpretation of self-reported health in this population. As this is a culturally-homogenous population there should be no bias in relation to this variable however careful examination of the distribution of self-reported health and consultation with community members assisted in appropriate interpretation.

Upstream Determinants

The variables considered as upstream determinants of social support and health among adults are: age category, gender, relationship status, whether the participant has children, education, income source, crowding in the home, condition of the home, family history of residential school attendance, and cultural attachment. The selection of these variables is based upon the social support literature as well as the Aboriginal-specific social determinants of health (Wright, 2006; Richmond et al, 2007; NAHO, 2007; Senate, 2004; Berkman & Syme, 1979).

The incorporation of Aboriginal-specific determinants of health is important because of the specific experiences of this population. Waldram et al (2006) declared that it is important to consider the contemporary context of Aboriginal population while linking them to the specific processes and events that have led to their current status. In investigating access to social support among Canadian Aboriginal populations, Richmond

(2007) performed narrative analysis on interviews with twenty six CHRs from across Canada to better understand the interaction between local social conditions and the broader social context and how these impact social support. The respondents had broad shared experiences of forced assimilation, government paternalism, and poverty. At the local level, five themes emerged which affected people's access to social supports. These were: Trust, socio-economic dependence, group belonging, parent-child relationships, and the changing nature of help within the community. The factors identified by Richmond are strongly linked to some of the social determinants of health specific to Aboriginal populations as identified by the NAHO and the Kirby commission on mental health (NAHO, 2007; Senate, 2004). Richmond suggests that even in the presence of institutional supports, lack of trust or group belonging, shame, and fear of being judged may prevent individuals from seeking support. Measures for housing, cultural attachment, and residential school history have been included to address Aboriginal-specific determinants of health which could in turn be associated with social support.

Age is an important upstream determinant of both social support and health. In Aboriginal populations in particular, turbulent recent history such as that of the residential school experience has affected the health of different age groups in different ways (CIHI, 2004).

Biological sex has been shown to be a very strong determinant of health as well as social support, although gender and sex are different things the term gender will be used in this paper for consistency with the language of the RHS. A study of the stress experiences of young women on-reserve in Nova Scotia found that there are still fairly rigid gender role definitions in these communities although these structures can be overruled by economic factors (McIntyre et al, 2001).

Marital Status is considered to be a strong indicator of social networks which are an important predictor of social support among adults (Berkman & Syme, 1979; Berkman & Glass, 2000). Also, whether or not one has children can influence one's support system and the support one receives from it (Berkman & Syme, 1979).

Education, an indicator of social status and a predictor of health (Marmot, 2004; Health Canada, 2007) is often highly interactive with other social determinants of health,

in particular income, occupation, gender, and age (MENK, 2008). Income, another indicator of social status and predictor of health (Marmot, 2004; Health Canada, 2007), is often represented as total household income. This data was collected by the RHS however there was a high rate of missing values and therefore was not included in these analyses. It should be noted however that there are predominantly low incomes for adults living on reserve in Nova Scotia (MHRG, 2007). Additionally, only 44% of the adult population was working for pay at the time of this survey compared to 55% for the overall Nova Scotia population (MHRG, 2007). There are a wide range of income sources for this population, which can generally be categorized as employment, government, and other.

Housing has been identified as a major concern and social determinant of health among the Canadian Aboriginal population and has been associated with self-reported health status (Richmond et al, 2007; NAHO, 2007). This holds true for Nova Scotia Mi'kmaq communities in which 35.4% of homes are in need of major repairs (MHRG, 2007).

One's mobility represents the capability of navigating in various settings. Reduced mobility is often an indicator of a poorer health status that can also reflect an increased need for practical support (Dicianno et al, 2009).

Though the residential school system is no longer present in the communities its effects are still felt through current survivors and through their children and grandchildren (MHRG, 2007; Richmond, 2007a). The Indian Residential School in Shubenacadie was established in 1929 and closed in 1967. Isabelle Knockwood described her experiences in the school and interviewed many survivors for her book "Out of the Depths" (Knockwood, 2001). She writes, "We were being forcibly disconnected from everything our parents and elders had taught us, and everything new was learned in an atmosphere of fear" (pp. 52). She describes the effects of loss of language and culture, separation from their home communities and families, and fear of physical touching on former students. The legacy of residential schools is believed to be associated with the health outcomes of First Nations population through the breakdown of culture and social norms as well as the direct experiences of abuse.

Attachment to culture can be measured in many different ways including language use, attachment to the land, and participation in cultural events. For this study four factors were identified by a committee member, Dr. Wien, who has worked closely with these communities. These four factors were language use, use of traditional medicines, traditional food consumption, and importance of cultural events in the participant's life.

The maintenance of language is often identified as one of the most important variables in maintaining traditional culture and spirituality (Healey & Meadows, 2008). The use of traditional medicines is an important aspect of both traditional culture and spirituality. The collection and consumption of traditional food is an important aspect of traditional life for First Nations communities. There are strong aspects of community involvement and sharing in addition to the benefits to diet (Thompson & Gifford, 2000; Healey & Meadows, 2008). Participation in cultural activities indicates one's level of cultural integration and connection to the community.

Health Behaviours

Six health behaviours were examined in this study: physical activity, diet, cigarette use, binge drinking, illegal drug use, and sexual partners.

Physical activity is an important predictor of chronic disease outcomes and the social environment in which one finds oneself can greatly impact the likelihood of being more physically active. Cigarettes are one of the most commonly-identified risk factors to physical health and social support has been positively associated with cessation and reduction in amount smoked (Albertsen et al, 2006). Alcohol consumption is a multi-faceted issue. In this study alcohol is being examined as a potentially risky substance and therefore the emphasis is not on casual consumption but on excessive use, in this case five or more drinks at one time.

CHAPTER 3: METHODS

For this thesis research Nova Scotia First Nations Regional Health Survey data was used. The data source and selection of variables is described in the following chapter. Also, a brief summary of the statistical methods used in the analyses is provided at the end of this chapter.

3.1 DATA SOURCE

Due to the unique healthcare provision for status Indians discussed in the previous chapter, this population is often excluded from provincial administrative healthcare databases used for research and also often omitted from national-level surveys completed by Statistics Canada due to the complex procedures of accessing this population. Additionally the practice of control of data remaining with government and university-based researchers has historically led to the exclusion of the Aboriginal population and their worldview.

Iwasaki (2006) argued for increased use of quantitative methods which use ethnocentric measures stating that “simply including non-dominant cultural group members in a large-scale survey does not solve the problem unless the measures have been validated as appropriate to the cultural contexts of particular non-dominant group members, and unless the research process acknowledges the characteristics and life circumstances of communities/cultural groups.”

There are currently two national groups collecting health data from Canadian on-reserve Aboriginal populations: Statistics Canada and the Assembly of First Nations. The Aboriginal People’s Survey (APS) which is conducted by Statistics Canada is centralized and performs a cross-sectional sample of First Nation, Métis, and Inuit individuals above the age of fifteen living on and off-reserve in the ten provinces and three territories. Participants are identified using Census data. Although national Aboriginal organizations were consulted in the development of the survey, full participation of on-reserve communities was not obtained and ownership of the data remains with Statistics Canada (Statistics Canada, 2006). The Assembly of First Nations

has criticized the APS for not maintaining the OCAP principles of ownership, control, access, and possession (HPAIED, 2006).

The First Nations Regional Longitudinal Health Survey (RHS) was implemented to “support First Nations research capacity and control and to provide scientifically and culturally validated information to decision-making, planning, programming and advocacy with the ultimate goal of improving First Nations Health” (HPAIED, 2006). The Assembly of First Nations currently plans the RHS nationally however it was under the control of the National Aboriginal Health Organization at the time of the first cycle which was utilized in this research study. The First Nations Information and Governance Committee undertook national coordination of the RHS but local partners implemented the survey regionally. The Union of Nova Scotia Indians (UNSI) was responsible for conducting both the 1997 and 2002/2003 cycles of the RHS in Nova Scotia and cooperated with the Confederacy of Mainland Mi’kmaq (CMM) in order to represent all thirteen Mi’kmaq communities in the province. Throughout the process there was consultation with the Mi’kmaq Health Research Group (MHRG) which brings together representatives from the UNSI, CMM, and the Atlantic Policy Congress of First Nations Chiefs, as well as Aboriginal and non-Aboriginal health science faculty members from Dalhousie University. Data from the survey is managed and stored by the Population Health Research Unit (PHRU) in the Department of Community Health and Epidemiology at Dalhousie University and is owned by UNSI. The survey has been under First Nations control from conception through design, implementation, and analysis which is in accordance with the CIHR Guidelines for Research Involving Aboriginal People (CIHR, 2007). Additionally, the RHS has been commended by the Harvard Project for American Indian Economic Development for its scientific rigour and accordance with the OCAP principles of ownership, control, access, and possession (HPAIED, 2006). Although the APS and the RHS collect similar information and have similar questionnaire, the RHS was selected for this study for its superior sampling and level of community involvement.

The 2002/2003 cycle of the RHS involved three surveys: Children (0-11 years), youth (12-17 years), and adults (18 and older). All three questionnaires were designed and validated by the NAHO.

The questionnaires from the pilot cycle of the RHS in 1997 were used as a foundation for developing the first cycle surveys. The process of questionnaire design was driven by discussions and consultations with a wide range of stakeholders. The guiding principles of questionnaire design were comparability with other Canadian surveys and its cultural validity to First Nations Peoples. Wherever possible, questionnaire wording of the RHS was highly consistent with standard practices. An evaluation of the survey found it to be highly similar to the APS and other international surveys of indigenous populations, although the RHS contained more questions regarding participation in cultural activities, the impact of residential schooling, and traditional practices (HPAIED, 2006). Additionally the RHS was the only survey to separate youth from the population (HPAIED, 2006). All three surveys were subjected to two rounds of formal field testing and recommendations for changes to survey instruments were based on the results of these tests (HPAIED, 2006).

Sampling was stratified to ensure representation by small and medium and large communities. Attempts were made to ensure equal sampling of men and women and to have adequate numbers of children, youth, and adults. Among adults, sampling was skewed to ensure a representative number of adults above fifty-five were sampled. Replacement sampling was utilized.

Upon granting of the community Chief's permission, participants were randomly selected from up-to-date band lists of registered or status Indians living on the reserve at the time of the survey. Randomization was obtained using a computer-generated table of random numbers.

Paper consent forms in French and English were utilized and read aloud by the research assistant administering the survey and the participant was given a copy and signed each page to ensure the full document was read. The consent forms identified the organizations involved, the purpose of the study, topics covered, how data would be used, measures of confidentiality, and the voluntary nature of the study. Participants were provided assurance that refusal to participate would not affect any individual or family healthcare or provision of other services. They were also informed of their right to

withdraw from the study at any time. In some cases verbal consent was accepted and recorded by the research assistant.

In total 1472 participants were selected of whom 1189 completed the survey which results in an 81% response rate. This varied among surveys however with an 86% response rate among children, 62% among youth, and 93% among adults. Questionnaires were administered in-home by community-based research assistants on laptops. Youth were permitted to complete the survey on their own answering questions directly into the laptop with a research assistant available to answer questions. Adults were asked questions by the interviewers who imputed the data into the laptop. Substitutions for non-respondents were allowed for up to half of the people who failed to respond. Substitutes were randomly selected from the original sampling frame.

Upon completion of the survey, the data was sent electronically to the national database at the NAHO for secure storage and preliminary analyses. Surveys missing age, gender, or community identification were excluded as weights could not be calculated for these participants. To avoid processing errors during data capture, coding, editing, and weighting verification of expected outputs and reviews of edits and program syntax were performed at all stages (NAHO, 2006).

Within Nova Scotia ethical approval for the survey was granted by the Social Sciences Ethics Review Board at Dalhousie University and the Mi'kmaw Ethics Watch at the Mi'kmaq College Institute at Cape Breton University.

Weights were constructed by the national overseer of the RHS in order for the results of data analyses to be representative of the target population. Estimates used for weighting were calculated from the 2002 Indian Register counts and were adjusted for late reporting and under-reporting. Weighting accounted for age, gender, community size, and sub-region and occurred in three steps. Firstly, individual weights were calculated based on the predetermined population of the age and gender group within the participant's community. Secondly, weighting occurred by the number of communities in the sub-region to the number of communities sampled in the sub-region. Thirdly, individuals were weighted by the ratio of the age and gender group in their sub-region to the age and gender group in the participating communities. The final weight produced is

the product of all three weights. In the dataset being used in this study, Nova Scotia was the sub-region and, as all communities in the region participated, the last two steps result in a value of one. Therefore the weights used account for the probability of being sampled in your community based on one's age and gender (NAHO, 2006).

3.2 VARIABLES OF INTEREST

As discussed in the previous chapter, variables for analysis were divided into four categories: Upstream determinants, social support measures, health outcomes, and health behaviours. The variables discussed below are summarized in Table 3.1.

Table 3.1. Variables of Interest.

| Upstream Determinants | Social Support | Health Behaviours | Health Outcomes |
|--|---|---|---|
| <ul style="list-style-type: none"> - Age - Gender - Relationship status - Given birth to or fathered children? - Highest level of formal education attained - Source of Income - Crowding in home - Condition of home - Having an activity limitation - Residential school attendance - Cultural Attachment | <ul style="list-style-type: none"> - Affection and Intimacy - Tangible Support - Emotional Support - Positive Social Interaction - Overall Support | <ul style="list-style-type: none"> - Physical activity - Quality of diet - Cigarette use - Binge drinking - Frequency of illegal drug use - # Sexual partners in past year* | <ul style="list-style-type: none"> - Self-rated health - Reporting having a medical condition - Emotional health (having felt sad, blue, or depressed for two or more weeks in a row in the past year) |

Social Support Measures

Social support was measured in four aspects: affection and intimacy, tangible support, emotional support, and positive social interaction as well as in a composite index of overall support.

Affection and Intimacy was measured by the question: "How often is someone who shows you love and affection available to you when you need them?" There were four potential answers: All of the time; most of the time; some of the time; and almost none of the time.

Tangible support was measured by the question: “How often is someone to take you to the doctor if you need it available to you when you need them?” There were four potential answers: All of the time; most of the time; some of the time; and almost none of the time.

Emotional support was measured using two questions: “How often is someone to confide in or talk about yourself or your problems available to you when you need them?” and “How often is someone you can count on to listen to you talk when you need to talk available to you when you need them?” There were four potential answers for each question: All of the time; most of the time; some of the time; and almost none of the time. An overall emotional support variable was constructed by summing the responses from the two questions. The distribution of this new measure was examined and then broken into four categories: high, medium-high, medium-low, and low.

Positive Social Interaction was measured using three questions: “How often is someone to have a good time with available to you when you need them?”; “How often is someone to do something enjoyable with available to you when you need them?”; and “How often is someone who can give you a break from your daily routines available to you when you need them?” There were four potential answers for each question: All of the time; most of the time; some of the time; and almost none of the time. An overall positive social interaction variable was constructed by summing the responses from the three questions. The distribution of this new measure was examined and then broken into four categories: high, medium-high, medium-low, and low.

Overall support was measure by summing the scores from all seven questions used for the affection and intimacy, tangible support, emotional support, and positive social interaction variables along with the question “How often is someone you can count on when you need help available to you when you need them?” which was also measured on a four-point scale (high, medium-high, medium-low, and low).

Health Outcomes

Self-reported health, number of reported medical conditions, and emotional health were the aspects of health that were modeled in this study.

Self-reported health was measured by the question: “In general would you say that your health is...?” There were five potential answers: Excellent; Very Good; Good; Fair; Poor.

Medical health was modeled as the presence or absence of a reported medical condition. Having a medical condition was indicated by calculating the total number of reported medical conditions. This was then dichotomized into whether the participant had reported a medical condition (≥ 1) or did not report having a medical condition (0).

Emotional health was indicated by reporting having felt sad, blue, or depressed for two or more weeks in a row in the past 12 months. Mental health is often under-diagnosed and therefore difficult to measure, this indicator of emotional health was used instead to indicate emotional well-being.

Upstream Determinants

The variables considered as upstream determinants of social support and health among adults are: age category, gender, relationship status, whether the participant has children, education, income source, crowding in the home, condition of the home, family history of residential school attendance, and cultural attachment.

Age was categorized into three groups: 18-34, 35-54, and 55+. This allowed an examination of groups at different phases in their life.

Often the differences in social support between men and women are significant enough to suggest separate models (Richmond et al, 2007b). Due to the limited sample size in this study, analyses were not stratified by gender however it was adjusted for in the models.

Relationship status was examined in six categories: Married, divorced, common-law, widowed, separated, or single. Initially, this was also examined as a dichotomous

variable (attached or unattached), however there appeared to be a specific importance attached to being single but not to being widowed, separated, or divorced therefore the measure was left with the six categories. The number of children one has fathered or given birth to was dichotomized into having had children or not.

Education was measured as the highest level of education achieved by the participant: Did not graduate high school, high school graduate, diploma from a trade school, community college or university, Bachelor's degree, or Master's degree. Income was examined as having income from employment and not government sources, income from government and not employment sources, or income from both government and employment sources.

Two variables to indicate the participant's housing situation were considered, one indicating the level of crowding in the home and the second indicating the structural state of the building. Crowding was measured by a variable which divided the number of people residing in the home by the number of rooms excluding bathrooms, halls, laundry rooms, and attached sheds. Crowded was considered >1 person per bedroom and not crowded was considered ≤ 1 person per bedroom. This measure is similar to that used by Rosenberg and Wilson (2001) in investigating housing in Canada. The structural state of the building was considered as being in need of major repairs, being in need of minor repairs, only regular maintenance needed, or being in need of no repairs.

Mobility was measured using self-reported activity limitations. In the RHS participants were asked if they have any activity limitations to their health. This was dichotomized into having activity limitations or not having activity limitations.

A variable was constructed to reflect the residential school history of the participant and their family and contained four categories which are shown in Table 3.2.

Table 3.2. Construction of Residential School History Variable.

| | Participant Attended | One or more of participants' parents attended | One or more of participants' grandparents attended |
|-------------------|-----------------------------|--|---|
| Category 1 | Yes | Yes or No | Yes or No |
| Category 2 | No | Yes | Yes or No |
| Category 3 | No | No | Yes |
| Category 4 | No | No | No |

Four factors were used to create a measure of cultural attachment: language use, use of traditional medicines, traditional food consumption, and importance of cultural events in the participant's life were each dichotomized into high or low and then summed together to produce a five-point scale.

Participants were asked which language they used most frequently in daily life. Results were dichotomized into Mi'kmaq and other. The other category was predominantly English however did include a French speaker. Participants were asked if they used traditional medicines. The RHS asked participants a number of questions regarding the consumption of traditional foods; this was then summed to produce a continuous measure indicating the frequency of traditional food consumption. The RHS asked adults about the importance of traditional cultural events and of traditional spirituality in their lives. Replies were on a four-point ordinal scale of importance: Very important, somewhat important, not very important, and not important.

Due to a very low count in the highest category, the two highest categories were combined to produce a four point scale (Table 3.3). This measure of cultural attachment was exploratory and was created for the purposes of this study and has not been validated.

Table 3.3. Construction of Cultural Attachment Variable

| <i>Initial Questions</i> | | | <i>Interim Variable</i> | | | <i>Final Variable</i> | |
|---|--------------------|-------|-------------------------|-----------|---------------------------|-----------------------|-----------|
| Question | Response | Value | Value | Frequency | | Value | Frequency |
| “What language to you use most often in daily life?” | Mi’kmaq | 2 | High (5) | 2 | Combine due to low value. | High | 37 |
| | Other | 1 | 4 | 35 | | Medium-High | 141 |
| “Do you use traditional medicines?” | Yes | 2 | 3 | 141 | | Medium-Low | 217 |
| | No | 1 | 2 | 217 | | Low | 87 |
| “How important are traditional cultural events in your life?” | Very Important | 2 | Low (1) | 87 | | | |
| | Somewhat Important | | | | | | |
| | Not Very Important | 1 | | | | | |
| | Not Important | | | | | | |
| Traditional Food Consumption Index | 10+ | 2 | | | | | |
| | 0-9 | 1 | | | | | |
| | | | Sum together | | | | |

Health Behaviours

Six health behaviours were examined in this study: physical activity, diet, cigarette use, binge drinking, illegal drug use, and sexual partners.

Physical activity was measured in frequency (number of times/week) and in time (hours/week). Due to a low response rate in frequency, physical activity will be measured as weekly duration in hours with six categories: 0 hours, 1-2 hours, 3-4 hours, 5-6 hours 7-10 hours, or 11 or more hours.

The RHS asked participants how frequently they eat a nutritious and balanced diet. There were four possible answers: Always or almost always, sometimes, rarely, or never.

Participants were asked a series of questions regarding their frequency of substance use within the past year. The frequency of use of Marijuana/Hash, PCP/Angel dust, Acid/LSD/Amphetamines, Ecstasy, Inhalants (glue, gas, paint), Sedatives/Downers (Valium, etc), Cocaine/Crack/Freebase, Codeine/Morphine/Opiates (Percodan, Tylenol 3,

etc), and Heroin were each scored as shown in Table 3.4. Each participants scores for all substances were then summed together to produce a continuous variable of the frequency of illicit drug use in the past year.

Table 3.4. Scoring for each type of Substance in the Drug Use Variable

| Frequency of Drug Use | Score |
|------------------------------|--------------|
| Never | 0 |
| About 2-3 times per year | 2.5 |
| About once a month | 12 |
| About 2-3 times per month | 30 |
| About 2-3 times per week | 130 |
| About once a day | 365 |

The measure for cigarette smoking only considered current cigarette use and contained three categories: not at all, occasionally, and daily. Binge drinking was indicated by reporting having drunk five or more drinks at one time within the past year. Sexual health practices will be indicated by the number of sexual partners in the past year. Categories include: None, 1-2, 3-4, or 5 or more. In the Harvard evaluation of the 2002/2003 RHS, some participants commented that they took offence from not having a category with just one sexual partner in the past year. Often these were individuals in monogamous relationships who felt that by indicating 1-2 partners they were being misrepresented (HPAIED, 2006). Although this variable is asking about sexual health practices, it is also possibly representing relationship stability or how many intimate relationships one has had within the past year.

3.3 ACCESS TO THE DATA

Data analyses were performed in the author's office in the Department of Community Health and Epidemiology at Dalhousie University. Data and related files were stored on a password-protected USB key which was kept in a locked cupboard in the office. Upon completion of the project, the data and files will be returned to the UNSI or destroyed at their request. The researcher and UNSI agreed upon the details of data storage which are outlined in the research agreement (Appendix 1).

Data were treated with strict confidentiality and identifying characteristics of names and addresses were inaccessible to the researchers who could only observe a

coded id. All identifiable information was aggregated to larger groupings to preserve individual anonymity. The data was only available to the student and her committee. Interpretation and presentation of results was carefully presented in consultation with stakeholders in order to protect individual and community confidentiality. All results are presented using statistical measures such as aggregated estimates such as averages, percentages, odds ratios and relative risks explaining the association between different factors.

3.4 ETHICS

Upon beginning the project the author and the UNSI created a research agreement outlining data storage, project details, the roles of the author and the UNSI, and the process for publication and presentation of results (Appendix 1). In addition to the Canadian Tri-Council Policy Statement, the CIHR Guidelines for Health Research Involving Aboriginal People and the RHS Code of Research Ethics were followed (CIHR, 2007). Approval for the research was granted by the Mi'kmaw Ethics Watch at the Mi'kmaq College Institute at Cape Breton University and by the Health Sciences Research Ethics Board at Dalhousie University (Appendices 2 & 3).

Data was treated with strict confidentiality and all identifiable information was aggregated to larger groupings to preserve community and individual confidentiality. Tri-Council guidelines on preserving anonymity and confidentiality were strictly followed.

3.5 COMMUNITY CONSULTATION

Communication was maintained with the Union of Nova Scotia Indians and the Mi'kmaq Health Research Group to gain insight on appropriate use and coding of variables. A summary of results will be presented to MHRG representatives and the UNSI's liason to gain feedback to ensure culturally appropriate interpretation of the results.

Draft articles and reports will be made available for review by community representatives whose comments will be incorporated into the report and/or included as footnotes. This process was outlined in the research agreement between the author and the UNSI (Appendix 1).

3.6 METHODOLOGICAL APPROACH

The overall methodological approach to this study is described in Figure 3.1. As discussed above, an initial review of the literature identified a series of variables of interest in this population (Table 3.1).

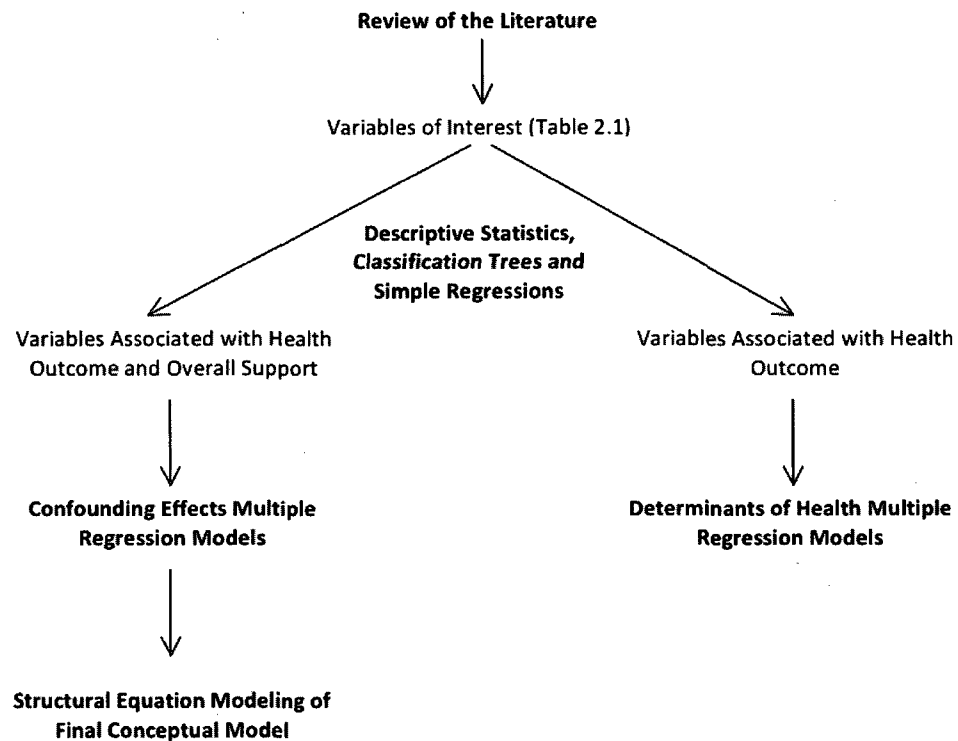


Figure 3.1 Overall Methodological Approach.

Chapter 4 contains the results of descriptive statistical methods: Classification trees and simple logistic regression

Descriptive Statistics

The variables of interest were extracted and certain variables were constructed as discussed in the previous chapter. In order to become more familiar with the data weighted frequencies for all variables of interest were run and an examination of variable distribution by gender and age category was performed. For categorical variables, the weighted frequency of each variable was calculated by gender and then by age category. These frequencies are expressed as proportions and percentages to protect participants' anonymity. A Chi-Square test of difference was performed to test the significance of differences between the groups. A substitution of 0.5 was used for zero-frequencies to allow for the chi-square calculation. Continuous variables were summarized by calculating the mean and F-Statistic.

Classification Tree Analysis

A classification tree is a tree-like diagram that describes the characteristics of a population based upon a particular outcome of interest. A classification tree begins with a root node at the top and follows through a series of branches and leaves until a terminal node is reached. The tree is created using recursive partitioning of the data. This process splits the data into subgroups as homogeneous as possible based on the variable of interest. The splitting process continues until the pre-set criterion is met (SAS, 2007). One of the advantages of this method is that it makes no assumptions regarding variable distributions and works on a trial and error basis (Gams & Krivec, 2008). This process produces the correlates of the outcome variables rather than investigating causal links and is therefore particularly useful in exploratory analysis such as this (Yahannes & Hoddinott, 1999). Additionally the large number of potential variables that presents an analytical problem in regression analysis is not a concern in the creation of classification

trees as it selects from a large set of variables those which are important in determining the outcome variable of interest.

Classification trees were created for each aspect of social support and health being investigated here. Using SAS Enterprise Miner (version 9.1) the variable of interest was selected as the target and all other possible predictor variables were added as input variables. For example, when 'affection and intimacy' was the target variable all upstream determinants, health outcomes, and health behavioural variables were added but not the other social support variables.

In the creation of classification trees, the data is split into three portions. The training set is used to fit the model, the validation set is used to "tune" the model or to improve its generalization, and the test set provides a final estimate of generalization. Due to the relatively smaller sample size of the data the test set was omitted and the validation set was used for tuning (SAS, 2007). The data was split randomly so that 70% was used for training and 30% was used for validation. For all of the trees, the target data was categorical and therefore it was necessary to stratify the training and validation sets by the target variable to ensure similar ratios of the target in both sets (SAS, 2007).

The Gini coefficient was used as the splitting criterion for all trees. The Gini coefficient is a measure of statistical dispersion using ratio analysis and is often used to study inequalities. It ranges from 0 to 1 with a low value indicating equality and increasing values representing increasing inequality. Enterprise Miner is able to discriminate within groups to maximize the probability of the target variable given a category and discriminates between groups, for example marital status and age category as well as within groups, for example single versus married. Based on the Gini Index, Enterprise Miner will use an iterative procedure to maximize the Gini coefficient and select the variable to split the tree and how to partition the branches.

For ease of interpretation, three branches were allowed as the maximum for one node and the tree was limited to a depth of three. The minimum number of observations allowed in a leaf was set to 10 and 20 observations were required for a split search. The final tree was identified using the point at which the Gini coefficients for the training and the validation sets crossed or were closed to one another.

Simple Regression Analysis

A series of weighted simple regressions were run with each of the social support and health variables as the dependent variable and the rest of the variables such as the upstream determinants of health, health behaviour, social support variable, or health outcome variable as the independent variable. Cumulative ordinal regression was used to examine affection and intimacy, tangible support, emotional support, positive social interaction, and self-rated health status. Linear regression was used to examine overall support and logistic regression to examine reported medical conditions and emotional health.

For those associations found to be significant, a second regression was run adjusting for age and sex. Results are presented as an odds ratio and 95% confidence interval.

Multiple Regression Analysis

Based on results from Chapter 4, variables for two types of models were identified: confounding effects and determinants of health. Confounding effects models are primarily concerned with identifying potential confounders of the association between health outcomes and social support whereas determinants of health models are aimed at creating predictive models of health outcomes. Weighted logistic regression was used to model emotional health and weighted cumulative ordinal regression to model self-rated health.

These models were built by first examining the association between the health outcome and support variable: $\text{Ln}(\gamma) = \alpha + \chi_1 + \varepsilon$. Where γ is the health outcome, α is the intercept, χ_1 is the social support variable, and ε is the error term for unexplained variance. Secondly, upstream socio-cultural variables were added to this model: $\text{Ln}(\gamma) = \alpha + \chi_1 + \chi_2 + \varepsilon$. Where χ_2 represents the socio-cultural variables.

Finally, health behaviours were added to produce the final model: $\text{Ln}(\gamma) = \alpha + \beta_1\chi_1 + \beta_2\chi_2 + \beta_3\chi_3 + \varepsilon$. Where χ_3 represents identified health behaviour variables. The emotional health models were run using the SURVEYLOGISTIC procedure in SAS in order to provide weighted estimates. The self-rated health cumulative ordinal model did not meet the proportional odds assumption and weighted non-proportional odds models were therefore run using PROC GENMOD.

For determinants of health models potential determinants of self-rated and emotional health were identified in the previous chapter. Using a model identification process such as stepwise selection is not available with weighted regression methods in SAS therefore un-weighted regressions were run using the LOGISTIC procedure to identify the model. The emotional health final model was then re-run using the SURVEYLOGISTIC procedure in order to produce weighted estimates. The self-rated health final model did not meet the proportional odds assumption and a weighted non-proportional odds model was therefore run using PROC GENMOD.

Forward stepwise selection was utilized to identify the models of best fit. In this process variables are added to the model individually testing their significance and including them if they are statistically significant. The log-likelihood difference is evaluated with a chi-square test to determine the significance of the change.

Structural Equation Models

Self-rated health and emotional health models were then examined through multiple regression analysis. They were then tested using pathways analysis also known as structural equation modeling (Hatcher, 1994) using the CALIS procedure in SAS. This procedure utilizes maximum likelihood parameter estimation on a variance covariance matrix. This analysis addresses the second research objective of this project which was to theorize the patterns connecting social support to health and health behaviours.

CHAPTER 4: DESCRIPTIVE ANALYSES

Three different types of descriptive analyses were carried out to understand primary associations between social support and health outcomes. These analyses also allowed a reduction in the number of variables of interest. Due to sample size restrictions, complex models cannot be run with all the variables identified in the literature review (Chapters 2 & 3). Therefore the data was first examined by age and gender, (Tables 4.2 & 4.3). Classification trees were then constructed to understand demographic and health behaviour profiles for social support and health outcomes. Simple regression analyses were used to explore the determinants of social support and of health outcomes. This method provided a tool to select variables that are significant when uncontrolled for others.

Initially the data included fourteen communities as the community of Miawpukek in Conne River, Newfoundland was sampled along with the Nova Scotia communities. Data from this community was removed producing a final sample of 482 participants representing individuals 18 and over living on-reserve in the thirteen Nova Scotia communities.

4.1 RESULTS

As the Mi'kmaq Health Research Group has presented many of the frequencies for the variables in its 2007 report they will not be reproduced here. To gain a better understanding of the population a table of community characteristics is presented below (Table 4.1).

TABLE 4.1. Summary of Community Characteristics. Percentages for gender and age distribution are presented to protect anonymity.

| Community | Population (Sample) Size | Rurality | Size | Gender (%) | | Age Distribution (%) | | | | Health Transfer Agreement |
|------------------|--------------------------|----------|--------|------------|------------|----------------------|------------|------------|-----------|---------------------------|
| | | | | M | F | \bar{x} | <35 | 35-54 | 55+ | |
| Acadia | 225 (6) | Rural | Small | 33% | 67% | 28 | 100% | 0% | 0% | No |
| Annapolis Valley | 78 (8) | Rural | Small | 50% | 50% | 56 | 13% | 25% | 62% | No |
| Bear River | 97 (8) | Rural | Small | 50% | 50% | 35 | 62% | 25% | 13% | Yes |
| Chapel Island | 429 (41) | Rural | Medium | 49% | 51% | 36 | 41% | 49% | 10% | No |
| Eskasoni | 3062 (182) | Urban | Large | 41% | 59% | 35 | 55% | 37% | 8% | Yes |
| Glooscap | 92 (6) | Rural | Small | 17% | 83% | 46 | 17% | 83% | 0% | No |
| Membertou | 753 (38) | Urban | Medium | 50% | 50% | 36 | 61% | 24% | 15% | Yes |
| Millbrook | 673 (32) | Urban | Medium | 47% | 53% | 39 | 34% | 53% | 13% | Yes |
| Paq'tnekek | 324 (37) | Rural | Medium | 46% | 54% | 32 | 65% | 24% | 11% | No |
| Pictou Landing | 391 (28) | Urban | Medium | 32% | 68% | 38 | 46% | 39% | 15% | Yes |
| Shubenacadie | 1078 (22) | Rural | Medium | 45% | 55% | 35 | 50% | 45% | 5% | No |
| Wagmatcook | 501 (24) | Rural | Medium | 46% | 54% | 37 | 42% | 50% | 8% | Yes |
| Whycomagh | 674 (50) | Rural | Medium | 46% | 54% | 35 | 50% | 46% | 4% | No |
| Total | 8377 (482) | | | 209 | 273 | 36 | 248 | 187 | 47 | |

Rurality of the community was identified using the Metropolitan Influence Zones (MIZ) tool from the 1996 Census to measure the level of rurality of the reserves attached to each community. The communities were assigned a status of rural or urban based on their MIZ. Any reserve that was a census metropolitan area (CMA) or census agglomeration (CA) was considered urban and any reserve that is not and therefore was assigned an MIZ score was considered rural.

Many of the communities have more than one parcel of land and therefore are comprised of multiple reserves. For eleven of the thirteen communities, all reserves had the same rurality designation (rural or urban). Two communities, Millbrook and Shubenacadie, had both urban and rural reserves. A designation was assigned based on the score of the largest reserve. For example, Shubenacadie is made up of four reserves: Indian Brook 14, New Ross 20, Pennal 19, and Shubenacadie 13. All of these communities were considered rural except for Shubenacadie 13, which was considered urban. However, Indian Brook 14 is, by far, the largest reserve in this community and Shubenacadie 13 has fewer than 5 people living on it according to the Department of Indian Affairs (INAC, 2009). Therefore the community of Shubenacadie was considered to be rural. The final categorizations were presented to Sally Johnson, the community liaison from the UNSI for an accuracy check and verification.

The level of control a community holds over its health services is indicated by whether they have a health transfer agreement with the federal government in which the community receives funds to manage their own services. Health Canada manages provision of health services for communities with no health transfer agreements.

Descriptive Statistics

Results from an examination of the data by gender are presented in Table 3.2 and by age category in Table 3.3. Any value indicated with an asterisk (*) indicates that there is a significant difference between men and women or between age groups at a significance of $p < 0.05$ or that the probability of them being similar is less than 5%.

Table 4.2. Weighted Analysis of Variables by Gender. For continuous variables the weighted average (μ) is presented and the significant difference was tested with an F-Statistic. The weighted proportions are presented for categorical variables and were tested with a Chi-Square test.

| Variable | | Male % or \bar{x} | Female % or \bar{x} | p-value (**p<0.05; *p<0.1) |
|--|--|------------------------|--------------------------|----------------------------------|
| Age | <35 | 43.7% | 53.3% | 0.0849* |
| | 35-54 | 44.3% | 32.3% | |
| | 55+ | 12.0% | 14.4% | |
| Relationship Status | Married | 27.8% | 28.0% | 0.1469 |
| | Divorced | 3.8% | 5.1% | |
| | Common-Law | 11.4% | 14.0% | |
| | Widowed | 1.6% | 6.4% | |
| | Separated | 5.5% | 3.3% | |
| | Single | 49.9% | 43.2% | |
| Has given birth to or fathered children? | Yes | 73.6% | 80.0% | 0.1521 |
| | No | 26.4% | 20.0% | |
| Highest level of formal education attained | Did not graduate high school | 53.7% | 45.4% | 0.0385** |
| | High school | 17.6% | 24.3% | |
| | Diploma (trade or community college, or university) | 22.5% | 17.6% | |
| | Bachelor or Masters degree | 6.2% | 12.7% | |
| Source of Income | Just employment | 21.1% | 7.4% | 0.0003** |
| | Just government | 35.5% | 48.0% | |
| | Both employment and government | 43.4% | 44.6% | |
| Crowding | Not crowded | 86.8% | 86.5% | 0.9274 |
| | Crowded | 13.2% | 13.5% | |
| Condition of home | Major repairs needed | 36.3% | 34.1% | 0.6970 |
| | Minor repairs needed | 29.8% | 26.8% | |
| | Regular maintenance needed | 22.8% | 24.3% | |
| | No repairs needed | 11.1% | 14.8% | |
| Residential School Attendance | Just participant attended | 13.9% | 5.7% | 0.0002** |
| | Parent and/or grandparent attended | 37.6% | 22.6% | |
| | Just grandparent attended | 6.4% | 14.3% | |
| | Neither participant, parent, or grandparent attended | 42.1% | 57.4% | |
| Cultural Attachment | High | 12.0% | 4.1% | 0.0464** |
| | Medium-High | 27.2% | 28.6% | |
| | Medium-Low | 45.9% | 48.3% | |
| | Low | 14.9% | 19.0% | |
| Activity limitations due to physical or mental health condition | Yes | 17.7% | 21.3% | 0.4226 |
| | No | 82.3% | 78.7% | |

Table 4.2. Weighted Analysis of Variables by Gender Continued.

| Variable | | Male % or \bar{x} | Female % or \bar{x} | p-value (**p<0.05; *p<0.1) |
|--|-------------------------|------------------------|--------------------------|----------------------------------|
| Self-reported health | Excellent | 15.8% | 14.4% | 0.6944 |
| | Very Good | 30.0% | 26.6% | |
| | Good | 30.3% | 36.1% | |
| | Fair | 21.0% | 18.7% | |
| | Poor | 2.9% | 4.2% | |
| Presence of medical condition | Yes | 60.3% | 63.9% | 0.4704 |
| | No | 39.7% | 36.1% | |
| Felt sad, blue or depressed for 2 or more weeks in a row in past 12 months | Yes | 30.0% | 38.5% | 0.1071 |
| | No | 70.0% | 61.5% | |
| Duration of Physical Activity per week | None | 8.4% | 11.4% | 0.0683* |
| | 1-2 hours | 26.2% | 38.5% | |
| | 3-4 hours | 22.9% | 18.1% | |
| | 5-6 hours | 12.0% | 11.2% | |
| | 7-10 hours | 11.6% | 12.1% | |
| | 11+ hours | 18.9% | 8.7% | |
| Do you eat a nutritious balanced diet? | Always or almost always | 33.6% | 34.1% | 0.3408 |
| | Sometimes | 50.2% | 50.6% | |
| | Rarely | 10.0% | 12.7% | |
| | Never | 6.2% | 2.6% | |
| Current cigarette use | Not at all | 35.3% | 35.5% | 0.4310 |
| | Occasionally | 56.1% | 59.1% | |
| | Daily | 8.6% | 5.4% | |
| Had 5+ drinks at one time? | No | 41.9% | 55.0% | 0.0134** |
| | Yes | 58.1% | 45.0% | |
| Drug Use | | 109.60 | 56.69 | 0.0029** |
| # Sexual Partners in past year | None | 17.6% | 21.4% | 0.1792 |
| | 1-2 | 66.6% | 70.9% | |
| | 3-4 | 9.5% | 4.6% | |
| | 5+ | 6.3% | 3.1% | |
| Overall Support (continuous) | | 24.668 | 26.061 | 0.0411** |
| Affection and Intimacy | All of the time | 60.2% | 70.9% | 0.0514* |
| | Most of the time | 19.5% | 16.2% | |
| | Some of the time | 17.9% | 9.3% | |
| | Almost none of the time | 2.4% | 3.6% | |
| Tangible Support | All of the time | 54.4% | 63.8% | 0.2676 |
| | Most of the time | 25.0% | 22.5% | |
| | Some of the time | 14.5% | 9.6% | |
| | Almost none of the time | 6.1% | 4.1% | |
| Emotional Support | High | 36.4% | 47.4% | <0.0001** |
| | Medium-High | 39.8% | 35.3% | |
| | Medium-Low | 19.8% | 13.8% | |
| | Low | 4.0% | 3.5% | |
| Positive Social Interaction | High | 29.2% | 34.1% | 0.0015** |
| | Medium-High | 40.8% | 39.4% | |
| | Medium-Low | 27.8% | 24.9% | |
| | Low | 2.2% | 1.6% | |

Table 4.3. Weighted Analysis of Variables by Age Category. For continuous variables the weighted average (μ) is presented and the significant difference was tested with an F-Statistic. The weighted proportions are presented for categorical variables and were tested with a Chi-Square test.

| Variable | | <35 % or \bar{x} | 35-54 % or \bar{x} | 55+ % or \bar{x} | Chi-Sq/t- test (**p<0.05; *p<0.1) |
|--|--|--------------------------|----------------------------|--------------------------|--|
| Gender | Male | 43.6% | 56.6% | 44.5% | 0.0787* |
| | Female | 56.4% | 43.4% | 55.5% | |
| Relationship Status | Married | 13.8% | 39.3% | 46.2% | <0.0001** |
| | Divorced | 0.2% | 6.2% | 15.3% | |
| | Common-Law | 18.4% | 9.8% | 1.1% | |
| | Widowed | 0.6% | 2.3% | 21.5% | |
| | Separated | 2.1% | 7.1% | 5.9% | |
| | Single | 64.9% | 35.3% | 10.0% | |
| Has given birth to or fathered children? | Yes | 68.5% | 85.6% | 83.7% | 0.0053** |
| | No | 31.5% | 14.4% | 16.3% | |
| Highest level of formal education attained | Did not graduate high school | 45.5% | 48.2% | 67.2% | <0.0001** |
| | High school | 32.8% | 11.7% | 5.0% | |
| | Diploma (trade or community college, or university) | 14.3% | 26.4% | 22.2% | |
| | Bachelor or Masters degree | 7.4% | 13.7% | 5.6% | |
| Source of Income | Just employment | 12.4% | 16.5% | 11.0% | 0.0313** |
| | Just government | 48.1% | 31.0% | 53.5% | |
| | Both employment and government | 39.5% | 52.5% | 35.5% | |
| Crowding | Not crowded | 79.6% | 93.3% | 92.0% | 0.0044** |
| | Crowded | 20.4% | 6.7% | 8.0% | |
| Condition of home | Major repairs needed | 38.2% | 36.0% | 24.4% | 0.0865* |
| | Minor repairs needed | 20.5% | 33.5% | 38.1% | |
| | Regular maintenance needed | 25.4% | 20.8% | 24.9% | |
| | No repairs needed | 15.9% | 9.7% | 12.6% | |
| Residential School Attendance | Just participant attended | 1.6% | 7.9% | 39.7% | <0.0001** |
| | Parent and/or grandparent attended | 25.4% | 43.8% | 7.2% | |
| | Just grandparent attended | 19.7% | 3.5% | 0.0% | |
| | Neither participant, parent, or grandparent attended | 53.3% | 44.8% | 53.1% | |
| Cultural Attachment | High | 7.4% | 9.4% | 5.9% | 0.2903 |
| | Medium-High | 26.7% | 30.7% | 24.2% | |
| | Medium-Low | 44.0% | 48.6% | 54.2% | |
| | Low | 21.9% | 11.3% | 15.7% | |
| Activity limitations due to physical or mental health condition | Yes | 9.9% | 24.7% | 42.5% | <0.0001** |
| | No | 90.1% | 75.3% | 57.5% | |

Table 4.3. Weighted Analysis of Variables by Age Category Continued.

| Variable | | <35 % or \bar{x} | 35-54 % or \bar{x} | 55+ % or \bar{x} | Chi-Sq/t- test (**p<0.05; *p<0.1) |
|--|-------------------------|--------------------------|----------------------------|--------------------------|--|
| Self-reported health | Excellent | 16.6% | 13.3% | 14.2% | 0.0022** |
| | Very Good | 34.1% | 26.1% | 15.0% | |
| | Good | 34.8% | 34.3% | 24.2% | |
| | Fair | 12.8% | 22.7% | 36.7% | |
| | Poor | 1.67% | 3.6% | 9.9% | |
| Presence of medical condition | Yes | 45.8% | 72.7% | 90.7% | <0.0001** |
| | No | 54.2% | 27.3% | 9.33% | |
| Felt sad, blue or depressed for 2 or more weeks in a row in past 12 months | Yes | 37.8% | 35.3% | 18.3% | 0.0621* |
| | No | 62.2% | 64.7% | 81.7% | |
| Duration of Physical Activity per week | None | 5.5% | 14.5% | 12.6% | 0.2418 |
| | 1-2 hours | 31.5% | 30.4% | 44.9% | |
| | 3-4 hours | 24.0% | 17.7% | 14.4% | |
| | 5-6 hours | 12.2% | 12.6% | 5.2% | |
| | 7-10 hours | 11.9% | 13.2% | 6.3% | |
| | 11+ hours | 14.9% | 11.6% | 16.6% | |
| Do you eat a nutritious balanced diet? | Always or almost always | 20.6% | 41.3% | 70.8% | <0.0001** |
| | Sometimes | 59.2% | 44.9% | 22.8% | |
| | Rarely | 15.2% | 8.9% | 5.1% | |
| | Never | 5.0% | 4.9% | 1.3% | |
| Current cigarette use | Not at all | 28.1% | 35.7% | 61.6% | <0.0001** |
| | Occasionally | 9.0% | 6.5% | 0.0% | |
| | Daily | 62.9% | 57.8% | 38.4% | |
| Had 5+ drinks at one time? | No | 34.0% | 54.6% | 84.6% | <0.0001** |
| | Yes | 66.0% | 45.4% | 15.4% | |
| Drug Use | | 95.11 | 85.84 | 26.79 | 0.0006** |
| # Sexual Partners in past year | None | 10.7% | 17.6% | 66.8% | <0.0001** |
| | 1-2 | 72.7% | 74.5% | 33.2% | |
| | 3-4 | 10.3% | 4.4% | 0.0% | |
| | 5+ | 6.3% | 3.5% | 0.0% | |
| Overall Support (continuous) | | 25.707 | 24.468 | 26.863 | 0.0389** |
| Affection and Intimacy | All of the time | 69.0% | 59.0% | 72.9% | 0.6524 |
| | Most of the time | 15.3% | 21.3% | 16.7% | |
| | Some of the time | 12.4% | 16.1% | 10.4% | |
| | Almost none of the time | 3.3% | 3.6% | 0.0% | |
| Tangible Support | All of the time | 58.2% | 54.4% | 75.2% | 0.0804* |
| | Most of the time | 20.7% | 30.9% | 13.6% | |
| | Some of the time | 14.7% | 10.0% | 8.4% | |
| | Almost none of the time | 6.4% | 4.7% | 2.8% | |
| Emotional Support | High | 44.4% | 38.8% | 45.6% | 0.9870 |
| | Medium-High | 37.2% | 38.8% | 43.9% | |
| | Medium-Low | 16.8% | 17.8% | 8.3% | |
| | Low | 1.6% | 4.6% | 2.2% | |
| Positive Social Interaction | High | 30.7% | 31.2% | 41.3% | 0.5994 |
| | Medium-High | 45.3% | 37.4% | 34.1% | |
| | Medium-Low | 23.7% | 27.6% | 24.6% | |
| | Low | 0.3% | 3.8% | 0.0% | |

Men demonstrated higher percentages of not graduating high school or holding a diploma from trade school, community college or university, gaining income from just employment, high cultural attachment, binge drinking, higher frequency of drug use, lower overall support, lower emotional support, and lower positive social interaction when compared to women. Women were more likely to be younger, more educated, less physically active, participate in less risky behaviour including drug use and binge drinking, and have higher social support.

Young adults under the age of 35 were more likely to be single or in a common-law relationship, not have children, have graduated from high school but not attained any higher formal education, live in crowded housing conditions, not have any activity limitations or mobility issues, higher self-rated health, no reported medical conditions, but have low emotional health when compared to older adults above the age of 35. Additionally, young adults reported higher rates of risky behaviours such as malnutritious diets, daily cigarette use, binge drinking, illegal drug use, and having multiple sexual partners compared to adults over 35.

Although some variables followed an expected gradient such as binge drinking decreasing as age increased, some variables did not follow such a clear pattern. The majority of people over the age of 55 had less than a high school education and although high school graduation rates were similar for those 35-54 and those under 35, the older adults were more likely to have achieved a diploma or degree beyond high school.

Adults between the ages of 35 and 54 had the highest rate of only getting income from an employment source and the lowest level of overall social support. Interestingly, overall support significantly differed across age groups but there were not significant differences when each type of support was examined.

Classification Tree Analysis

The classification trees produced by the Profile Analyses are presented in Figures 4.1-4.8. The classification tree for 'Affection and Intimacy' (Figure 4.1) had a Gini Coefficient of 0.4824 which was one of the lower coefficients among the trees produced

for this study indicating that although there is still 48% heterogeneity in the sample, it is fairly homogenous after it has been broken down into the subgroups identified by the classification tree.

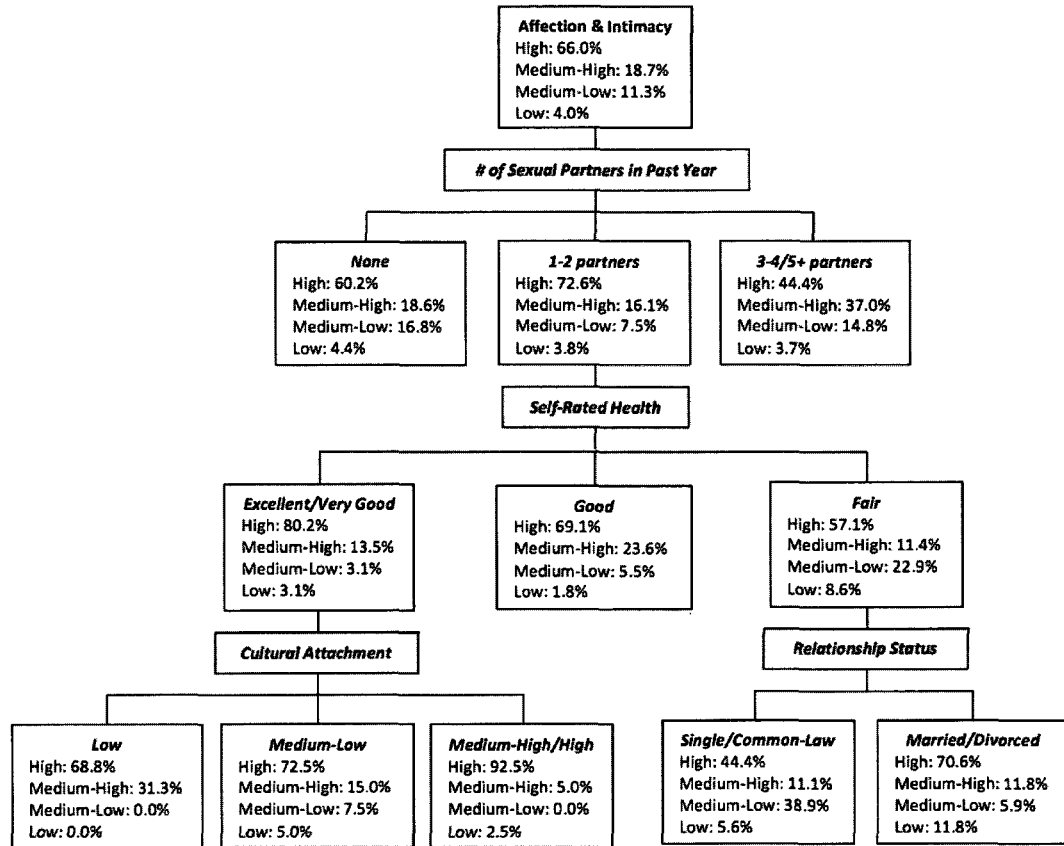


Figure 4.1. Classification Tree of Affection & Intimacy. Gini Coefficient of tree: 0.4824.

The variable ‘Number of Sexual Partners in the Past Year’ became the primary contributor to affection and intimacy followed by ‘Self-Rated Health’, ‘Cultural Attachment’, and ‘Relationship Status’. Individuals with the profile of 1-2 sexual partners, excellent or very good health, and medium-high or high cultural attachment had the highest probability of affection and intimacy. Those with 1-2 partners, fair health, and who were single or common-law had the lowest probability of self-rated health. The category used to further split the population is selected by SAS based on having a high level of heterogeneity.

Among the entire sample, the subgroup of individuals who had 1-2 partners had the highest proportion of affection and intimacy followed by those who were not sexually active. The group with the lowest affection and intimacy were those who had three or more partners in the past year.

Breaking the subgroup of people who had 1-2 partners down by self-rated health further homogenized the sample with those who reported excellent or very good health having the highest levels of affection and intimacy and those reporting fair health having the lowest – there were no individuals reporting poor health in this subgroup. The group reporting excellent or very good health was further divided based on cultural attachment with higher levels of attachment resulting in higher affection and intimacy. Those reporting fair health were divided by relationship status with those who were single or common-law reporting lower affection and intimacy than those who were married or divorced. This final split may be interacting with age as the age-based analysis demonstrated that a significantly large proportion of individuals under the age of thirty-five were single or in a common-law relationship.

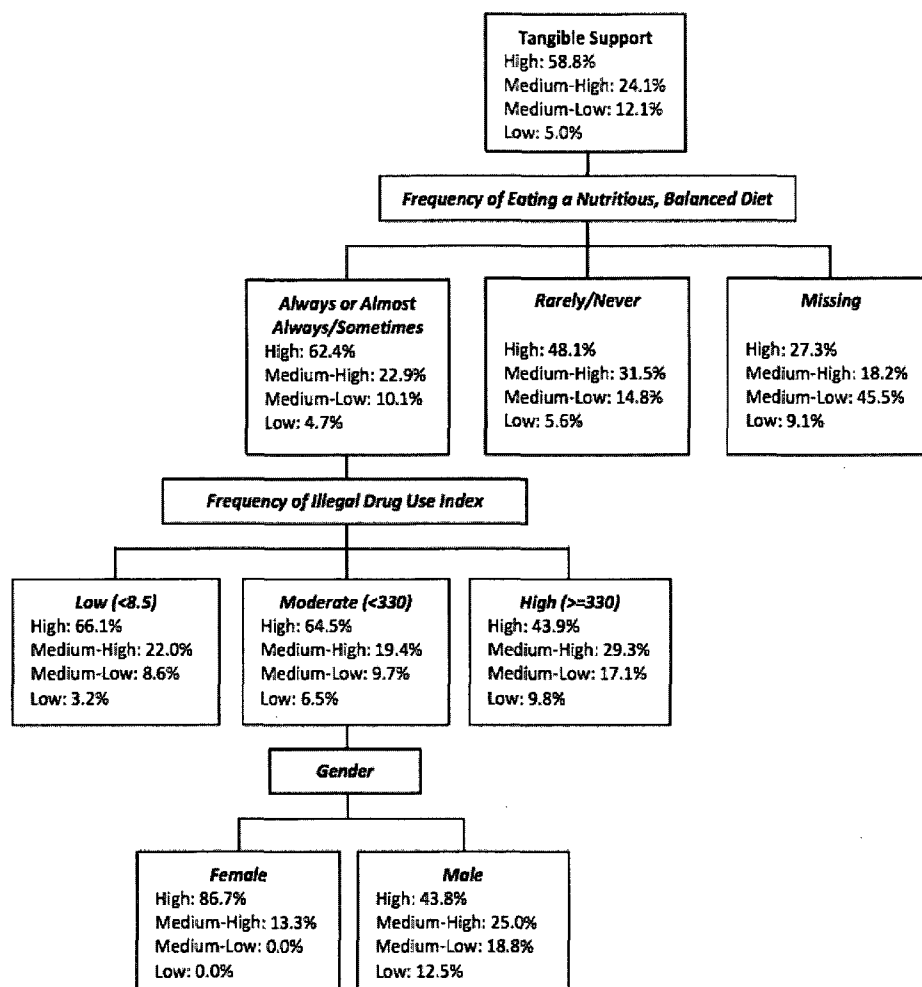


Figure 4.2. Classification Tree of Tangible Support. Gini Coefficient of tree: 0.5538.

The primary contributor to ‘Tangible Support’ (Figure 4.2) was identified as the ‘Frequency of Eating a Nutritious, Balanced Diet’, followed by the ‘Frequency of Illegal Drug Use’ and ‘Gender’.

Those who reported always, almost always or sometimes eating a good quality diet had higher levels of tangible support than those reporting eating well rarely or never. The subgroup with the lowest proportion of tangible support was those with missing information regarding diet. The subgroup of people who eat well always, almost always or sometimes were divided based on the frequency of illegal drug use. As this was on a continuous index, SAS Enterprise Miner identified the most appropriate cut points for this subgroup based on tangible support. Those with low drug use had the highest levels

of tangible support and those with high drug use had the lowest levels of tangible support. A further division was identified which was splitting the group of people with good diet and moderate drug use by gender. This demonstrated that females of this group have higher tangible support than males in this group.

The final Gini coefficient for the classification tree of tangible support was 0.5538 suggesting that although some homogeneity was achieved, the final classifications left a fair amount of heterogeneity in the sample based on tangible support.

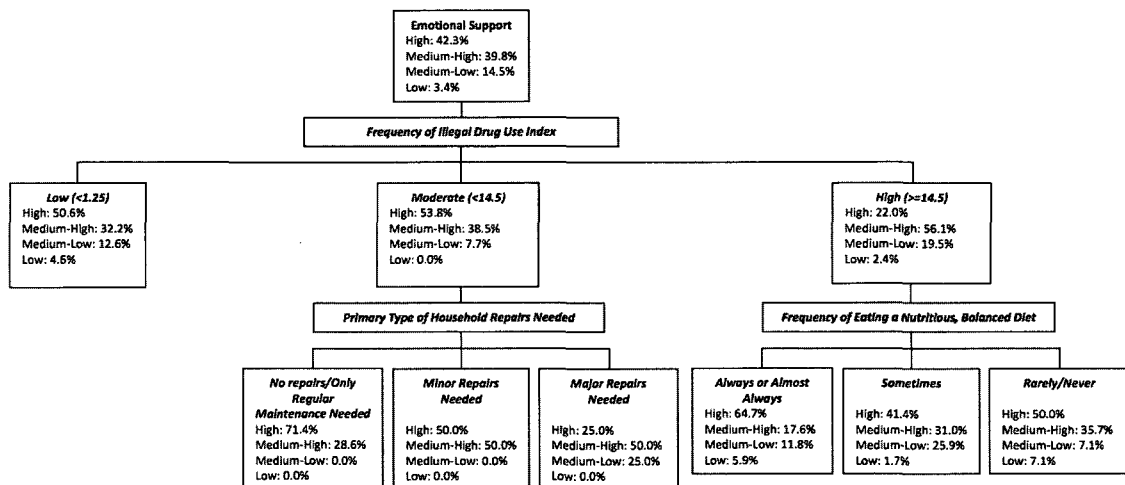


Figure 4.3. Classification Tree of Emotional Support. Gini Coefficient of tree: 0.6164.

‘Emotional Support’ was initially split by the ‘Frequency of Illegal Drug Use’ followed by the ‘Type of Household Repairs Needed’ and the ‘Frequency of Eating a Nutritious, Balanced Diet’ (Figure 4.3). Those with high drug use and poor quality of diet had the lowest proportion of emotional support while those with moderate drug use and no household repairs or only regular maintenance needed had the highest levels of emotional support.

Of the group of moderate drug users, those with no repairs or only regular maintenance needed had the highest amount of emotional support followed by those whose homes only needed minor repairs. The group with moderate drug use whose homes needed major repairs had the lowest proportion of high emotional support among this subgroup.

The group with high drug use was further split by their self-rated quality of diet (Figure 4.3). The Gini coefficient for the emotional support tree was 0.6164 suggesting a relatively high level of heterogeneity even after all the splits were performed.

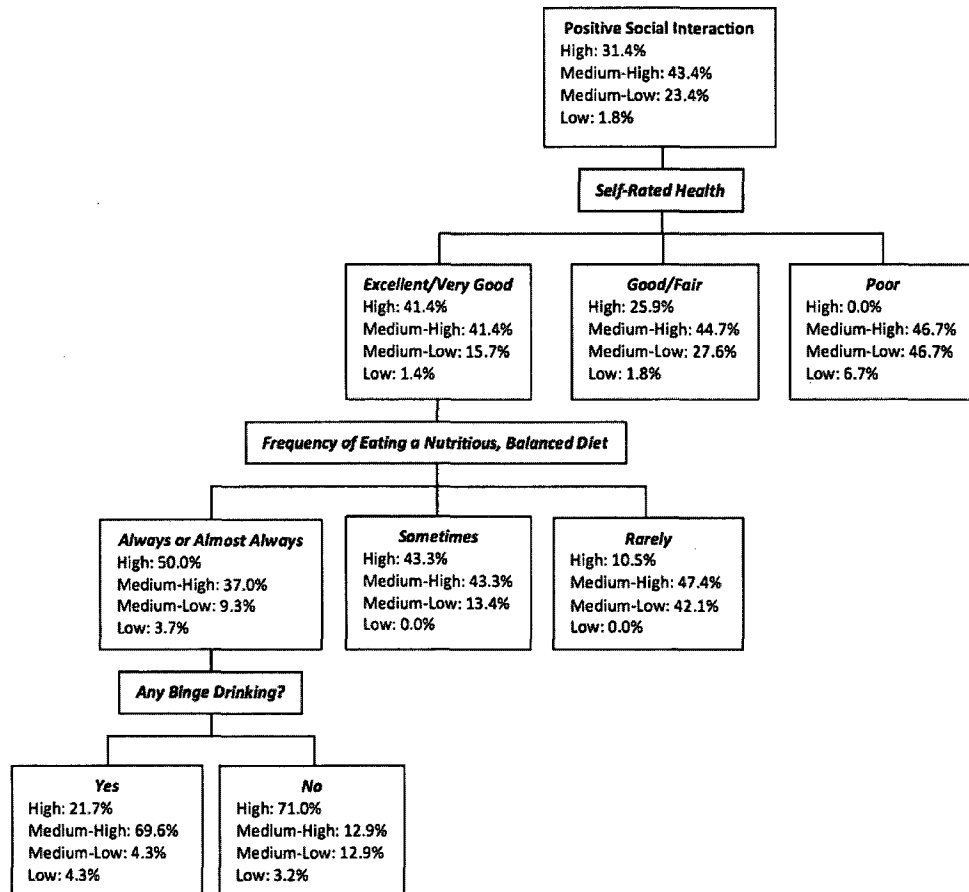


Figure 4.4. Classification Tree of Positive Social Interaction. Gini Coefficient of tree: 0.6057.

The primary split of ‘Positive Social Interaction’ was followed by ‘Frequency of Eating a Nutritious, Balanced Diet’ and ‘Binge Drinking’ (Figure 4.4). Those with poor self-rated health had the lowest level of positive social interaction of all the subgroups and those with the profile of excellent or very good health, always or almost always eating a nutritious, balanced diet, and no binge drinking had the highest level of positive social interaction.

The Gini coefficient for the final classification tree was 0.6057 suggesting that there is still high heterogeneity of positive social interaction even after the divisions of the data represented in the tree.

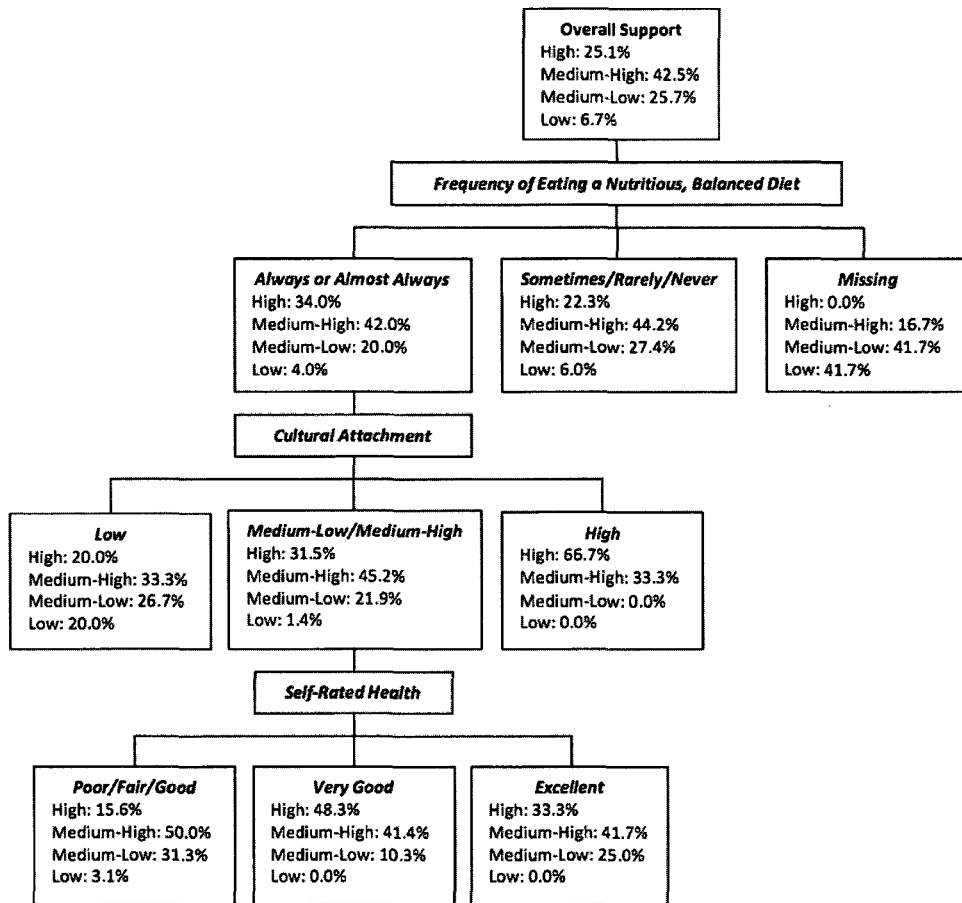


Figure 4.5. Classification Tree of Overall Support. Gini Coefficient of tree: 0.6547.

The distribution of the ‘Overall Support’ variable was examined and divided into four categories: High, medium-high, medium-low, and low (Figure 4.5). ‘Frequency of Eating a Nutritious, Balanced Diet’ was identified as the primary contributor followed by ‘Cultural Attachment’ and ‘Self-Rated Health’. The Gini coefficient for this tree was 0.6547 suggesting that there is still a high level of heterogeneity even after all the splits identified in Figure 4.5. Those with the profile of always or almost always eating a nutritious balanced diet and high cultural attachment had the highest proportion of overall social support and those with missing information regarding diet had the lowest.

Diet was split into three categories: Always or almost always eat a nutritious, balanced diet; sometimes, rarely, or never eat a nutritious, balanced diet; and did not respond. The distribution of support for the first two categories was very similar with the

majority of respondents having high or medium-high support. Contrary to this, those who did not respond had primarily low overall support. This suggests a problem in the responses to this question; somehow non-respondents differ significantly from respondents.

The subgroup who replied that they always or almost always ate a nutritious, balanced diet were further split by their level of cultural attachment (Figure 4.5). Among this group, as cultural attachment increased so did overall support. Those with good diet and medium-low or medium-high cultural attachment were further split by their self-rated health. Those who reported their health as very good had the highest proportion of high support followed by those who responded that they had excellent health. Those who reported good, poor, or fair health had the lowest levels of overall support.

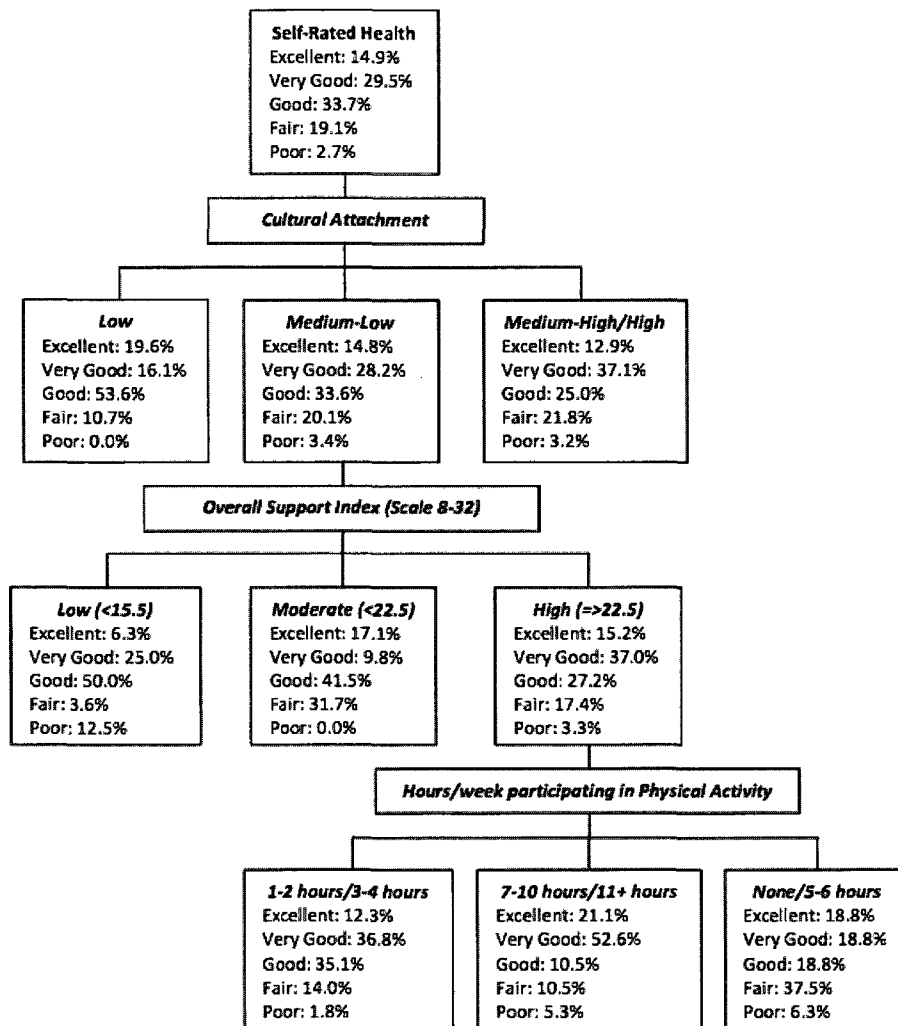


Figure 4.6. Classification Tree of Self-Rated Health. Gini Coefficient of tree: 0.7001.

The primary split for ‘Self-Rated Health’ (Figure 4.6) was by ‘Cultural Attachment’ followed by ‘Overall Social Support’ and ‘Physical Activity’. Among those with the highest levels of self-rated health were individuals with medium-low cultural attachment, high overall support and who completed seven or more hours of physical activity per week.

The majority of those who displayed low cultural attachment reported good health while the majority of those displaying medium-high or high cultural attachment reported very good health (Figure 4.6). Those with medium-low cultural attachment had a relatively normal distribution centering around reporting good health.

The group with medium-low cultural attachment was then split based on their level of overall support which was examined as a continuous variable and was therefore split based on cut-offs identified by SAS Enterprise Miner. As expected, a higher proportion of those reporting high overall support also reported high excellent and very good health than those with moderate or low support. Those with medium-low cultural attachment and high support were then split by weekly hours of physical activity. Those reporting seven or more hours of physical activity a week, high overall support, and medium-low cultural attachment mostly reported excellent or very good health. One of the categories identified combined no physical activity and five to six hours per week suggesting some classification or reporting limitations.

The Gini coefficient for this classification tree was 0.7001, which is the highest of all the identified trees and suggests that even after all the splits identified in the classification tree there is still a very high level of heterogeneity. This was the highest Gini coefficient of all the classification trees produced suggesting that this is a very complex target variable and there are more contributors beyond those identified in this tree.

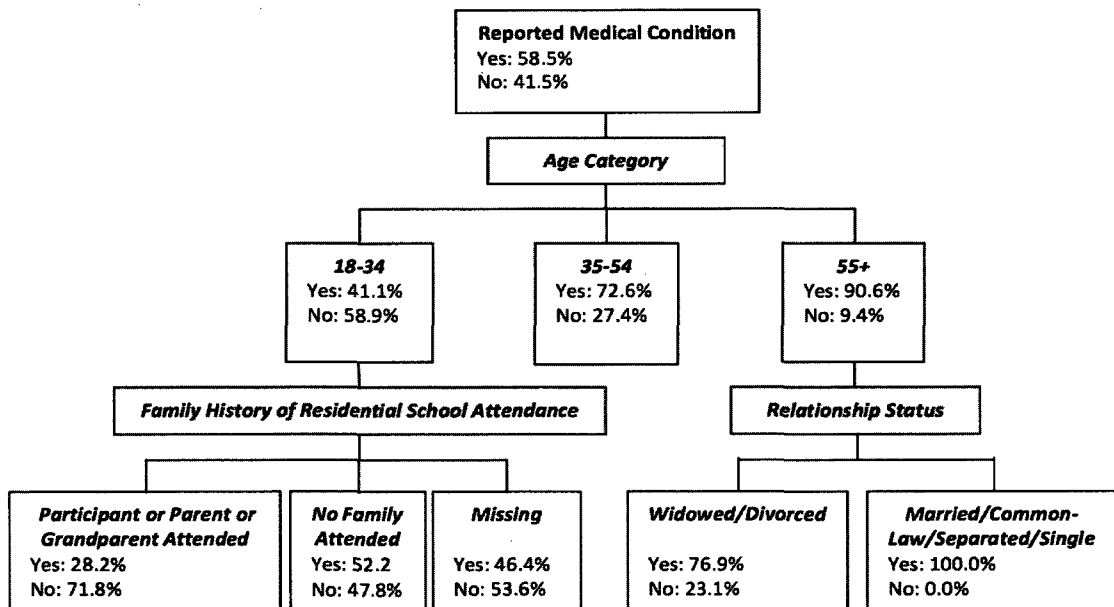


Figure 4.7. Classification Tree of Reported Medical Conditions. Gini Coefficient of tree: 0.4043.

Unsurprisingly the primary contributor to reporting a medical condition was ‘Age’ followed by ‘Family History of Residential School Attendance’ and ‘Relationship Status’ (Figure 4.7). Those above the age of 55 who were married, common-law, separated, or single had the highest proportion of reporting a medical condition. Those between the ages of 18 and 34 who reported having a family member attend a residential school had the lowest proportion of individuals reporting a medical condition. The Gini coefficient for this tree is 0.4043 which is low compared to the others produced in this study suggesting that after the population is divided as demonstrated in the classification tree, there is a fair amount of homogeneity by reporting a medical condition. The results regarding residential school attendance are unexpected and as with physical activity in the previous tree it is highly possible that there are reporting concerns around this variable. This could be an anomalous result arising from a small number of cases for this variable.

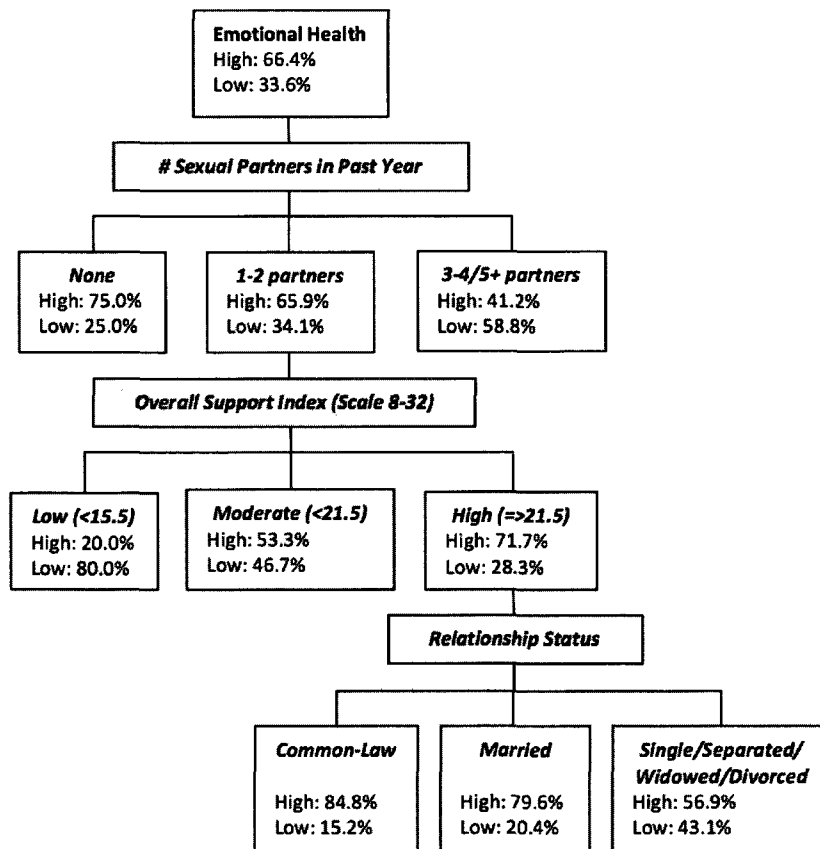


Figure 4.8. Classification Tree of Emotional Health. Gini Coefficient of tree: 0.3962.

The primary contributor to 'Emotional Health' (Figure 4.8) was the 'Number of Sexual Partners in the Past Year' followed by 'Overall Support' and 'Relationship Status'. The Gini coefficient for this tree, 0.3962, was the lowest of all the trees suggesting that a good level of homogeneity was achieved in the splitting of the population as demonstrated by Figure 3.8 and therefore it was a good representation of the way emotional health manifested itself in this sample.

Those with 1-2 partners with high overall support who were in common-law relationships had the highest proportion of good emotional health; those with the profile of 1-2 partners with low overall social support had the lowest. When examining the initial split, those who were not sexually active had the highest proportion of those with high emotional health (75%), followed by those individuals with 1-2 partners (65.9%), and finally those with three or more partners (41.2%).

Among those with 1-2 partners and high support, individuals who were in common-law relationships had the highest proportion of high emotional health (84.8%), followed by those who were married (79.6%), followed by those who were single, separated, widowed, and divorced (56.9%). The latter group could also be identified as those who are unattached or not in a formal relationship.

Simple Regression Analysis

The results of simple regression with social support variables as the dependent variable are shown in Tables 4.4 to 4.7.

Table 4.4. Weighted Simple Regression Analysis of Social Support Variables. Modeled odds of increasing support (OR, 95%CI).

| Variable | Affection and Intimacy | | Tangible Support | | Emotional Support | | Positive Social Interactions | | Overall Support (continuous) | | |
|--|---|-------------|------------------|-------------|-------------------|-------------|------------------------------|-------------|------------------------------|--------------|--------------|
| | OR | 95% CI | OR | 95% CI | OR | 95% CI | OR | 95% CI | OR | 95% CI | |
| Age | * indicates p<0.05 | | | | | | | | | | |
| | <35 | ref | - | - | - | - | - | - | - | - | - |
| | 35-54 | 1.488 | 0.943-2.346 | 0.988 | 0.643-1.517 | 0.666 | 0.441-1.006 | 0.753 | 0.505-1.122 | 0.290 | 0.070-1.204 |
| 55+ | 0.782 | 0.388-1.577 | 2.245* | 1.043-4.832 | 1.030 | 0.568-1.868 | 1.176 | 0.625-2.214 | 3.177 | 0.519-19.453 | |
| Gender | Male | ref | - | - | - | - | - | - | - | - | - |
| | Female | 1.617* | 1.043-2.507 | 1.542* | 1.018-2.337 | 1.543* | 1.045-2.279 | 1.111 | 0.757-1.630 | 4.023* | 1.058-15.302 |
| Relationship Status | Married | ref | - | - | - | - | - | - | - | - | - |
| | Divorced | 0.531 | 0.220-1.281 | 0.681 | 0.280-1.655 | 0.534 | 0.245-1.162 | 0.394* | 0.169-0.919 | 0.071 | 0.004-1.230 |
| | Common-Law | 1.355 | 0.617-2.975 | 0.764 | 0.398-1.467 | 1.013 | 0.523-1.962 | 1.208 | 0.636-2.294 | 2.440 | 0.378-15.737 |
| | Widowed | 2.300 | 0.658-8.038 | 1.171 | 0.350-3.915 | 0.779 | 0.323-1.883 | 0.770 | 0.278-2.133 | 1.430 | 0.127-16.103 |
| | Separated | 0.369* | 0.148-0.917 | 0.853 | 0.317-2.300 | 0.876 | 0.314-2.449 | 0.781 | 0.292-2.093 | 0.058 | 0.002-2.145 |
| | Single | 0.523* | 0.307-0.891 | 0.510* | 0.302-0.861 | 0.597* | 0.378-0.942 | 0.590* | 0.378-0.920 | 0.107* | 0.024-0.477 |
| | Yes | 0.792 | 0.463-1.357 | 0.956 | 0.579-1.581 | 1.466 | 0.909-2.366 | 1.702* | 1.082-2.678 | 3.607 | 0.730-17.832 |
| Has given birth to or fathered children? Highest level of formal education attained | No | ref | - | - | - | - | - | - | - | - | - |
| | Did not graduate high school | 0.814 | 0.456-1.454 | 1.086 | 0.617-1.910 | 0.741 | 0.436-1.258 | 1.039 | 0.641-1.686 | 0.418 | 0.074-2.37 |
| | High School | ref | - | - | - | - | - | - | - | - | - |
| | Diploma (trade or community college or university) | 1.000 | 0.511-1.955 | 0.810 | 0.432-1.520 | 0.846 | 0.478-1.498 | 0.993 | 0.588-1.678 | 0.856 | 0.127-5.772 |
| | Bachelor or Master's degree | 1.434 | 0.597-3.443 | 1.288 | 0.584-2.839 | 1.107 | 0.550-2.227 | 1.198 | 0.601-2.388 | 1.761 | 0.195-15.879 |
| Source of income | Just employment | 0.708 | 0.340-1.473 | 1.712 | 0.811-3.617 | 1.556 | 0.852-2.842 | 1.122 | 0.614-2.052 | 3.815 | 0.586-24.854 |
| | Just government | 0.824 | 0.502-1.350 | 0.851 | 0.542-1.337 | 0.881 | 0.569-1.363 | 0.895 | 0.585-1.369 | 0.557 | 0.124-2.494 |
| | Both employment and government | ref | - | - | - | - | - | - | - | - | - |
| | Not crowded | ref | - | - | - | - | - | - | - | - | - |
| Crowding | Crowded | 0.712 | 0.375-1.353 | 0.553 | 0.300-1.021 | 0.928 | 0.554-1.553 | 0.851 | 0.513-1.410 | 0.878 | 0.158-4.879 |
| | Major repairs needed | 1.070 | 0.579-1.978 | 1.082 | 0.605-1.936 | 1.296 | 0.761-2.208 | 1.311 | 0.781-2.203 | 0.735 | 0.126-4.293 |
| | Minor repairs needed | 1.235 | 0.675-2.259 | 1.303 | 0.719-2.361 | 1.055 | 0.625-1.781 | 1.153 | 0.686-1.938 | 0.649 | 0.117-3.593 |
| | Regular maintenance needed | ref | - | - | - | - | - | - | - | - | - |
| Residential School Attendance | No repairs needed | 0.823 | 0.396-1.710 | 1.113 | 0.564-2.199 | 1.243 | 0.672-2.301 | 1.517 | 0.820-2.806 | 2.886 | 0.457-18.229 |
| | Participant attended | 1.946 | 0.910-4.160 | 0.672 | 0.318-1.422 | 0.550 | 0.285-1.061 | 0.555 | 0.278-1.108 | 0.191 | 0.020-1.828 |
| | Parent and/or grandparent attended | 1.146 | 0.619-2.123 | 0.844 | 0.477-1.494 | 0.997 | 0.582-1.705 | 0.908 | 0.553-1.492 | 0.438 | 0.073-2.622 |
| | Just grandparent attended | 1.513 | 0.720-3.176 | 0.426* | 0.206-0.883 | 0.559 | 0.283-1.102 | 0.632 | 0.322-1.239 | 0.171 | 0.013-2.248 |
| Cultural Attachment | Neither participant, parent or grandparent attended | ref | - | - | - | - | - | - | - | - | - |
| | High | ref | - | - | - | - | - | - | - | - | - |
| | Medium-High | 0.537 | 0.207-1.395 | 0.978 | 0.458-2.087 | 0.666 | 0.338-1.311 | 0.447* | 0.221-0.906 | 0.143* | 0.022-0.956 |
| | Medium-Low | 0.401 | 0.159-1.008 | 0.828 | 0.396-1.732 | 0.603 | 0.311-1.168 | 0.355* | 0.178-0.707 | 0.050* | 0.008-0.329 |
| | Low | 0.242* | 0.089-0.654 | 0.485 | 0.208-1.131 | 0.305* | 0.147-0.631 | 0.202* | 0.094-0.435 | 0.008* | 0.001-0.075 |

Table 4.4. Weighted Simple Regression Analysis of Social Support Variables Continued.

| Variable | Affection and Intimacy | | Tangible Support | | Emotional Support | | Positive Social Interactions | | Overall Support (continuous) | |
|---|------------------------|-------------|------------------|-------------|-------------------|-------------|------------------------------|-------------|------------------------------|---------------|
| | OR | 95% CI | OR | 95% CI | OR | 95% CI | OR | 95% CI | OR | 95% CI |
| * indicates p<0.05 Activity limitations due to physical or mental health condition | Ref | - | ref | - | ref | - | ref | - | ref | - |
| | 0.594 | 0.347-1.018 | 1.190 | 0.700-2.022 | 1.631 | 0.969-2.746 | 2.193* | 1.339-3.590 | 8.248* | 1.362-49.999 |
| Self-reported health | 1.224 | 0.298-5.030 | 3.396 | 0.857-13.46 | 3.000 | 0.975-9.231 | 6.282* | 2.111-18.70 | 5.093* | 1.485, 8.701 |
| | 1.506 | 0.380-5.959 | 3.185 | 0.835-12.15 | 2.864 | 0.961-8.529 | 5.310* | 1.859-15.17 | 4.908* | 1.394, 8.422 |
| | 0.562 | 0.145-2.171 | 1.936 | 0.515-7.276 | 1.498 | 0.513-4.374 | 2.207 | 0.776-6.281 | 2.462 | -1.062, 5.986 |
| | 0.473 | 0.119-1.891 | 2.074 | 0.526-8.185 | 0.980 | 0.321-2.985 | 2.190 | 0.750-6.396 | 1.687 | -2.015, 5.390 |
| | ref | - | ref | - | ref | - | ref | - | ref | - |
| Presence of medical conditions | ref | - | ref | - | ref | - | ref | - | ref | - |
| | 0.929 | 0.595-1.451 | 0.670 | 0.441-1.017 | 0.992 | 0.670-1.469 | 1.051 | 0.725-1.524 | 0.575 | 0.149-2.217 |
| Felt sad, blue, depressed for two or more weeks in a row | ref | - | ref | - | ref | - | ref | - | ref | - |
| | 1.622* | 1.025-2.567 | 1.327 | 0.846-2.082 | 1.350 | 0.881-2.071 | 1.806* | 1.198-2.725 | 7.471* | 1.713-32.590 |
| Duration of physical activity per week | ref | - | ref | - | ref | - | Ref | - | ref | - |
| | 0.595 | 0.228-1.553 | 1.144 | 0.484-2.704 | 1.698 | 0.752-3.834 | 2.626* | 1.101-6.266 | 18.07* | 1.102-296.190 |
| | 1.224 | 0.456-3.288 | 0.594 | 0.241-1.462 | 0.904 | 0.389-2.100 | 1.454 | 0.583-3.626 | 2.406 | 0.112-51.676 |
| | 0.638 | 0.216-1.882 | 0.956 | 0.337-2.712 | 1.478 | 0.562-3.889 | 2.297 | 0.841-6.275 | 15.472 | 0.734-326.033 |
| | 0.848 | 0.291-2.466 | 0.672 | 0.246-1.836 | 2.093 | 0.793-5.526 | 1.802 | 0.662-4.901 | 12.453 | 0.504-307.66 |
| Do you eat a nutritious, balanced diet? | 0.554* | 0.326-0.942 | 1.902* | 1.157-3.127 | 1.772* | 1.33-2.773 | 2.015* | 1.307-3.107 | 11.62* | 2.881-46.852 |
| | ref | - | ref | - | ref | - | ref | - | ref | - |
| | 1.424 | 0.711-2.855 | 0.652 | 0.347-1.226 | 0.631 | 0.332-1.200 | 1.033 | 0.574-1.857 | 0.351 | 0.042-2.951 |
| | 3.249* | 1.124-9.390 | 0.591 | 0.216-1.618 | 0.549 | 0.243-1.238 | 0.547 | 0.167-1.792 | 0.049 | 0.002-1.449 |
| | 0.895 | 0.384-2.087 | 1.632 | 0.743-3.583 | 1.166 | 0.534-1.548 | 0.846 | 0.395-1.813 | 6.475 | 0.342-2.250 |
| Current cigarette use | ref | - | ref | - | ref | - | ref | - | ref | - |
| | 1.148 | 0.497-2.650 | 1.131 | 0.524-2.442 | 1.072 | 0.496-1.321 | 1.086 | 0.499-2.366 | 1.496 | 0.078-28.646 |
| Had 5+ drinks at one time? | ref | - | ref | - | ref | - | ref | - | ref | - |
| | 0.836 | 0.539-1.299 | 0.635 | 0.419-0.963 | 0.697 | 0.471-1.031 | 0.786 | 0.535-1.155 | 0.261 | 0.069-0.982 |
| Drug Use | 0.998* | 0.997-0.999 | 0.998* | 0.997-0.999 | 0.998* | 0.997-0.999 | 0.999 | 0.998-1.000 | 0.994* | 0.993-0.998 |
| | 0.673 | 0.346-1.310 | 1.049 | 0.542-2.029 | 0.582 | 0.328-1.033 | 0.639 | 0.363-1.123 | 0.266 | 0.041-1.714 |
| # Sexual partners in past year | ref | - | ref | - | ref | - | ref | - | ref | - |
| | 0.429 | 0.160-1.150 | 0.607 | 0.207-1.773 | 0.476 | 0.174-1.301 | 0.445 | 0.188-1.051 | 0.063 | 0.002-1.929 |
| | 0.435 | 0.166-1.136 | 1.538 | 0.490-4.827 | 0.943 | 0.343-2.595 | 1.219 | 0.467-3.182 | 0.082 | 0.002-4.446 |
| | | | | | | | | | | |

TABLE 4.5. Summary of results of Table 4.4. Variables presented are those significantly associated with the outcome in that category at an $\alpha=0.05$ level of significance. *Indicates that they remained significant after age and sex adjustment.

| Affection & Intimacy | Tangible Support | Emotional Support | Positive Social Interaction | Overall Support |
|---|---|---|---|--|
| <ul style="list-style-type: none"> - Gender* - Relationship Status* - Cultural Attachment* - Emotional Health* - Diet* - Drug Use | <ul style="list-style-type: none"> - Age* - Gender* - Relationship Status - Residential School Attendance* - Diet* - Binge Drinking - Drug Use | <ul style="list-style-type: none"> - Gender - Relationship Status* - Cultural Attachment* - Diet* - Drug Use | <ul style="list-style-type: none"> - Relationship Status* - Has Children?* - Cultural Attachment* - Activity Limitations* - Self-Rated Health* - Emotional Health* - Physical Activity* - Diet* | <ul style="list-style-type: none"> - Gender - Relationship Status* - Cultural Attachment* - Activity Limitations* - Self-Rated Health* - Emotional Health* - Physical Activity* - Diet* - Binge Drinking - Drug Use* |

Overall women who were married with high cultural attachment and high emotional health and who eat a balanced diet had higher odds of affection and intimacy. Women over fifty-five who did not have a family connection to residential schools, and who ate a balanced diet had high tangible support. People who were married with high cultural attachment and good diets reported higher emotional support. Finally people who were married, had children, high cultural attachment, self-rated and emotional health, no activity limitations, participated in physical activity and ate a nutritious diet had higher odds of positive social interaction.

Affection and intimacy, tangible support, emotional support, and positive social interaction were modeled using cumulative ordinal regression. The proportional odds assumption was not met however upon further inspection non-proportionality affected the estimates but not their significance. Therefore, for the purposes of simplicity as this is an exploratory step in the methodology, the odds ratios were reported as they are.

Odds of overall support increased if you were married, had high cultural attachment, high self-rated health, high emotional health, high physical activity, a good diet and low illegal drug use.

Some patterns emerge in this series of regressions including the importance of gender, relationship status, cultural attachment, diet, and health to the odds of having support. Five types of relationship status: divorced, common-law, widowed, separated, and single, were all compared to being married. Most commonly it was being single as compared to being married that produced a significant result suggesting the importance of being single lowering your odds of having support compared to being married raising your odds.

Self-reported health was only associated with positive social interaction and overall support, but having a medical condition was not associated with any type of support. This suggests that there is a difference between how people interpret their health and their health as diagnosed by a physician or other health professional.

Good emotional health was found to be significantly associated with higher affection and intimacy, positive social interaction, and overall support but was not associated with tangible support or emotional support.

Table 4.6. Weighted Simple Regression Analysis of Health Outcome Variables. Modeled odds of good health (OR, 95% CI).

| Variable * indicates p<0.05 | Self-Reported Health | | Presence of Chronic Condition | | Feeling Sad, Blue, or Depressed >=2 weeks in a row in past year | | |
|---|---|--------|-------------------------------|--------|---|--------|-------------|
| | OR | 95% CI | OR | 95% CI | OR | 95% CI | |
| Age | <35 | ref | ref | ref | ref | ref | |
| | 35-54 | 0.615* | 0.418-0.905 | 0.317* | 0.200-0.501 | 1.117 | 0.701-1.783 |
| | 55+ | 0.299* | 0.146-0.612 | 0.086* | 0.027-0.280 | 2.725* | 1.096-6.757 |
| Gender | Male | ref | - | ref | - | ref | - |
| | Female | 0.883 | 0.605-1.287 | 0.853 | 0.564-1.289 | 0.677 | 0.428-1.072 |
| Relationship Status | Married | ref | - | ref | - | ref | - |
| | Divorced | 0.959 | 0.609-1.509 | 0.499 | 0.135-1.842 | 1.086 | 0.373-3.155 |
| | Common-Law | 1.826 | 0.930-3.585 | 2.681* | 1.287-1.842 | 1.348 | 0.603-3.012 |
| | Widowed | 0.622 | 0.195-1.981 | 1.064 | 0.272-4.167 | 0.589 | 0.169-2.049 |
| | Separated | 1.519 | 0.662-3.489 | 1.031 | 0.352-3.012 | 0.487 | 0.173-1.368 |
| | Single | 0.959 | 0.609-1.509 | 2.137* | 1.290-3.546 | 0.486* | 0.283-0.937 |
| | Yes | 0.847 | 0.536-1.339 | 0.782 | 0.476-1.285 | 1.212 | 0.716-2.232 |
| Has given birth to or fathered children? | No | ref | - | ref | - | ref | - |
| | Yes | 0.671 | 0.416-1.082 | 2.045* | 1.198-3.484 | 0.930 | 0.530-1.631 |
| Highest level of formal education attained | Did not graduate high school | ref | - | ref | - | ref | - |
| | High School | 0.619 | 0.347-1.105 | 2.169* | 1.159-4.065 | 1.706 | 0.890-3.268 |
| | Diploma (trade or community college or university) | 1.673 | 0.866-3.234 | 1.515 | 0.708-3.236 | 0.904 | 0.397-2.058 |
| | Bachelor or Master's degree | 1.037 | 0.596-1.802 | 0.876 | 0.459-1.675 | 1.063 | 0.504-2.237 |
| Source of income | Just government | 0.607* | 0.401-0.920 | 1.285 | 0.820-2.016 | 0.876 | 0.543-1.412 |
| | Both employment and government | ref | - | ref | - | ref | - |
| Crowding | Not crowded | ref | - | ref | - | ref | - |
| | Crowded | 1.096 | 0.611-1.969 | 1.393 | 0.743-2.611 | 1.284 | 0.702-2.347 |
| Condition of home | Major repairs needed | 1.021 | 0.618-1.688 | 0.830 | 0.472-1.458 | 0.611 | 0.334-1.117 |
| | Minor repairs needed | 0.894 | 0.536-1.492 | 0.570 | 0.316-1.027 | 1.079 | 0.568-2.049 |
| | Regular maintenance needed | ref | - | ref | - | ref | - |
| Residential School Attendance | No repairs needed | 1.320 | 0.682-2.557 | 1.350 | 0.670-2.717 | 0.831 | 0.389-1.736 |
| | Participant attended | 0.444* | 0.211-0.934 | 0.226* | 0.077-0.666 | 1.099 | 0.402-3.003 |
| | Parent and/or grandparent attended | 0.752 | 0.457-1.239 | 1.269 | 0.733-2.203 | 0.660 | 0.376-1.157 |
| | Just grandparent attended | 0.905 | 0.496-1.650 | 2.257* | 1.114-4.587 | 0.508 | 0.247-1.043 |
| | Neither participant, parent or grandparent attended | ref | - | ref | - | ref | - |
| Cultural Attachment | High | ref | - | ref | - | ref | - |
| | Medium-High | 0.518 | 0.258-1.039 | 1.335 | 0.609-2.924 | 0.536 | 0.219-1.314 |
| | Medium-Low | 0.480* | 0.243-0.949 | 1.124 | 0.530-2.381 | 0.686 | 0.286-1.647 |
| | Low | 0.452* | 0.215-0.949 | 1.073 | 0.459-2.506 | 0.316* | 0.122-0.816 |
| Activity limitations due to physical or mental health condition | Yes | ref | - | n/a | n/a | ref | - |
| | No | 5.065* | 3.134-8.187 | n/a | n/a | 1.706 | 0.979-2.976 |

Table 4.6. Weighted Simple Regression Analysis of Health Outcome Variables Continued.

| Variable | Self-Reported Health | | Presence of Chronic Condition | | Feeling Sad, Blue, or Depressed ≥ 2 weeks in a row in past year | | |
|---|--------------------------------|--------|-------------------------------|--------|--|--------|--------------|
| | ref | - | ref | - | ref | - | |
| Duration of physical activity per week * indicates $p < 0.005$ | None | | | | | | |
| | 1-2 hours | 1.895 | 0.888-4.043 | 1.381 | 0.562-3.390 | 1.546 | 0.613-3.891 |
| | 3-4 hours | 1.763 | 0.809-3.841 | 1.109 | 0.433-2.841 | 1.946 | 0.713-5.291 |
| | 5-6 hours | 1.849 | 0.805-4.245 | 1.802 | 0.620-5.236 | 1.555 | 0.529-4.566 |
| | 7-10 hours | 3.323* | 1.252-8.815 | 1.835 | 0.648-5.181 | 1.555 | 0.529-4.566 |
| | 11+ hours | 2.597* | 1.089-6.197 | 0.912 | 0.326-2.551 | 2.262 | 0.749-6.803 |
| Do you eat a nutritious, balanced diet? | Always or almost always | 1.563 | 0.985-2.482 | 0.489* | 0.298-0.801 | 1.224 | 0.733-2.045 |
| | Sometimes | ref | - | ref | - | ref | - |
| | Rarely | 0.737 | 0.434-1.252 | 1.890 | 0.969-3.690 | 1.256 | 0.616-2.558 |
| Current cigarette use | Never | 0.750 | 0.414-1.355 | 1.464 | 0.477-4.505 | 0.561 | 0.177-1.783 |
| | Not at all | 0.750 | 0.354-1.591 | 0.553 | 0.247-1.239 | 2.203 | 0.949-5.128 |
| | Occasionally | ref | - | ref | - | ref | - |
| | Daily | 0.618 | 0.299-1.277 | 0.826 | 0.380-1.799 | 1.862 | 0.820-4.237 |
| Has had 5+ drinks at one time? | No | ref | - | ref | - | ref | - |
| | Yes | 1.296 | 0.888-1.892 | 0.409* | 0.266-0.629 | 0.862 | 0.554-1.340 |
| Drug Use (continuous) | | 1.000 | 0.999-1.001 | 1.000 | 0.999-1.001 | 1.001* | 1.000-1.002 |
| | # Sexual partners in past year | 0.279* | 0.154-0.505 | 3.968* | 1.876-8.403 | 0.949 | 0.486-1.852 |
| | 0 | ref | - | ref | - | ref | - |
| | 1-2 | 0.912 | 0.392-2.123 | 1.721 | 0.637-4.630 | 0.272* | 0.100-0.740 |
| | 3-4 | 0.890 | 0.324-2.445 | 0.841 | 0.321-2.203 | 0.176* | 0.060-0.517 |
| Affection and Intimacy | 5+ | 1.515 | 0.522-4.398 | 0.560 | 0.211-1.488 | 2.865* | 1.072-7.634 |
| | High | 0.727 | 0.240-2.208 | 0.444 | 0.155-1.274 | 2.288 | 0.775-6.757 |
| | Medium-High | 0.687 | 0.216-2.189 | 0.488 | 0.154-1.543 | 1.637 | 0.517-5.181 |
| | Medium-Low | ref | - | ref | - | ref | - |
| | Low | 2.276 | 0.959-5.404 | 0.426 | 0.161-1.122 | 3.846* | 1.497-9.901 |
| Tangible Support | High | 1.464 | 0.586-3.654 | 0.556 | 0.201-1.541 | 3.333* | 1.203-9.259 |
| | Medium-High | 1.616 | 0.575-4.545 | 0.615 | 0.201-1.876 | 4.386* | 1.433-13.514 |
| | Medium-Low | ref | - | ref | - | ref | - |
| | Low | 1.722 | 0.560-5.296 | 1.238 | 0.425-3.610 | 1.550 | 0.519-4.630 |
| Emotional Support | High | 1.188 | 0.384-3.676 | 1.248 | 0.424-3.676 | 1.479 | 0.495-4.425 |
| | Medium-High | 0.451 | 0.140-1.452 | 1.272 | 0.393-4.115 | 0.947 | 0.288-3.125 |
| | Medium-Low | ref | - | ref | - | ref | - |
| Positive Social Interaction | Low | 3.586* | 1.274-10.093 | 0.561 | 0.107-2.941 | 6.329* | 1.138-35.714 |
| | High | 2.258 | 0.811-6.284 | 0.361 | 0.069-1.880 | 6.098* | 1.098-34.483 |
| | Medium-High | 1.060 | 0.373-3.015 | 0.481 | 0.090-2.564 | 3.546 | 0.625-20.000 |
| | Medium-Low | ref | - | ref | - | ref | - |
| Overall Support (continuous) | | 1.071* | 1.041-1.102 | 1.013 | 0.981-1.047 | 1.049* | 1.014-1.086 |

TABLE 4.7. Summary of results of Table 4.6. Variables presented are those significantly associated with the outcome in that category at an $\alpha=0.05$ level of significance. *Indicates that they remained significant after age and sex adjustment.

| Self-Rated Health | Reported Medical Condition | Emotional Health |
|---------------------------------|---------------------------------|-------------------------------|
| - Age* | - Age* | - Age* |
| - Income Source* | - Relationship Status | - Relationship Status |
| - Residential School Attendance | - Education | - Cultural Attachment* |
| - Cultural Attachment* | - Residential School Attendance | - Drug Use* |
| - Activity Limitations* | - Diet | - # Sexual Partners* |
| - Physical Activity* | - Binge Drinking* | - Overall Support* |
| - # Sexual Partners* | - # Sexual Partners* | - Affection and Intimacy |
| - Overall Support* | | - Tangible Support* |
| - Positive Social Interaction* | | - Positive Social Interaction |

Older adults who rely on the government alone for income, have low cultural attachment, activity limitations or low mobility, no physical activity, are not sexually active and have low positive social interaction or low overall support are more likely to have low self-rated health. The proportional odds assumption was not met by self-rated health however non-proportionality affected the estimates but not their significance. Therefore, for the purposes of simplicity as this is an exploratory step in the methodology, the odds ratios were examined as they are and non-proportional and partial proportional odds models were reported for multiple regressions.

Older adults, who binge drink, and are not sexually active had higher odds of reporting a medical condition. Young people with low cultural attachment, high illegal drug use, multiple sexual partners, and low tangible support or overall support were more likely to report low emotional health.

The odds of having a medical condition or reporting low self-rated health increased with age. However, the odds of low emotional health decreased as age increased indicating that young people, though not a risk group for medical conditions are more at risk of feeling sad, blue or depressed for two or more weeks in a row. This appeared to be driven by the under 35 age category when compared to people over 55. There was no significant result for the 35-54 age group. There were no associations observed between health and gender.

A number of social determinants of health were associated with self-rated health status including the income source and cultural attachment as well a health behaviours

including physical activity, binge drinking, and the number of sexual partners one has had in the past year. Upstream determinants did not appear as important in determining emotional health which was associated with age, frequency of illegal drug use, number of sexual partners and social support measures.

Reporting a medical condition was not associated with any social support variables. Increasing overall support was associated with high self-rated health and good emotional health. These associations were maintained after adjustment for age and gender. Emotional health also displayed associations with affection and intimacy, tangible support, and positive social interaction. This is unsurprising as previous research suggests the important impact of social support on mental and emotional health in particular.

4.2 DISCUSSION

Principal Findings in Relation to Other Research

Results from the age and sex stratified analyses are consistent with previous studies of this population (MHRG, 2007; McIntyre et al, 2001). The population is predominantly young and single and the majority of risky health behaviours are found in the under thirty-five portion of the population and, in the cases of binge drinking and illegal drug use, among men. The drug use finding is an excellent example of this trend as the mean score from frequency of illegal drug use in the past year was double that for men compared to women (109.6 versus 56.7; $p=0.0029$) and decreases significantly with increasing age group ($<35=95.1$; $35-54=85.8$; $55+=26.8$; $p=0.0006$). With a largely young population, this is an important concern for policy makers and service providers. Substance use was identified as a health priority by the Tripartite Forum (2008) who highlighted the challenges to delivering services around this need as well as noting the link between addictions, and mental health problems, which was also identified as a top priority by the group.

The rate of high school graduates significantly decreases with age suggesting improvements in secondary school achievement ($p < 0.0001$). Those under thirty-five have the highest rate of high school completion (54.5%) while those thirty-five to fifty-four are the most likely to have completed a higher degree or diploma (40.1%). The reason why the under thirty-fives have not achieved the same levels of higher education could be attributed to more barriers to entry for these institutions, less incentives or desire to attend such schools, or possibly that some individuals are returning to higher education later in life and not directly after high school (CCL, 2009). The ACEWH study of young people in these communities (2001) did reveal that teenagers found school to be a major source of stress in their lives and school achievement and attendance were of significant concern for these young people. The study also found that this group was, in some cases, unrealistic in their career aspirations, not realizing the process and challenges of education beyond high school (McIntyre et al, 2001).

Unsurprisingly, older adults are more likely to have a medical condition and to report poor self-rated health but emotional health displays an opposite trend to this with younger adults experiencing poor emotional health (<35=37.8%; 35-54=35.3%; 55+=18.3%; $p=0.0621$). The previously-discussed ACEWH study shows that some of these stress experiences are still present in this group although the gender associations observed in that study do not appear to be as strong in the present study. It is possible that the ACEWH qualitative study was able to get at the context of how young men and women experience stress differently but in the end, as the current results suggest, they both experience it.

Each of the three health outcomes examined: Self-rated health, emotional health, and reporting a medical condition were associated with different sets of variables suggesting different determinants of and pathways to health. This is most interesting when comparing self-rated health and reporting a medical condition. Self-rated health is a commonly-used measure of overall physical and mental health but in this study, the differences between it and having been told you have a medical condition are striking. It has been documented that this population views its health in a more holistic manner than the rest of the general population (Waldram et al, 2006) and this finding could be a reflection of that. Self-rated health may be reflecting not a medical disease perspective

but an illness perspective than encompasses all aspects of health including physical, mental, emotional, social, and relational as well as their associated experiences.

Researchers have estimated that 70-90% of all self-recognized episodes of ill-health are managed exclusively outside of the formal healthcare system (Kleinman et al, 2006). This represents sickness outside the parameters of doctor-diagnosed disease which was represented in this study by having been diagnosed with a medical condition by a physician. Illness, the subjective experience of sickness was indicated here by self-rated health. Self-rated health was more closely associated with social determinants of health such as cultural attachment and sources of income than reporting a medical condition. This is an expected observation as illness is more shaped by cultural and social factors than disease (Kleinman et al, 2006).

When stratified by gender, women appeared to have significantly higher levels of support than men with the exception of tangible support which did not differ significantly by gender (Table 4.2).

Gender, relationship status, cultural attachment, self-rated health, and diet were associated with most types of support. Although each type of support displayed unique characteristics, tangible support did stand out as it was the only one significantly associated with age and with residential school attendance, despite possible reporting concerns with the latter variables. Tangible support, or having someone to take you to the doctor, is measuring something a little more objective than the other support measures. Positive social interaction also stood out for not being associated with gender. This is understandable as having someone to “hang out with” or “spend time with” can be applied equally, though probably differently to men and women. The association of this measure with activity limitations is also strong; certainly one’s mobility will affect one’s ability to connect with and see other people. The negative association between affection and intimacy and health among women in the Richmond et al study (2007) was not observed here and all associations between health and social support were positive.

The results of the classification trees provided an alternative method of examining the data. The trees were useful in better understanding the population and the data however with this level of complexity and small data set their limited reliability was a

drawback. The Gini coefficients associated with each of the trees ranged from 0.7001 or 70% heterogeneous for self-rated health to 0.3962 or 40% heterogeneous for emotional health. The advantage to this method was the ability to examine the data without causal assumptions. The results reveal how the variables of interest are distributed through population subgroups. Prominent contributors including relationship status and overall support among the health trees point to social determinants of health present in this population. Among the social support trees, diet and cultural attachment were important contributors that can be called 'determinants of the determinants'. Both of these findings are consistent with the literature on the social determinants of health (Health Canada, 2007).

Variables Identified for Multiple Regression Models.

Based on the above results, variables were identified for inclusion in the multiple regression models. The initial literature review identified a large number of variables as seen in Chapter 3 however concerns with power related to the sample size of the RHS limited the number of variables which could be investigated together. It was for this reason that the variables were initially investigated through descriptive statistics and simple regression models to select those to be included in multiple regression models.

For the confounding effects models age, gender, cultural attachment, activity limitations, and physical activity were identified as potential confounders of the association between overall support and self-rated health. For the association between overall support and emotional health age, gender, relationship status, cultural attachment, illegal drug use, and the number of sexual partners in the past year were identified as potential confounders. As reporting a medical condition was not significantly associated with any type of social support in the simple regressions, this outcome was not modeled in a multiple regression.

Potential determinants of self-rated health included age, gender, income source, cultural attachment, activity limitations, number of sexual partners, physical activity and overall support. For emotional health potential determinants included age, gender, cultural attachment, drug use, number of sexual partners and overall support. These

models were then entered into a data-driven stepwise selection process to produce the models of best fit (Chapter 5).

CHAPTER 5: MULTIPLE REGRESSIONS & STRUCTURAL EQUATION MODELS

Chapter 5 presents the results of multiple regression models and pathways analysis. Based on results from Chapter 4, variables for two types of weighted multiple regression models were identified: confounding effects and determinants of health.

The confounding effects models resemble the final conceptual model presented in Chapter 2 (Figure 2.5). These are presented in Figure 5.1 with the variables identified in Chapter 4.

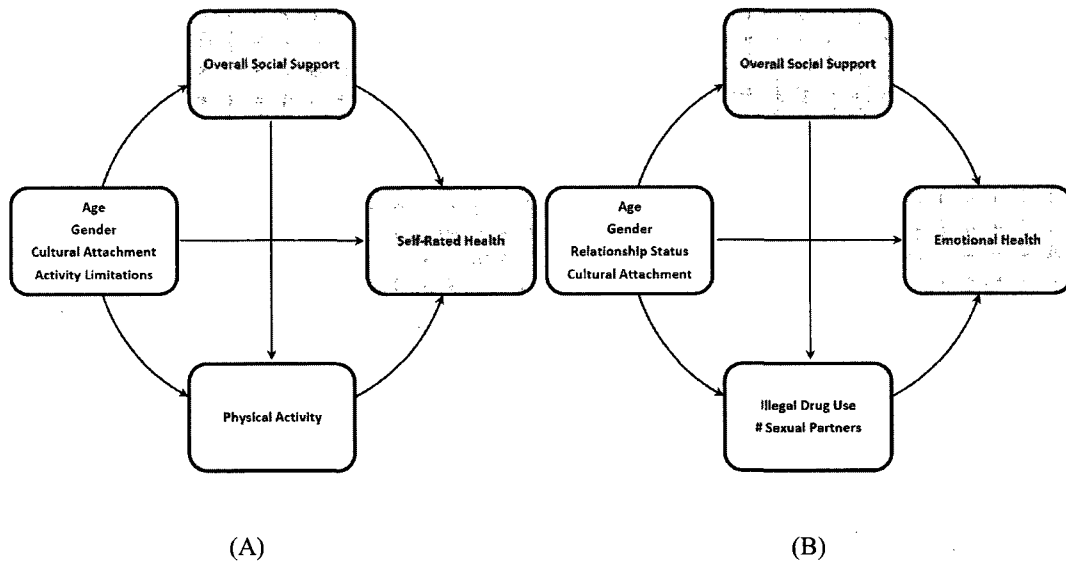


Figure 5.1 Confounding Effects Models of Social Support and Health. (A) Displays a conceptual model of variables associated with Self-Rated Health and (B) displays a conceptual model of variables associated with Emotional Health.

The confounding effects models were then examined using un-weighted pathway analysis, also known as structural equation modeling.

5.1 RESULTS

Multiple Regression Determinants of Health Models

Initially age, gender, relationship status, activity limitations, number of sexual partners, physical activity, and overall support were added to the un-weighted model of self-rated health using a stepwise regression procedure. Activity limitations was the first variable SAS selected to be added to the model with a p-value of <0.0001 indicating that having an activity limitation is the variable of the utmost importance in determining self-rated health. This was followed by overall support (p-value 0.0002) and age category (p-value 0.0260). The final model with these three variables was then re-run using a weighted cumulative odds regression procedure, however since the proportional odds assumption was not met a weighted non-proportional odds model was fitted. The results of this model are displayed in Table 5.1.

As one's level of overall social support rose by 1 unit, the odds of not reporting poor health increased by 1.098 or 9.8%. In addition, having an activity limitation lowered the odds of reporting fair or better health by 0.774. Age category did not emerge as a significant variable, which could be due to it being highly correlated with age as older individuals having more activity limitations.

No odds ratios comparing good or better health to poor, very good or better health to poor, or excellent health to poor were significant at the $\alpha=0.05$ level of significance and are therefore not displayed. This indicates that self-rated health of poor is significantly different from the other categories combined and no other combination of categories showed a similar trend.

Table 5.1 Determinants of Health Model of Self-Rated Health. * indicate a significance level of $\alpha=0.05$. γ = Odds of Good Self-Rated Health; α = Intercept; χ_1 = Overall Social Support; χ_2 = Age Category; χ_3 = Activity Limitations; ε = Error.

$$\text{Ln}(\gamma) = \alpha + \beta_1\chi_1 + \beta_2\chi_2 + \beta_3\chi_3 + \varepsilon$$

| | | Self-Rated Health Status | |
|----------------------|-------|-------------------------------------|------|
| | | Excellent, Very Good, Good, or Fair | Poor |
| Overall Support | | 1.098* (1.033-1.167) | Ref |
| Age | 55+ | 0.328 (0.094-1.148) | Ref |
| | 35-54 | 0.925 (0.306-2.793) | Ref |
| | <35 | Ref | Ref |
| Activity Limitations | Yes | 0.256* (0.094-0.701) | Ref |
| | No | Ref | Ref |

Age category, gender, cultural attachment, illegal drug use, number of sexual partners, and overall support were initially entered into the un-weighted stepwise regression model of emotional health. Overall support was the first variable entered into the model (p-value 0.0019), followed by gender (p-value 0.0040), illegal drug use (0.0011), and number of sexual partners in the past year (p-value 0.0162). No other variables met the 0.05 significance level required for entry into the model. The final model was then re-run with population weights and the final estimates are displayed in Table 5.2.

Being female and three or more sexual partners in the past year and having low overall social support showed significantly higher likelihood of reporting having felt sad, blue, or depressed for two or more weeks in the past year. This model explained 68% of the variability of the emotional health variable and therefore caution should be taken when used for predicting emotional health using model estimates.

Table 5.2 Determinants of Health Model of Emotional Health. * indicate a significance level of $\alpha=0.05$. γ = Odds of Good Emotional Health; α = Intercept; χ_1 = Gender; χ_2 = # Sexual Partners; χ_3 = Frequency of Illegal Drug Use; χ_4 = Overall Support; ε = Error.

$$\text{Ln}(\gamma) = \alpha + \beta_1\chi_1 + \beta_2\chi_2 + \beta_3\chi_3 + \beta_4\chi_4 + \varepsilon$$

| Variable | | OR | 95% CI | R ² |
|--------------------------------|--------|--------|-------------|----------------|
| Gender | Female | 0.474* | 0.270-0.832 | 0.6781 |
| | Male | ref | - | |
| # Sexual Partners in Past Year | None | 1.021 | 0.505-2.063 | |
| | 1-2 | ref | - | |
| | 3-4 | 0.263* | 0.079-0.876 | |
| | 5+ | 0.173* | 0.056-0.532 | |
| Frequency of Illegal Drug Use | | 0.999 | 0.998-1.001 | |
| Overall Support | | 1.067* | 1.021-1.115 | |

Multiple Regression Confounding Effects Models

In this model we included variables sequentially using overall support as the exposure variable and the other variables as confounders. Each regression model indicates the confounding effects on the association between health and social support when upstream determinants are entered into the model.

Results of the confounding effects models are presented in Tables 5.3 and 5.4. Table 5.3 displays the model of Self-Rated health. Initially overall support was added to the model resulting with a statistically significant odds ratio of 1.096 for having a health status of fair or greater compared to poor for each unit increase in overall support. Due to the limited sample size all the identified variables could not be added to the model. Age, activity limitations, and cultural attachment were successfully added although the final addition of physical activity could not be completed.

Having an activity limitation significantly lowered one's odds of reporting fair or better health by 0.256 and increasing overall support by one unit significantly increases the odds of reporting fair or better health by 1.097. As was observed in the determinants of self-rated health model (Table 5.1) the significant cut-off appears to be between fair and poor health with having an activity limitation and low social support being the primary factors in reporting poor health. Also, age category was again significant which could be due to its correlation with having a medical condition. This is consistent with previous results.

Table 5.3 Confounding Effects Model of Social Support and Self-Rated Health. * indicate a significance level of $\alpha=0.05$. γ = Odds of Positive Self-Rated Health; α = Intercept; χ_1 = Overall Support; χ_2 = Age; χ_3 = Activity Limitations; χ_4 = Cultural Attachment; ε = Error.

$$\text{Ln}(\gamma) = \alpha + \beta_1\chi_1 + \varepsilon$$

| | Self-Rated Health Status | |
|-----------------|-------------------------------------|------|
| | Excellent, Very Good, Good, or Fair | Poor |
| Overall Support | 1.096* (1.039-1.157) | Ref |

$$\text{Ln}(\gamma) = \alpha + \beta_1\chi_1 + \beta_2\chi_2 + \beta_3\chi_3 + \beta_4\chi_4 + \varepsilon$$

| | | Self-Rated Health Status | |
|----------------------|-------------|-------------------------------------|------|
| | | Excellent, Very Good, Good, or Fair | Poor |
| Overall Support | | 1.097* (1.031-1.168) | Ref |
| Age | <35 | Ref | Ref |
| | 35-54 | 0.987 (0.321-3.035) | Ref |
| | 55+ | 0.340 (0.096-1.202) | Ref |
| Activity Limitations | No | Ref | Ref |
| | Yes | 0.256* (0.093-0.707) | Ref |
| Cultural Attachment | High | 0.651 (0.700-6.051) | Ref |
| | Medium-High | 0.953 (0.214-4.246) | Ref |
| | Medium-Low | 0.658 (0.176-2.462) | Ref |
| | Low | Ref | Ref |

Results of the model of emotional health are presented in Table 5.4. The initial simple regressions displayed that those with increasing social support had higher odds of good emotional health. The R-square for this model was 19.71 therefore representing 20% of the variability of the data. When age, gender, relationship status, and cultural attachment were added to the model this rose to 62%. The final additions to the model were the frequency of illegal drug use and number of sexual partners in the past year, which increased the R-square value to 0.7701. The final statistically significant odds ratio for overall support, after controlling for all confounders, was 1.058. Very little confounding effects upon the association between social support and health are observed in the above models.

Table 5.4 Confounding Effects Model of Social Support and Emotional Health. * indicates a significance level of $\alpha=0.05$ γ = Odds of Good Emotional Health; α = Intercept; χ_1 = Overall Support; χ_2 = Age; χ_3 = Gender; χ_4 = Relationship Status; χ_5 = Cultural Attachment; χ_6 = Frequency of Illegal Drug Use; χ_7 = # Sexual Partners in Past Year; ε = Error.

$$\text{Ln}(\gamma) = \alpha + \beta_1\chi_1 + \varepsilon$$

| Variable | OR | 95% CI | R ² |
|-----------------|--------|-------------|----------------|
| Overall support | 1.049* | 1.014-1.086 | 0.1971 |

$$\text{Ln}(\gamma) = \alpha + \beta_1\chi_1 + \beta_2\chi_2 + \beta_3\chi_3 + \beta_4\chi_4 + \beta_5\chi_5 + \varepsilon$$

| Variable | OR | 95% CI | R ² | |
|---------------------|-------------|-------------|----------------|-------------|
| Overall Support | 1.039* | 1.001-1.078 | 0.6193 | |
| Age | <35 | ref | | - |
| | 35-54 | 0.980 | | 0.560-1.714 |
| | 55+ | 2.687* | | 1.028-7.025 |
| Gender | Female | 0.619 | | 0.370-1.034 |
| | Male | ref | | - |
| Relationship Status | Married | ref | | - |
| | Divorced | 1.240 | | 0.401-3.836 |
| | Common Law | 1.515 | | 0.598-3.843 |
| | Widowed | 0.371 | | 0.101-1.366 |
| | Separated | 0.462 | | 0.131-1.628 |
| Cultural Attachment | Single | 0.602 | | 0.329-1.102 |
| | High | ref | | - |
| | Medium-High | 0.610 | | 0.238-1.562 |
| | Medium-Low | 0.859 | | 0.332-2.224 |
| Low | 0.422 | 0.152-1.168 | | |

$$\text{Ln}(\gamma) = \alpha + \beta_1\chi_1 + \beta_2\chi_2 + \beta_3\chi_3 + \beta_4\chi_4 + \beta_5\chi_5 + \beta_6\chi_6 + \beta_7\chi_7 + \varepsilon$$

| Variable | OR | 95% CI | R ² | |
|-----------------------|-------------|-------------|----------------|-------------|
| Overall Support | 1.058* | 1.011-1.107 | 0.7701 | |
| Age | <35 | ref | | - |
| | 35-54 | 0.797 | | 0.406-1.563 |
| | 55+ | 1.325 | | 0.423-4.144 |
| Gender | Female | 0.480* | | 0.262-0.880 |
| | Male | ref | | - |
| Relationship Status | Married | ref | | - |
| | Divorced | 1.407 | | 0.374-5.295 |
| | Common Law | 1.638 | | 0.577-4.645 |
| | Widowed | 0.573 | | 0.133-2.466 |
| | Separated | 0.656 | | 0.122-3.546 |
| | Single | 0.655 | | 0.310-1.386 |
| Cultural Attachment | High | ref | | - |
| | Medium-High | 0.639 | | 0.220-1.851 |
| | Medium-Low | 0.934 | | 0.313-2.787 |
| | Low | 0.556 | | 0.171-1.810 |
| Frequency of Drug Use | 0.999 | 0.998-1.001 | | |
| # Sexual Partners | 0 | 1.095 | | 0.471-2.549 |
| | 1-2 | ref | | - |
| | 3-4 | 0.331 | 0.086-1.271 | |
| | 5+ | 0.209* | 0.065-0.673 | |

Structural Equation Modeling of Self-Rated Health

For self-rated health, a theoretical model, “Self-Rated Health, Model 1” was developed based on the results of the multiple regression confounding effects model and the conceptual model developed in Chapter 1 (Figure 2.5).

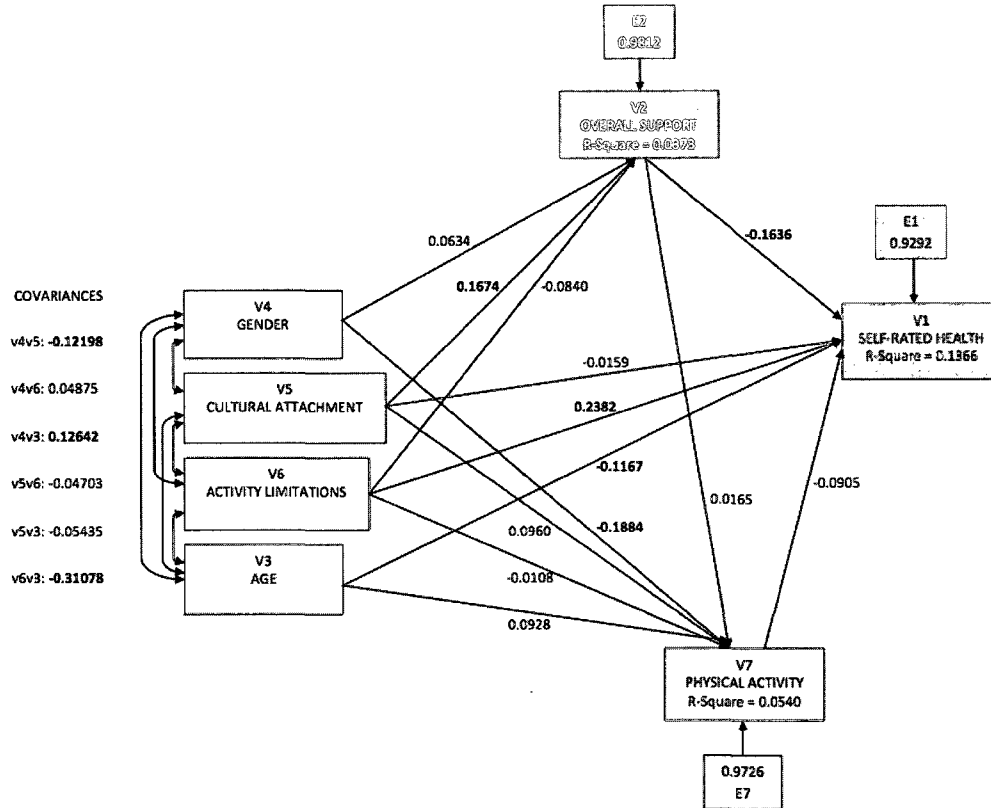


Figure 5.2. Self-Rated Health, Model 1. Standardized covariances, path coefficients, error estimates, and R-Square values are presented. Covariances and path coefficients in bold are statistically significant ($p < 0.05$).

Goodness of fit indices for all the self-rated health models, are presented in Table 5.5. The chi-square statistic, the most commonly-reported goodness of fit test for path analyses, tests the null hypothesis that the covariance matrix fits the model structure. Therefore, a significant p-value results in rejecting the null hypothesis and concluding that the model does not fit the data.

Table 5.5. Goodness of Fit Indices for Self-Rated Health Models (Figures 5.1-5.3).

| | | Model 1 | Model 2 | Model 3 |
|--|-------------------------------|---------|---------|---------|
| Chi-Square Test | Chi-Square | 0.4390 | 6.4592 | 0.9330 |
| | Chi-Square Degrees of Freedom | 2 | 5 | 2 |
| | P-Value | 0.8029 | 0.25641 | 0.6272 |
| Bentler's Comparative Fit Index (CFI) | | 1.0000 | 0.9879 | 1.0000 |
| Bentler & Bonnet's (1980) Non- normed Fit Index (NNFI) | | 1.1356 | 0.9493 | 1.0772 |
| Bentler & Bonnett's (1980) Normed Fit Index (NFI) | | 0.9969 | 0.9545 | 0.9921 |

Analysis of the initial model presented in Figure 5.2 demonstrated a non-significant model chi-square value ($p=0.8029$). The initial model was accepted but further examination of results was completed to check if modifications could be made to improve the fit.

Path coefficients were reviewed to examine whether any paths should be deleted. The path coefficients are presented in Figure 5.2, those in bold indicate statistical significance ($p<0.05$). The t-values for the paths from support, age, and activity limitations to health were statistically significant ($p<0.05$), as well as were the paths from cultural attachment to social support and from gender to physical activity. However none of the path coefficients were above 0.32 in absolute magnitude suggesting that they were not meaningful in size (Billings & Wroten, 1978).

Three paths were eliminated due to non-significance: Cultural attachment to health and age and cultural attachment to physical activity as well as three covariances: Age and cultural attachment, gender and activity limitations, and cultural attachment and activity limitations. The other non-significant paths were not removed as eliminating them was inconsistent with previous research and to maintain the theoretical model.

None of the residuals in the standardized residual matrix had an absolute value greater than two and the Lagrange multiplier test (Bentler, 1990) did not find a path that, if added, would significantly improve the fit of the model. The new model resulting from the removed paths, called "Self-Rated Health, Model 2" was then re-estimated (Figure 5.3).

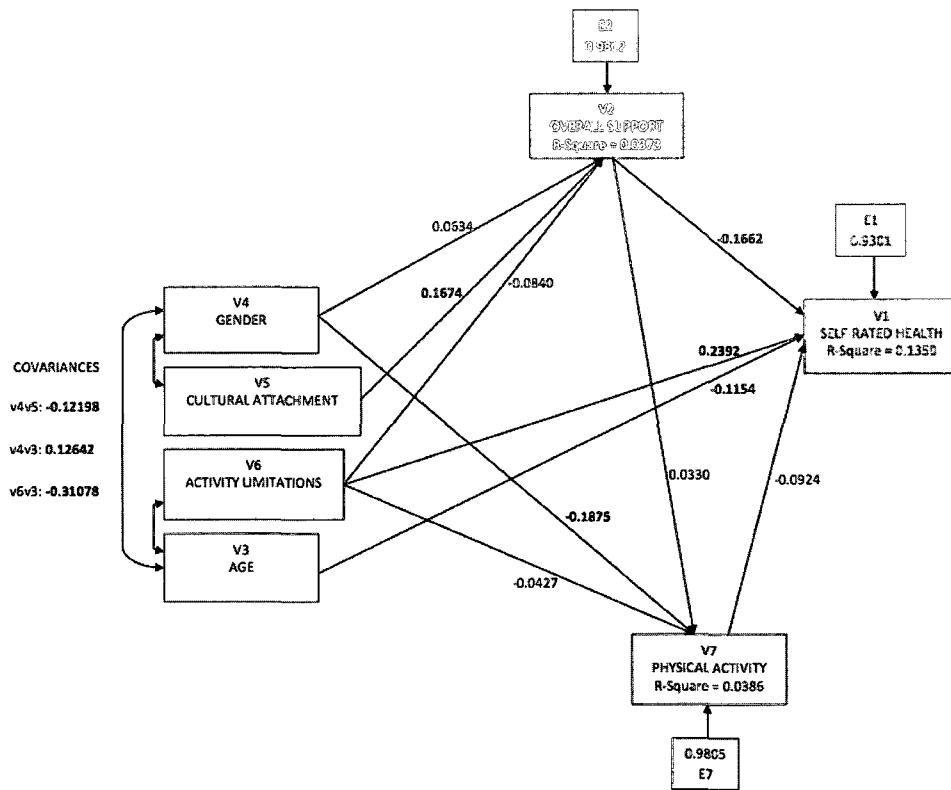


Figure 5.3. Self-Rated Health, Model 2. Standardized covariances, path coefficients, error estimates, and R-Square values are presented. Covariances and path coefficients in bold are statistically significant ($p < 0.05$).

The goodness of fit measures for Self-Rated Health, Model 2 are also presented in Table 5.5. With the removal of the paths and covariances, the fit of the model, though still significant, worsened. The chi-square test remained non-significant ($p = 0.25641$). In comparing the chi-square statistic for Model 1 to the chi-square statistic for Model 2, a chi-square difference test was performed and was not significant ($p > 0.05$). Therefore, although both models fit the data neither is a significantly better or worse fit. The path coefficients for Self-Rated Health, Model 2 are presented in Figure 5.3 with those in bold indicating statistical significance ($p < 0.05$).

The statistically significant path coefficients at $p < 0.05$ were the same as for Model 1 with the paths kept in the model for theoretical reasons remaining non-significant. The analyses revealed R-squared values of 0.1350 for health, 0.0373 for social support, and 0.0386 for physical activity. None of the normalized residuals from

Model 2 exceeded 2.0 in absolute magnitude although the largest normalized residual was 1.72666 for the Cultural Attachment-Physical Activity relationship. None of the Lagrange multiplier tests were significant.

A final model, “Self-Rated Health, Model 3” was run which removed the physical activity variable from the model and restored all other pathways from model 1 (Figure 5.4). The goodness of fit indices are presented in Table 5.5 and show that Model 3 also provides a good fit to the data as the p-value remained non-significant ($p=0.6272$). When compared to Model 2 the chi-square statistic for the difference between the models was non-significant ($p>0.05$). The standardized path coefficients for Model 3 are presented in Figure 5.4, bold indicating significance ($p<0.05$). None of these were meaningful in absolute magnitude and the R-squared value was 0.1286 for health and 0.0373 for support.

In summary, three models of self-rated health were examined using structural equation modeling. The first two included all variables identified using multiple regression analysis and the third removed physical activity. All three models displayed good fit to the data.

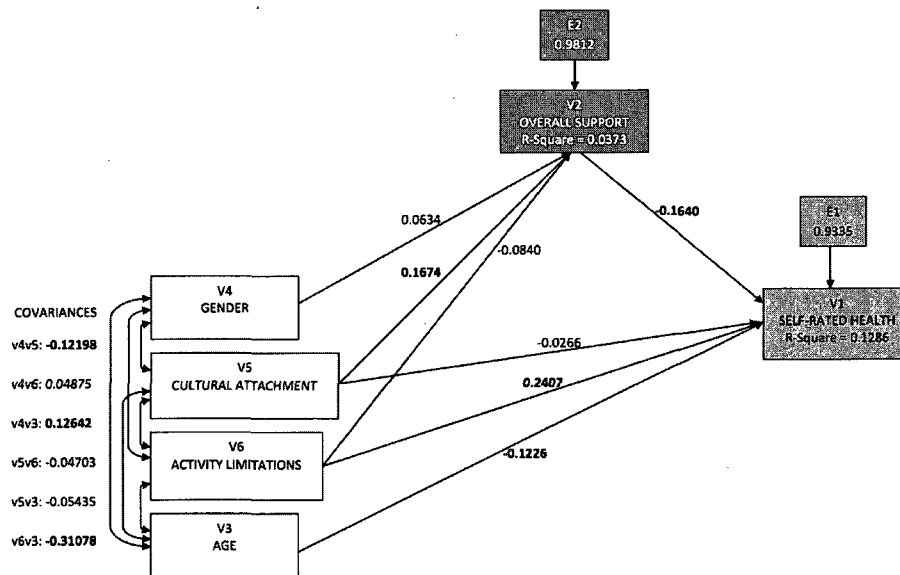


Figure 5.4 Self-Rated Health, Model 3. Standardized covariances and path coefficients are presented, those in bold are statistically significant ($p<0.05$).

Structural Equation Modeling of Emotional Health

The original structural equation model of emotional health, “Emotional Health, Model 1” is presented in Figure 5.5 and was developed based on the conceptual multiple regression model and the conceptual model in Chapter 1 (Figure 2.5).

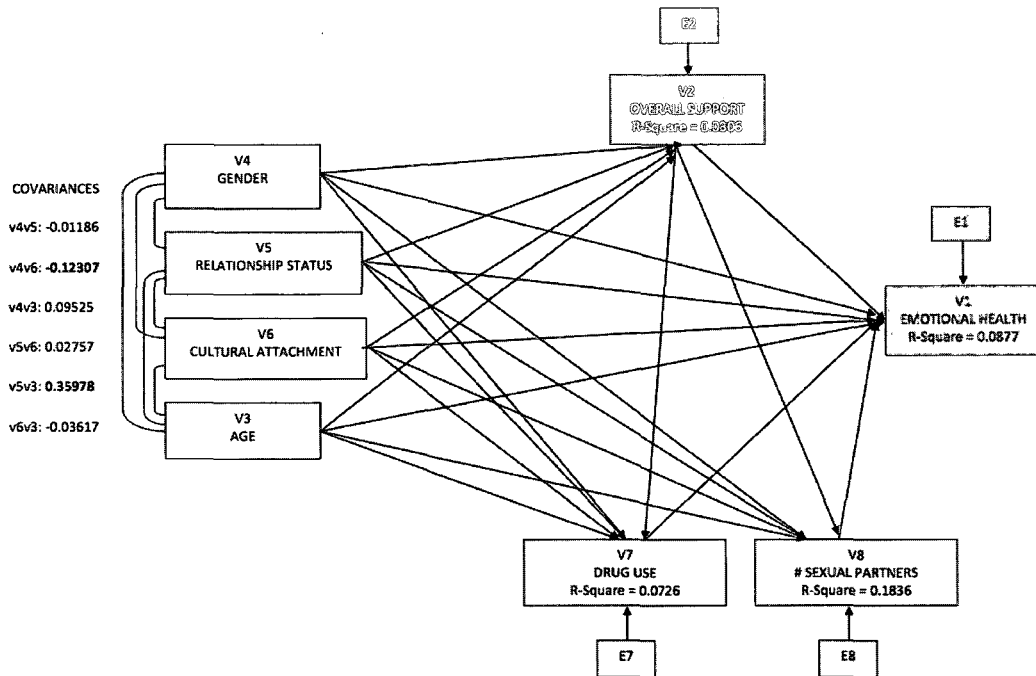


Figure 5.5. Emotional Health, Model 1. Standardized covariances are presented, those in bold are statistically significant ($p < 0.05$).

Goodness of fit indices for all the emotional health models are presented in Table 5.6. Model 1 had a non-significant chi-square statistic ($X^2=2.3815$, $df=1$, $p=0.1228$) indicating a model of good fit.

Table 5.6. Goodness of fit Indices for Emotional Health Models (Figures 5.4-5.5).

| | | Model 1 | Model 2 |
|--|-------------------------------|---------|---------|
| Chi-Square Test | Chi-Square | 2.3815 | 10.9969 |
| | Chi-Square Degrees of Freedom | 1 | 8 |
| | P-Value | 0.1228 | 0.2019 |
| Bentler's Comparative Fit Index (CFI) | | 0.9925 | 0.9837 |
| Bentler & Bonnet's (1980) Non- normed Fit Index (NNFI) | | 0.7895 | 0.9429 |
| Bentler & Bonnett's (1980) Normed Fit Index (NFI) | | 0.9888 | 0.9481 |

Path coefficients for Model 1 are presented in Table 5.7, those in bold indicate statistical significance ($p < 0.05$). Two paths had absolute values above 0.32 in magnitude and therefore meaningful in magnitude. These were the path from relationship status to number of sexual partners (-0.3447) and from age category to number of sexual partners (0.3783). Both estimates were statistically significant ($p < 0.05$).

None of the standardized residuals had an absolute value greater than two though the drug use-number of sexual partners association had a residual of -1.54073. The Lagrange multiplier test did not identify any additional pathways that, if added would significantly improve the fit of the model.

Table 5.7. Standardized Path Coefficients for Emotional Health, Model 1. Those coefficients in bold indicate significance at $\alpha=0.05$.

| | | | | | | | | |
|------------------------|---------------------|-------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------|
| Emotional Health (V1) | Social Support (V2) | Drug Use (V7) | # Sexual Partners (V8) | Age Category (V3) | Gender (V4) | Relationship Status (V5) | Cultural Attachment (V6) | Error (E1) |
| = | + | + | + | + | + | + | + | |
| | 0.1652 | -0.1419 | 0.0230 | -0.0259 | -0.1602 | -0.0864 | 0.000614 | 0.9552 |
| Social Support (V2) | Age Category (V3) | Gender (V4) | Relationship Status (V5) | Cultural Attachment (V6) | Error (E2) | | | |
| = | + | + | + | + | | | | |
| | 0.0575 | 0.0579 | -0.0963 | 0.1463 | 0.9846 | | | |
| Drug Use (V7) | Social Support (V2) | Age Category (V3) | Gender (V4) | Relationship Status (V5) | Cultural Attachment (V6) | Error (E7) | | |
| = | + | + | + | + | + | | | |
| | -0.0621 | 0.0857 | -0.1313 | 0.1765 | 0.0320 | 0.9630 | | |
| # Sexual Partners (V8) | Social Support (V2) | Age Category (V3) | Gender (V4) | Relationship Status (V5) | Cultural Attachment (V6) | Error (E8) | | |
| = | + | + | + | + | + | | | |
| | 0.0215 | 0.3783 | 0.0496 | -0.3447 | 0.1140 | 0.9036 | | |

Of the twelve path coefficients that were non-significant ($p>0.05$), seven were removed from the model. The remaining non-significant paths (number of sexual partners to health; gender and relationship status to social support; support to drug use; and support to number of sexual partners) were left in the model to either maintain the original conceptual model or because of strong evidence of the association in univariable and multi-variable analysis. Furthermore, four covariances were found to be insignificant and were therefore also removed. The new model, “Emotional Health, Model 2” is presented in Figure 5.6.

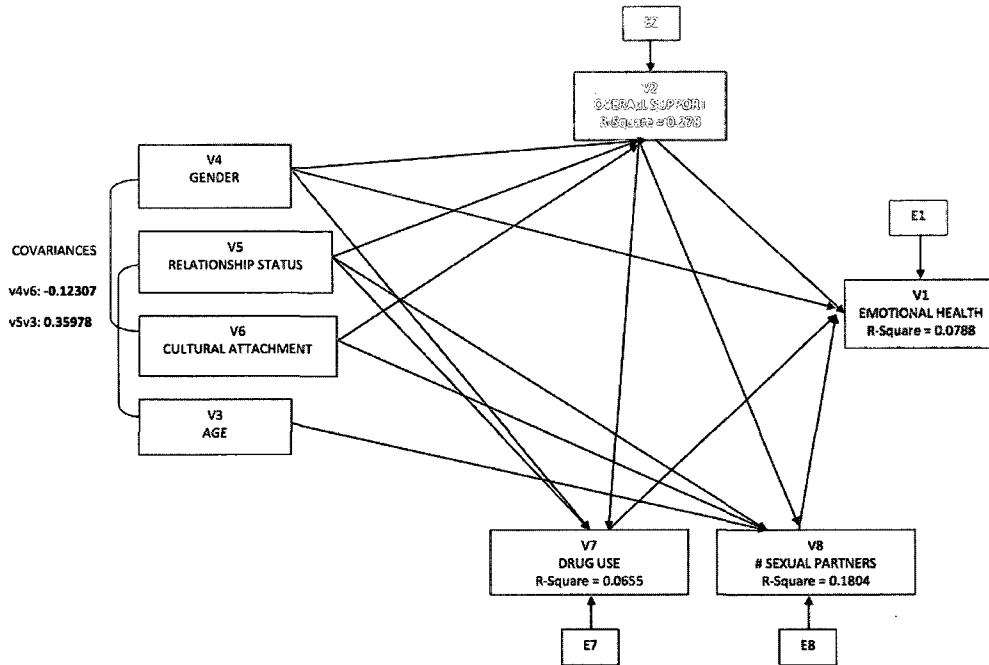


Figure 5.6. Emotional Health, Model 2. Standardized covariances are presented, those in bold are statistically significant ($p < 0.05$).

The goodness of fit measures for Emotional Health, Model 2 are presented in Table 5.6. The p-value for the chi-square test increased (0.1228 to 0.2019) suggesting an improvement in the fit of the model. To test whether the removal of the paths and covariances produced a significantly better fitting model a chi-square test was performed and was found to be non-significant ($p > 0.05$). Therefore, both models fit the data and there is no significant difference in the fit based on the chi-square statistic.

The path coefficients for Emotional Health, Model 2 are presented in Table 5.8. The statistically significant path coefficients ($p < 0.05$) were the same for as for Model 1 with the paths kept in the model for theoretical reasons remaining non-significant. The analyses revealed R-squared values of 0.0788 for emotional health, 0.0278 for social support, 0.0655 for drug use, and 0.1804 for number of sexual partners.

Two path estimates had an absolute value greater than 0.32 and were therefore meaningful in magnitude. These were age category to number of sexual partners (0.3837) and relationship status to number of sexual partners (-0.3470). While the magnitude of the majority of the path coefficients remained low, the error terms for the

endogenous variables were quite high: 0.9598 for emotional health, 0.9860 for social support, 0.9667 for drug use, and 0.9053 for number of sexual partners (Table 5.8).

None of the standardized residuals had an absolute magnitude greater than 2 though the largest was -1.83980 for the relationship status-emotional health association. None of the Lagrange multiplier tests were significant ($p < 0.05$) therefore no additional modifications were made.

Table 5.8. Standardized Path Coefficients for Emotional Health, Model 2. Those coefficients in bold indicate significance at $\alpha = 0.05$.

| | | | | | |
|------------------------|---------------------|--------------------------|--------------------------|--------------------------|---------------|
| Emotional Health (V1) | Social Support (V2) | Drug Use (V7) | # Sexual Partners (V8) | Gender (V4) | Error (E1) |
| = | + | + | + | + | |
| | 0.1688 | -0.1633 | 0.0325 | -0.1654 | 0.9598 |
| Social Support (V2) | Gender (V4) | Relationship Status (V5) | Cultural Attachment (V6) | Error (E2) | |
| = | + | + | + | | |
| | 0.0634 | -0.0755 | 0.1443 | 0.9860 | |
| Drug Use (V7) | Social Support (V2) | Gender (V4) | Relationship Status (V5) | Error (E7) | |
| = | + | + | + | | |
| | -0.0537 | -0.1271 | 0.2088 | 0.9667 | |
| # Sexual Partners (V8) | Social Support (V2) | Age Category (V3) | Relationship Status (V5) | Cultural Attachment (V6) | Error (E8) |
| = | + | + | + | + | |
| | 0.0244 | 0.3837 | -0.3470 | 0.1079 | 0.9053 |

5.2 DISCUSSION

Ultimately it is clear these two types of models are well suited in addressing different research questions. The confounding effects models are attempting to address the true association between overall support and health, which appears to be small but significant ($p < 0.05$). The odds of reporting fair or higher self-rated health were 1.097 (95% CI: 1.031-1.168) and the odds of reporting high emotional health were 1.049 (95% CI: 1.011-1.107) with every unit increase in social support.

The determinants of health models are a more predictive approach to understanding health at a population level. These models were included at the request of a committee member with experience working with the data and the communities involved and these results will probably be the ones of most interest to community partners.

Multiple Regression Determinants of Health Models

The predictive model of self-rated health included a measure of mobility (activity limitations) and the social environment (overall support). Older people with activity limitations and low support are at higher risk of reporting low self-rated health.

In examining the five levels of self-rated health with a non-proportional ordinal model the cut-off between reporting fair and poor health appeared to be the most important suggesting that the associations are being driven by those who are reporting fair or better health.

While variables such as cultural attachment were eliminated from this model it is important to think of a larger web of association. For example, social support emerged as a predictor of health in this population and cultural attachment emerged as a predictor of social support (Tables 5.4 & 5.5). Therefore, while these results present a number of key variables in determining the overall health of the population, it is possible that this model can be placed within a larger model in incorporating the determinants of the determinants of health.

The predictive model of emotional health included gender, number of sexual partners, frequency of illegal drug use and overall support indicating that young women with multiple sexual partners, high drug use and low support are at highest risk of feeling sad, blue, or depressed for two or more weeks in a row. While unsurprising, being able to narrow into these four variables with a predictive ability of around 68% can focus policy directive, interventions, and future research examining this topic.

The emergence of risky sexual behaviour as a predictor of low emotional health highlights the need for culturally-safe STI screening, treatment, and prevention and

increased awareness around sexual health issues within the communities and its association with emotional health. Workshops like the one held by Audrey Steenbeek, Marni Amirault, and Gabe Saulnier (2009) in Halifax in early 2009 are good examples of attempts to develop culturally-sensitive sexual health need assessments for First Nations and other stakeholders.

The association between gender and emotional health is expected and has been observed in this population previously with young women carrying a high burden of depression and low self-esteem (McIntyre et al, 2001). This is also consistent with the Tripartite Forum's identification of mental health as a top priority for health in these communities (2008). Positive steps taken have included the development of formal and informal supports within the communities and health system and developments in prevention and promotion activities including workshops and newsletters though there is still much need for culturally-safe services that embrace traditional practices (Tripartite, 2008). The results of this study help to point to some of the risk factors associated with negative emotional health such as being a young woman with multiple sexual partners as well as some of the protective buffers including positive social support.

Unfortunately cross-sectional studies such as this one prevent an understanding of the temporal associations between variables so we are unable to determine causality or whether for example, low emotional health is causing young women to engage in risky sexual behaviour or vice versa.

Multiple Regression Confounding Effects Models

The variables identified as potential confounders of the association between social support and self-rated health were age, gender, cultural attachment, activity limitations, and physical activity but due to sample size restrictions gender and physical activity were not included in the model.

The final adjusted odds ratio for overall support was 1.097 (p-value <0.05) for reporting fair or better health compared to reporting poor health. These results indicate that social support is a key factor in determining self-reported health above and beyond

the effects of age, having an activity limitation due to a medical condition and cultural attachment. However these odds are lower than the odds found by Richmond et al (2007) who dichotomized self-rated health in their study of the Canadian Aboriginal population. With such a large sample size, the 2007 study was able to examine each aspect of social support separately however sample size limitations prevented this in the current study. Results of the simple regression analyses (Chapter 4) provide clues as to how different types of support differ in the population.

The unadjusted and adjusted estimates for the association between overall social support and self-rated and emotional health did not drastically change. This suggests that confounding is not accounting for most of the association between social support and health outcomes or that the correct confounders have not been identified in this study. However, the confounders identified for the confounding effects model of emotional health: age, gender, relationship status, cultural attachment, drug use, and risky sexual behaviour were also consistent with the literature. Again, only a few of the confounders displayed significance: gender and number of sexual partners while the R-squared was relatively high explaining 77% of the variance. The final association of support and emotional health was 1.058 (95% CI: 1.011-1.107).

With different confounders emerging for self-rated health and emotional health it is clear that support follows different pathways to different types of health. However, in both cases it was found to be a significant if small association.

Structural Equation Modeling of Self-Rated Health

All three structural equation models of self-rated health had at least an acceptable fit to the data. Model 1 with all possible pathways provided the best fit but it is argued here that Model 3 which did not include Physical Activity should be tentatively considered the 'final' identified model for self-rated health.

Although Model 1 arguably demonstrated a better fit to the data based on the chi-square test there was no statistically significant difference between it and the chi-square

for Model 3. It is the combination of the chi-square statistic with a CFI, NNFI, and NFI all above 0.9 that identifies Model 3 as fitting the data.

The removal of physical activity was based on two reasons. First the paths from social support to physical activity and from physical activity were of small magnitude and not statistically significant. As well, when physical activity was removed from the model, there was no change in the significance or directionality of the path coefficients or any large change in their magnitude (Figure 5.4).

This removal raises questions regarding the behavioural pathway between social support and health discussed by Berkman and Glass (2000). There is much evidence to support an association between behavioural changes and social support (Berkman & Glass, 2000; Giles et al, 2008) however such evidence is often very contextual and the general context of this study may not be capable of capturing such an association. The final structural equation model of self-rated health also displays the mediating role that social support plays between cultural attachment and health.

Structural Equation Modeling of Emotional Health

Both Emotional Health Models 1 and 2 provided at least, minimally acceptable fit to the data. But, Model 2 with less pathways provided the best fit with a non-significant chi-square test ($p=0.2019$) and values greater than 0.9 for the CFI, NNFI, and NFI. Therefore, Model 2 should be accepted as the “final” model for this investigation due to its improved fit.

Also, it has also been advised that changes made to the model be theoretically meaningful (MacCallum et al, 1992) which was true for the changes made to produce Emotional Health, Model 2.

The final model is reminiscent of the conceptual models presented in Chapter 2 with overall support acting as a mediator between upstream social determinants of health such as relationship status and cultural attachment and health. Other upstream determinants followed different paths: age did not display a significant path to support or health but only to the number of sexual partners in the past year. Gender maintained

paths to support, health, and the frequency of illegal drug use. The paths from social support to the two behavioural variables – drug use and risky sexual behaviour – were kept in the model to maintain the original theoretical structure however these pathways were non-significant.

The two pathways that demonstrated absolute magnitudes greater than 0.32 and were therefore meaningful in magnitude were age category to number of sexual partners (0.3837) and relationship status to number of sexual partners (-0.3470). Being single and young can unsurprisingly therefore be considered strong determinants of risky sexual behaviour and based on the strong association between risky sexual behaviour and emotional health provides a starting point for identifying at-risk groups for low emotional health.

Reliability and Validity of Structural Equation Models

Although two models – one for Self-Rated Health and one for Emotional Support – have been accepted they themselves have somewhat questionable validity as they are relatively data-driven and based on one sample of only moderate size. Additionally, between the two models there were only two path coefficients that had a magnitude greater than 0.32 (relationship status to number of sexual partners (-0.3447) and age category to number of sexual partners (0.3783)). It is quite possible that these models will not generalize to other samples or to the population. To test validity further path analyses should be performed.

CHAPTER 6: CONCLUSION

6.1 PRINCIPAL FINDINGS

The objectives of this thesis were to describe the influence of social support as an upstream and downstream determinant of health and to theorize the patterns connecting social support to health and health behaviours within the Nova Scotia Mi'kmaq on-reserve population using secondary analysis of survey data.

Age and gender were the two most important determinants of both health outcomes and social support. Risky behaviours were largely observed in the younger male portion of the population who displayed a number of risk factors including low educational achievement compared to women and higher rates of drug use and binge drinking.

Some potential buffers to risk behaviours and health concerns including increased social support and education that showed significantly higher rates among women in the population compared to men.

Age was also one of the most important determinants of self-rated health and reporting a medical condition with increasing age associated with decreasing self-rated health. Low emotional health appeared to be linked to young people and improved with age. Gender, cultural attachment, relationship status, diet, and self-rated health were commonly found to be determinants of all types of social support.

The differences between the three definitions of health examined: self-rated, emotional, and reporting a medical condition pin-pointed the importance of thinking of health as a multi-dimensional construct.

When a multiple regression model was created, self-rated health was found to be predicted by age category, mobility, and overall social support whereas emotional health was predicted by gender, the number of sexual partners in the past year, and overall support.

When controlling for confounders, social support has a small but statistically significant ($p < 0.05$) association with both types of health examined. The use of a general measure of social support, although allowing the analyses performed here, prevents

understanding of the contextual impacts of social support and an understanding of how they fit into the broader social environment as conceived by Berkman and Glass (2000) (Figure 1.1). Undeniably, social support is crucial in determining both overall illness and emotional health and is shaped by a number of upstream determinants of health such as culture and other common demographic factors such as gender and age (Figure 3.4).

6.2 STRENGTHS AND LIMITATIONS

The use of the RHS as a culturally validated survey is a clear strength of this study as is the application of in-depth statistical analyses, which will hopefully contribute to future directions for analysis of future cycles of the RHS.

A major limitation of this research was the small sample size. As discussed previously, 482 adult interviews were completed with a response rate of 93%. Although there was a desire to stratify analyses by gender, this was not possible due to the limited number of people of each gender. In response to this challenge, a variable reduction technique was utilized to reduce the number of variables.

Unfortunately due to these sample size restrictions, social support was aggregated into an overall measure for the multiple regressions and structural equation modeling. Although beyond the scope of this study, such a break down by type of social support would provide a more intimate understanding of how social support influences health.

It should also be noted that the measure of cultural attachment was exploratory and was created for the purposes of this study and has not been validated.

Another potential limitation arises from the nature of the self-reported survey measures. Although this was not a limitation for measures of social support as this study investigated perceived support, recall bias may have affected measures of health conditions and social acceptability introducing a bias towards measures of cultural and community involvement. A final limitation was the cross-sectional nature of the RHS which prevented determination of causality and directionality of associations.

6.3 POLICY IMPLICATIONS AND FUTURE RESEARCH

A 2002 literature review of evidence on social support interventions (Hogan et al, 2002) discovered that although such interventions are generally useful, there is too much variety in treatment protocols and areas of application as well as not enough evidence to indicate what type of interventions work best in what situations. This research clearly shows a positive association between social support and health outcomes suggesting that programs that enhance social support would be beneficial to the population's overall health as well as emotional health. There are many discussions in the literature on the types of interventions that are effective, however clear evidence is needed to better understand their efficacy in particular for the on-reserve First Nations population.

Results from the analysis of emotional health point to the importance of creating programs that focus on building healthy relationships, especially for women in these communities and the potential benefits of social support in such interventions. Also, longitudinal data and qualitative research studies can provide more contextual evidence of such relationships.

Iwasaki et al (2006) observed that in addition to health problems, individuals who identify as Aboriginal appear to have stressful lives due to day-to-day circumstances and the cultural political contexts in which they live and called for a need to find proactive ways of coping with such stress. The strong links between support and health and stress make social support interventions an excellent method of developing such coping mechanisms. Additionally, the link between self-esteem and a strong cultural identity observed in the Atlantic Centre of Excellence for Women's Health was confirmed here indicating that this would be a good basis for developing such programs.

While there are unanswered questions arising as to the manner of the association between social support and health, future research in this field should embrace the principles of intervention research in order to best serve the population. Such research can address both theoretical questions and program initiatives in the communities.

REFERENCES

- Albertsen, K., Borg, V., Oldenburg, B. (2006). A systematic review of the impact of work environment on smoking cessation, relapse and amount smoked. *Preventive Medicine*, 43(4), 291-305. doi: 10.1016/j.ypmed.2006.05.001
- Assembly of First Nations (AFN). (2007). First Nations Regional Longitudinal Health Survey (RHS) 2002/03 Results for Adults, Youth and Children Living in First Nations Communities. Retrieved from First Nations Information and Governance Committee: <http://www.rhs-ers.ca/english/pdf/rhs2002-03reports/rhs2002-03-technicalreport-afn.pdf>
- Barrera, M. (1986). Distinctions between social support concepts, measures, and models. *American Journal of Community Psychology*, 14(4), 413-445. doi: 10.1007/BF00922627
- Bentler, P.M. (1990). Comparative Fit Indexes in Structural Models. *Psychological Bulletin*, 107(2), 238-246. doi: 10.1037/0033-2909.107.2.238
- Bentler, P.M., Bonett, D.G. (1980). Significance tests and goodness-of-fit in the analysis of covariance structures. *Psychological Bulletin*, 88, 588-600.
- Berkman, L.F., Glass, T. (2000). Social Integration, Social Networks, Social Support, and Health. In L.F. Berkman & I. Kawachi (Eds.) *Social Epidemiology* (pp. 137-173). New York: Oxford University Press.
- Berkman, L.F., Syme, S.L. (1979). Social Networks, Host Resistance, and Mortality: Nine-Year Follow-Up Study of Alameda County Residents. *American Journal of Epidemiology*, 109(2), 186-204. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/425958>
- Billings, R.S., Wroten, S.P. (1978). Use of path analysis in industrial/organizational psychology: Criticisms and suggestions. *Journal of Applied Psychology*, 63(6), 677-688. Retrieved from <http://psycnet.apa.org/journals/apl/63/6/677/>
- Broadhead, W.E., Kaplan, B.H., James, S.A., Wagner, E.H., Schoenback, V.J., Grimson, R., Heyden, S., Tibblin, G., Gehlbach, S.H. (1983). The Epidemiologic Evidence for a Relationship Between Social Support and Health. *American Journal of Epidemiology*, 117(5), 521-537. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/6342368>
- Chandler, M.J., Lalonde, C. (1989). Cultural continuity as a hedge against suicide in Canada's First Nations. *Transcultural Psychiatry*, 35(2), 191-219. doi: 10.1177/136346159803500202
- Canadian Council on Learning (CCL). (2009). The Roundtable on Aboriginal Post-Secondary Education in New Brunswick and Nova Scotia. Retrieved from CCL: http://www.ccl-cca.ca/pdfs/AdLKC/Reports08/COR_Aboriginal_Roundtable.pdf

Canadian Institute for Health Information (CIHI). (2004). Improving the Health of Canadians. Retrieved from CIHI:
http://secure.cihi.ca/cihiweb/dispPage.jsp?cw_page=PG_39_E&cw_topic=39&cw_rel=AR_322_E

Canadian Institutes for Health Research (CIHR). (2007). CIHR Guidelines for Health Research Involving Aboriginal Peoples. Retrieved from CIHR: <http://www.cihr-irsc.gc.ca/e/29134.html>

Dicianno, B.E., Gaines, A., Collins, D.M., Lee, S. (2009). Mobility, Assitive Technology Use, and Social Integration Among Adults with Spina Bifida. *American Journal of Physical Medicine & Rehabilitation*, 88(7), 533-541. doi:
10.1097/PHM.0b013e3181aa41d4

Evans, R.G., Stoddart, G.L. (1990). Producing Health, Consuming Health Care. *Social Science & Medicine*, 31(12), 1347-1363. Retrieved from
<http://www.ncbi.nlm.nih.gov/pubmed/2126895>

Frolich, K.L., Ross, N., Richmond, C. (2006). Health disparities in Canada today: Some evidence and a theoretical framework. *Health Policy*, 79(2-3), 132-143. doi:
10.1016/j.healthpol.2005.12.010

Gams, M., Krivec, J. (2008) Demographic Analysis of Fertility Using Data Mining Tools. *Informatica*, 32, 147-156. Retrieved from http://www.informatica.si/PDF/32-2/05_Gams-Demographic%20Analysis%20of%20Fertility%20Using%20Data%20Mining%20Tools.pdf

Garro, L.C. (1995). Individual or societal responsibility? Explanations of diabetes in an Anishinaabe (Ojibway) community. *Social Science & Medicine*, 40(1), 37-46. doi:
10.1016/0277-9536(94)00125-D

Giles, B.G., Haas, G., Sajna, M., Findlay, C.S. (2008). Exploring Aboriginal Views of Health Using Fuzzy Cognitive Maps and Transitive Closure. *Canadian Journal of Public Health*, 99(5), 411-417. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/19009928>.

Harvard Project on American Indian Development (HPAIED). (2006). Review of the First Nations Regional Longitudinal Health Survey (RHS) 2002/2003. Retrieved from First Nations Information and Governance Committee: http://www.rhs-ers.ca/english/pdf/rhs2002-03reports/rhs_harvard_independent_review.pdf

Hatcher, L. (1994). *A Step-by-Step Approach to Using the SAS System for Factor Analysis and Structural Equation Modeling*. Cary NC: SAS Publishing.

Health Canada. (2007). *The Population Health Approach: Key Determinants*. Retrieved from <http://www.phac-aspc.gc.ca/ph-sp/determinants/index.html>

Healey, G.K., Meadows, L.M. (2008). Tradition and Culture: An Important Determinant of Inuit Women's Health. *Journal of Aboriginal Health*, 4(1), 25-33. Retrieved from http://www.naho.ca/english/journal/jah04_01/05TraditionCulture_25-33.pdf

Helman, C.C. (1981). Disease versus illness in general practice. *Journal of the Royal College of General Practitioners*, 31(230), 548-552. Retrieved from <http://www.ncbi.nlm.nih.gov:80/pmc/articles/PMC1972172/>

Ho, L., Gittelsohn, J., Sharma, S., Cao, X., Treuth, M., Rimal, R., Ford, E., Harris, S. (2008). Food-related behavior, physical activity and dietary intake in First Nations – a population at high risk for diabetes. *Ethnicity & Health*, 13(4), 335-349. doi: 10.1080/13557850701882936

Hogan, B.E., Linden, W., Najarian, B. (2002). Social support interventions: Do they work? *Clinical Psychology Review*, 22(3), 381-440. doi: 10.1016/S0272-7358(01)00102-7

House, J.S. (1981). *Work Stress and Social Support*. Reading MA: Addison-Wesley Publishing Company.

Hsieh, C-H. (2008). A Concept Analysis of Social Capital Within a Health Context. *Nursing Forum*, 43(3), 151-159. doi: 10.1111/j.1744-6198.2008.00107.x

Idler, E.L., Benyamini, Y. (1997). Self-rated health and mortality: a review of twenty-seven community studies. *Journal of Health and Social Behavior*, 38(1): 21-37. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/9097506>

Indian and Northern Affairs Canada (INAC). (2009). First Nations Profiles. Retrieved from INAC: <http://pse5-esd5.ainc-inac.gc.ca/FNP/Main/Index.aspx>

Iwasaki, Y., Bartlett, J. (2006). Stress-coping Among Aboriginal Individuals with Diabetes in an Urban Canadian City: From Woundedness to Resilience. *Journal of Aboriginal Health*, 3(1), 16-25. Retrieved from <http://www.naho.ca/english/journal/Article02.pdf>

Jeffery, B., Abonyi, S., Labonte, R., Duncan, K. (2006). Engaging Numbers: Developing Health Indicators that Matter for First Nations and Inuit People. *Journal of Aboriginal Health*, 3(1), 44-52. Retrieved from <http://www.naho.ca/english/journal/Article05.pdf>

Joreskog, K.G., Sorbom, D. (1989). *LISREL 7 User's Reference guide*. Mooresville, Indiana: Scientific Software, Inc.

Keon, W.J., Pepin, L. (2009). A Healthy, Productive Canada: A Determinants of Health Approach. Retrieved from The Standing Senate Committee on Social Affairs, Science, and Technology, Ottawa ON: <http://www.parl.gc.ca/40/2/parlbus/commbus/senate/com-e/popu-e/rep-e/rephealth1jun09-e.pdf>

Kirby, M.J., Keon, W.J. (2004). Mental Health, Mental Illness, and Addiction: Overview of Policies and Programs in Canada. Retrieved from The Standing Senate Committee on Social Affairs, Science, and Technology: <http://www.parl.gc.ca/38/1/parlbus/commbus/senate/Com-e/SOCI-E/rep-e/report1/repintnov04vol1table-e.htm>

Kleinman, A., Eisenberg, L., Good, B. (2006). Culture, Illness, and Care: Clinical Lessons From Anthropologic and Cross-Cultural Research. *The Journal of Lifelong Learning in Psychiatry*, 4(1), 140-149. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/626456>

Knockwood, I. (2001). *Out of the Depths: The Experiences of Mi'kmaq Children at the Indian Residential School at Shubenacadie, Nova Scotia*. Nova Scotia: Fernwood Publishing.

Krieger, N. (2001). Theories for social epidemiology in the 21st century: an ecosocial perspective. *International Journal of Epidemiology*, 30(4), 668-677. Retrieved from <http://ije.oxfordjournals.org/cgi/content/short/30/4/668>

Lalonde, M. (1974). A New Perspective on the Health of Canadians. Retrieved from Health Canada: <http://www.hc-sc.gc.ca/hcs-sss/com/fed/lalonde-eng.php>

Lavergne, R. (2009). *Health in non-metropolitan Canada: Beyond the Urban/Rural Dichotomy*. (Unpublished Master's thesis). Dalhousie University, Halifax NS.

MacCallum, R.C., Roznowski, M., Necowitz, L.B. (1992). Model modifications in covariance structure analysis: The problem of capitalization on chance. *Psychological Bulletin*, 111(3), 490-504. Retrieved from <http://www.scopus.com/record/display.url?eid=2-s2.0-0001348083&view=basic&origin=inward&txGid=Dc9vSJGrVEzpIrPfyZdzO9Q%3a2>

Marmot, M.G. (2004). *The status syndrome: how social standing affects our health and longevity*. New York: Times Books/Henry Holt.

McIntyre, L., Wien, F., Rudderham, S., Etter, L., Moore, C., MacDonald, N., Johnson, S., Gottschall, A. (2001). An Exploration of the Stress Experiences of Mi'kma On-Reserve Female Youth in Nova Scotia. Retrieved from the Atlantic Centre of Excellence for Women's Health: <http://www.acewh.dal.ca/eng/reports/Wien%20Finalreport.pdf>

Mi'kmaq Health Research Group (MHRG). (2007). The Health of the Nova Scotia Mi'kmaq Population. Retrieved from the Atlantic Aboriginal Health Research Program: http://aahrp.socialwork.dal.ca/files/Report_RHS%5B1%5D.pdf

Mi'kmaq-Nova Scotia-Canada Tripartite Forum (Tripartite). (2005). Providing Health Care, Achieving Health. Truro, NS: The Tripartite Forum.

Mi'kmaq-Nova Scotia-Canada Tripartite Forum (Tripartite). (2008). Exploring Health Priorities in First Nation Communities in Nova Scotia. Retrieved from the Tripartite Forum: <http://www.tripartiteforum.com/files/health/2TFReportLow.pdf>

Mignone, J., O'Neill, J. (2005). Social capital and youth suicide risk factors in First Nations communities. *Canadian Journal of Public Health*, 96(1), S51-54.

Milloy, J.S. (1999). *A National Crime: The Canadian Government and the Residential School System, 1879-1986*. Winnipeg: The University of Manitoba Press.

National Aboriginal Health Organization (NAHO). (2007). How we see it! Broader Determinants of Health within Aboriginal Contexts. Retrieved from NAHO: <http://www.naho.ca/english/publications/vaccho.pdf>

National Aboriginal Health Organization (NAHO). (2006). First Nations Regional Longitudinal Health Survey (RHS) 2002/2003 Report on Process and Methods. Retrieved from First Nations Information and Governance Committee: http://www.rhs-ers.ca/english/pdf/rhs2002-03reports/rhs2002-03-report_on_process_and_methods.pdf

Newbold, K.B. (1998). Problems in search of Solutions: Health and Canadian Aboriginals. *Journal of Community Health*, 23(1), 59-74. doi: 10.1023/A:1018774921637

Richmond, C.A.M. (2007). Narratives of social support and health in Aboriginal communities. *Canadian Journal of Public Health*, 98(6), 347-351. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/17896750>

Richmond, C.A.M., Ross, N.A., Egeland, G.M. (2007). Social Support and Thriving Health: A New Approach to Understanding the Health of Indigenous Canadians. *American Journal of Public Health*, 97(10), 1827-1833. doi: 10.2105/AJPH.2006.096917

Rosenberg, M.W., Wilson, K. (2001). Exploring the links between health and housing: The limitations of population health surveys. *GeoJournal*, 53, 109-116. doi: 10.1023/A:1015768302098

Royal Commission on Aboriginal Peoples (RCAP). (1996). Report of the Royal Commission on Aboriginal Peoples. Retrieved from Indian and Northern Affairs Canada: <http://www.ainc-inac.gc.ca/ap/rrc-eng.asp>

Sen, A. (2000). *Development as Freedom*. New York: Anchor Books.

Shah, C.P. (2004). Health of Aboriginal Peoples. In D. Raphael (Ed.), *Social Determinants of Health: Canadian Perspectives* (pp.267-280). Toronto: Canadian Scholar's Press.

Sherbourne, C.D., Stewart, A.L. (1991). The MOS Social Support Survey. *Social Science & Medicine*, 32(6): 705-714. doi: 10.1016/0277-9536(91)90150-B

Shields, M., Shooshtari, S. (2001). Determinants of self-perceived health. *Health Reports*, 13(1): 35-52. Statistics Canada, Catalogue 82-003. Retrieved from Statistics Canada: <http://www.statcan.gc.ca/bsolc/olc-cel/olc-cel?catno=82-003-X20010016023&lang=eng>

Standing Senate Committee on Social Affairs, Science, and Technology (Senate). (2004). Mental Health, Mental Illness, and Addiction: Overview of Policies and Programs in Canada. Retrieved from The Standing Senate Committee on Social Affairs, Science, and Technology: <http://www.parl.gc.ca/38/1/parlbus/commbus/senate/Com-e/SOCI-E/rep-e/report1/repintnov04vol1table-e.htm>

Standing Senate Committee on Social Affairs, Science, and Technology (Senate). (2009). A Healthy, Productive Canada: A Determinants of Health Approach. Retrieved from The Standing Senate Committee on Social Affairs, Science, and Technology, Ottawa ON: <http://www.parl.gc.ca/40/2/parlbus/commbus/senate/com-e/popu-e/rep-e/rephealth1jun09-e.pdf>

Statistical Analysis Software Institute (SAS). (2007). *Introduction to Data Mining and SAS Enterprise Miner 4.3*. Cary, North Carolina: SAS Institute.

Statistics Canada. (2006). Aboriginal Peoples Survey (APS), 2001: user's guide to the public use microdata file. Retrieved from Statistics Canada: <http://www.statcan.gc.ca/bsolc/olc-cel/olc-cel?catno=89M0020GPE&lang=eng>

Statistics Canada. (2008). Aboriginal Peoples in Canada in 2006: Inuit, Métis, and First Nations, Census 2006. Retrieved from Statistics Canada: <http://www.statcan.gc.ca/daily-quotidien/080115/dq080115a-eng.htm>

Statistics Canada. (2009a). 2006 Census Nova Scotia Community Profiles. Retrieved from Statistics Canada: <http://www12.statcan.ca/census-recensement/2006/dp-pd/prof/92-591/search-recherche/lst/page.cfm?Lang=E&GeoCode=12>

Statistics Canada. (2009b). 2006 Census Nova Scotia Aboriginal Population Profiles. Retrieved from Statistics Canada: <http://www.census2006.ca/census-recensement/2006/dp-pd/prof/92-594/search-recherche/lst/page.cfm?Lang=E&GeoCode=12>

- Steenbeek, A., Amirault, M., Saulnier, G. (2009). Strengthening Community-Based Approaches to HIV/AIDS & STI Screening, Treatment & Prevention among Aboriginal People in the Atlantic Region. Halifax: Dalhousie University.
- Stokes, M.E., Davis, C.S., Koch, G.G. (2000) *Categorical Data Analysis Using The SAS System, 2nd Edition*. Cary, NC: SAS Institute Inc.
- Thompson, S.J., Gifford, S.M. (2000). Trying to keep a balance: the meaning of health and diabetes in an urban Aboriginal community. *Social Science & Medicine*, 51(10), 1457-1472. doi: 10.1016/S0277-9536(00)00046-0
- Waldram, J.B., Herring, A., Young, T.K. (2006). *Aboriginal Health in Canada: Historical, Cultural, and Epidemiological Perspectives*. Toronto: University of Toronto Press.
- Webster, D., Weerasinghe, S., Stevens, P. (2004). Morbidity and mortality rates in a Nova Scotia First Nations Community, 1996-1999. *Canadian Journal of Public Health*, 95(5): 369-374. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/15490928>
- Willows, N.D. (2005). Determinants of Healthy Eating in Aboriginal Peoples in Canada: The Current State of Knowledge and Research Gaps. *Canadian Journal of Public Health*, 96(Supp 3), S32-S36. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/16042162>
- Wilson, K., Rosenberg, M. W. (2002). Exploring the Determinants of Health for First Nations Peoples in Canada: Can existing frameworks accommodate traditional activities? *Social Science & Medicine*, 55(11): 2017-2031. doi: 10.1016/S0277-9536(01)00342-2
- World Health Organization (WHO). (1948). Preamble to the Constitution of the World Health Organization. At *The International Health Conference, New York, 19-22 June 1946*. Retrieved from WHO: <http://www.who.int/about/definition/en/print.html>
- WHO. (1978). Declaration of Alma Ata. At *International Conference on Primary Health Care, Alma-Ata, USSR, 6-12 September 1978*. Retrieved from WHO: http://www.who.int/hpr/NPH/docs/declaration_almaata.pdf
- WHO. (1986). Ottawa Charter for Health Promotion. At *First International Conference on Health Promotion, Ottawa, Canada, 21 November 1986*. Retrieved from WHO: http://www.who.int/hpr/NPH/docs/ottawa_charter_hp.pdf
- WHO. (2007). Achieving Health Equity: from root causes to fair outcomes. Commission on Social Determinants of Health. Retrieved from WHO: http://whqlibdoc.who.int/publications/2007/interim_statement_eng.pdf

WHO Measurement and Evidence Knowledge Network (WHO-MEKN). (2007). The Social determinants of health: Developing an evidence base for political action. Retrieved from WHO:

http://www.who.int/social_determinants/resources/mekn_final_report_102007.pdf

Wien F. (2006). A Dance to Create Meaning Together: Perspectives of the ACADRE Network on Knowledge Translation. In *Knowledge Translation Summit: Sharing What We Know About a Good Life, Regina, Saskatchewan, 2-5 March 2006*. Regina: First Nations University.

Wright R. (2006). Social Support and Health Outcomes in a Multicultural Urban Population. *Social Work in Health Care*, 43(4): 15-28. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/16966307>

Yahannes, Y., Hoddinott, J. (1999). *Classification and Regression Trees: An Introduction*. Washington, D.C.: International Food Policy Research Institute.

APPENDIX 1: RESEARCH AGREEMENT WITH UNSI

The First Nations Regional Longitudinal Health Survey 2002/2003: Analysis and
Knowledge Translation

RESEARCH AGREEMENT

[March 2009]

Vanessa Perry agrees to conduct the named research project under the supervision of Dr. Swarna Weerasinghe and Dr. Fred Wien with the following understandings:

1. The purpose of this research project, as discussed with and understood with the *Union of Nova Scotia Indians(UNSI)* as represented by *Sally Johnson* is:
 - *To perform secondary analysis of the 2002/2003 cycle of the First Nations Regional Longitudinal Health Survey (RHS) to contribute to a better understanding of the health and its determinants of the on-reserve Mi'kmaq population in Nova Scotia.*
2. The scope of this research project as discussed with and understood by the UNSI is:
 - *To perform data analysis of the 2002/2003 cycle of the RHS to be completed by the researcher in consultation with the UNSI and the Mi'kmaq Health Research Group (MHRG).*
3. The methods to be used, as agreed by the researchers and the community, are:
 - *Multi-variable and pathway analysis of the data using Statistical Analysis Software (SAS).*
4. UNSI participation, as agreed is to include:
 - *The development of this project is based on sincere communication between UNSI representatives and researchers. All efforts will be made to incorporate and address local concerns and recommendations at each step of the project.*
 - *At the end of the project, the researcher will be available to participate in meetings to discuss the results of the analysis with the UNSI and community members.*
5. Information collected is to be shared, distributed, and stored in these agreed ways:
 - *The copy of the data held by the researcher will be kept on a password-protected USB , in an office in the Department of Community Health and Epidemiology at Dalhousie University. The USB will be kept in locked cupboard in the office. Upon completion of*

the project, the data and related programming and output files will be returned to the Union of Nova Scotia Indians and all data-related files cleared from the computer utilized for analyses.

- *The researcher will be available to answer questions and assist the UNSI and MHRG regarding methods, results, and conclusions;*
 - *A final report and summary will be distributed after approval from the UNSI representatives*
6. *The names of participants and of the communities are to be protected in these agreed ways:*
- *As outlined in consent forms, the interviews are confidential and in no instance will the name of a participant be attached to a record*
 - *The researcher will sign an oath of confidentiality similar to that used by RHS fieldworkers*
 - *All identifiable information will be aggregated to larger grouping to preserve individual anonymity*
 - *Analyses will be regional in nature with community anonymity maintained*
 - *Community-level variables will be categorized into groups with interpretation and presentation of results carefully presented in consultation with stakeholders to protect community anonymity*
 - *All results will be presented as odds ratios explaining the association between different factors such as smoking and cancer and will protect participant's privacy.*
7. *In the event of publication or presentation the following steps will be followed:*
- *If seeking publication in a peer-reviewed journal the researcher will request approval from UNSI and provide the paper for review and comments to ensure culturally appropriate interpretation of the results. The First Nations Information and Governance Committee (FNIGC) will be acknowledged as outlined in the First Nations Regional Longitudinal Health Survey Code of Research Ethics and the UNSI will be acknowledged as the owners and stewards of the data.*
 - *In the event of a presentation of the research by the researcher, the above steps related to peer-reviewed publication will be followed. Additionally, a UNSI or MHRG representative will be invited to co-present reflecting the fact that this is a partnership.*
8. *Project progress will be communicated to the UNSI in these agreed ways:*

- *E-mail communication and written reports*
 - *Presentations at scheduled meetings*
9. Review of reports and other forms of communication will be handled in these agreed ways:
- *Draft reports will be made available to the MHRG and UNSI with an appropriate time frame to allow review and comments to ensure culturally-appropriate interpretation of results*
 - *Comments will be incorporated into the report and/or included as footnotes*

FUNDING, BENEFITS, AND COMMITMENTS

Funding

The researcher has received funding for this research project through a 2008/2009 Student Fellowship at the RURAL Centre at Dalhousie University.

The funding agency has imposed the following criteria, disclosures, limitations, and reporting responsibilities on the main researchers:

- *Acknowledgement of the RURAL Centre in presentations, reports, and publications*
- *Preparation of an annual report in the Fall 2009 upon completion of the funding*

Benefits

The researcher wishes to use this research project for their benefit in the following ways:

The researcher will complete her thesis by the fall 2009 and will submit a final report to the funding agency in the fall 2009. Publication in peer-reviewed journals and presentations at scientific conferences will be sought. The process for such dissemination is outlined above in point seven.

The benefits likely to be gained by the UNSI through this research project are:

- *Research services from the researcher*
- *Informational – a better understanding of the determinants of health among the Nova Scotia on-reserve Mi'kmaq population*

Commitments

The UNSI's commitment to the researcher is to:

- *Keep informed about the progress of the project, and help in leading the project toward meaningful results*
- *Where approval or review is sought, the UNSI will provide a response in a timely manner*

The researchers' main commitment to the UNSI is to:

- *Inform the UNSI about the progress of the project in a clear, specific, and timely manner.*
- *Act as a resource to the UNSI in the capacity of a research assistant on the secondary analysis of the RHS 2002/2003 for the purposes of knowledge sharing with the community*

Circumstances for interruption of the research project:

- *Access to the data, once approved, will not be unreasonable withheld or denied by UNSI*

SIGNED BY:

Date:

Date:

Name: Sally Johnson

Name: Vanessa Perry

Position: Community Health
Representative, UNSI

Position: MSc Candidate, Dalhousie
University

APPENDIX 2: ETHICS APPROVAL FROM MI'KMAW ETHICS WATCH

APPENDIX 3: ETHICS APPROVAL FROM DALHOUSIE REB