FRAMING HEALTH ASSESSMENT: DIFFERENCES IN SUBJECTIVE PERCEPTIONS OF HEALTH BY EDUCATIONAL ATTAINMENT LEVEL

by

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Submitted in partial fulfillment of the requirements
for the degree of Master of Arts

at

Dalhousie University
Halifax, Nova Scotia
August 18, 2016

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Abstract

Extensive academic study has revealed a positive correlation between educational attainment and health; education is considered a major social determinant of health. Less commonly researched, however is research into how education might affect how individuals perceive and report their health status. Using the Canadian Community Health Survey, this study explores social patterns in health reporting behaviour. In particular, it examines the extent to which individuals' self-perceived health corresponds to their health functioning, and how the degree of correspondence varies by educational background. The study also examines whether educational attainment affects the 'frames of reference' that individuals use to evaluate their health. Findings indicate that individuals with lower levels of education have more highly correlated self-perceived health status and physical health functioning than those with higher levels of education. While both educational groups commonly use their physical conditions to assess their health, individuals with high education are more likely to also consider their health behaviours. These results can be attributed to health habitus and its ability to structure health assessment. They demonstrate that people's perceptions of their health are not based solely on actual illness and disability, but also on normative views shaped by education and social position.

List of Abbreviations Used

WHO	World Health Organization
HUI	Health Utility Index
SPH	Self-Perceived Health
CCHS	Canadian Community Health Survey
PUMF	Public Use Micro-data File
LEG	Lower Education Group
HEG	Higher Education Group

Acknowledgements

I would like to thank my supervisor Dr. Fiona Martin and Dr. Yoko Yoshida, who was a closely collaborating committee member. I am extremely grateful of the amount of time and effort they have given to tutor me in the craft of research and guide this project to completion.

I would also like to thank my peers and the faculty members in the Department of Sociology and Social Anthropology at Dalhousie University.

Finally, I would like to thank my family, Adam Muir, and Kimberley Hunt for deeply believing in my abilities and in me, even when I did not.

Chapter 1: Introduction

Globally, Canada is regarded as a highly educated and healthy country. In 2011, Statistics Canada reported that approximately 36 percent of Canadians had a high school diploma or less education, while 64 percent of the population has some post-secondary qualifications. High levels of formal education are often accompanied by other social benefits, including higher rates of employment, increased income, and greater social engagement. More education, along with the social benefits that company high education, is also usually attributed to better health.

The nature of the relationship between education and health is commonly investigated and social science research suggests that physical health increases as educational attainment level increases (Herd, Goesling & House 2007; Simon et al 2005). More highly educated individuals tend to enjoy better health status than those who are less educated (Herd, Goesling & House 2007; Raphael 2011; Simon et al 2005). However, physical health can be measured in a number of different ways and the way individuals perceive and report their health status varies depending on their educational attainment level. Accordingly, the amount of health inequality due to level of educational may be differently estimated depending on the choice of health measures used by researchers.

The various measures used to estimate health can be categorized as either subjective or objective. Subjective measures of health typically involve individuals reporting on their general feelings about their own health; in health research, these are commonly referred to as self-reported health status measures (Idler, Hudson & Leventhal 1999). Objective measures, on the other hand, assess individuals' more observable conditions and include the presence or absence of specific illness or disabilities, or even

rate of deaths. The Health Utility Index (HUI) is one of the most common used objective measures among health researchers in Canada (Feng, Bernier, McIntosh & Orpana 2009). HUI is an overall score that indicates levels of health; it measures the functionality of various physical facilities using a scoring system. Although is the HUI relies on individuals' self-assessments, it is considered more objective than self-reported health status (Horsman 2003).

Subjective and objective measures are typically used interchangeably to measure health, but are not often used in compared. Evidence suggests that when they are used together, subjective and objective measures do not always produce congruent results (Bago d'Uva, O'Donnel & van Doorslaer 2008; Krause & Jay 1994; Simon et al 2005). Previous academic research has found, for example, that individuals with lower levels of educational attainment tend to report their health as better than their actual health conditions, while individuals with higher levels of education, tend to report poorer health than their actual health (Krause & Jay 1994; Layes, Asada & Kephart 2012; Simon et al 2005). Others suggest that while education directly impacts health outcomes, it may also impact the manner in which health is perceived and subjectively explained (Bago d'Uva, O'Donnel & van Doorslaer 2008; Krause & Jay 1994; Simon et al 2005). This research demonstrates that there is a link between education and reporting behaviour, however, it remains unclear what accounts for the discrepancy between self-perceived health status and observable health conditions.

One important attempt to theorize the patterns of perception of health can be found in the influential work of Krause and Jay (1994), who put forth the concept of "frames of reference". According to their theoretical framework, individuals use various

criteria to evaluate their health status, which in turn are influenced by social factors like class. A frame of reference, therefore, allows researchers to consider how social factors— such as race, age, sex, and educational attainment levels— shape individuals' perceptions of their health. While Krause and Jay's hypothesis is influential (Dowd & Todd 2011; Peersman et al 2012; Simon et al 2005), few studies have explored how frames of reference relate to educational attainment. Moreover, frames of references may also be culturally sensitive, and the findings within one social context may not be applicable to other contexts.

The idea that social factors influence how individuals evaluate their health has also emerged in the academic debates on "health habitus" (Korp 2008; Veenstra 2000; Veenstra 2007). Originating from the work of Pierre Bourdieu , habitus refers to the varying orientations and propensities acquired throughout life that are based on and patterned by one's social positioning, which then organize how individuals perceive the world and act in it. It refers, in other words, to how tastes and preferences vary in different social classes. Habitus, like health and frames of reference, is socially patterned and has been applied to health research in order to better understand how individuals with different levels of social and cultural capital perceive and describe their health (Veenstra 2000; Veenstra 2007).

My thesis draws on the concept of habitus and the frames of reference hypothesis to explore the influence of educational attainment on Canadian's self-reported health status. It will do so by using nationally representative survey data to examine variations in reporting behaviour across education groups. My goal is to generate new knowledge about the validity of the frame of reference hypothesis and provide a better picture on

how education affects reporting patterns. Using the data from the Canadian Community Health Survey 2009/2010 cycle (CCHS), I will first examine the effect of education on both objective and subjective health and identify the extent to which education is associated with measures of health. Following this, I will then test the relevance of frames of reference in order to investigate if health was assessed and reported differently based on educational attainment.

Chapter 2: Literature Review and Theoretical Framework

In order to explain patterned differences in health, social scientists have examined the influence of social factors on health. Education is frequently identified in the literature as having a significant influence on health outcomes (Peersman, Cambier, De Maeseneer, Willems 2012; Simon, De Boer, Joung, Bosma1 & Mackenbach 2005). However, there is less research detailing how it shapes how health is perceived and then reported. This chapter outlines the ways in which education influences health outcomes and describes how further investigation into frames of reference and health habitus can provide new insight into the influence of education on people's subjective assessments of their health.

2.1 Education as a Social Determinant of Health

Health is not simply a physiological condition. As the World Health Organization (WHO) asserts, health is "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (Üstün & Jakob 2005). Nor is health entirely biologically determined. As numerous studies have demonstrated, health status is both socially patterned and influenced by various social characteristics (Bambra et al 2010; Blane 1996; Coburn 2005; Gabe, Bury & Elston 2004; Graham 2007; Marmot 2005; Raphael 2011; Townsend & Davidson 1992; Williams 2003). These are commonly referred to as "social determinants of health", have been defined as follows:

> [The] economic and social conditions that shape the health of individuals, communities, and jurisdictions as a whole [which include] aboriginal status, disability status, early life education, employment and working conditions, food security, health services, housing, income and income distribution, race, social exclusion, social safety net, and unemployment and employment insecurity (Raphael 2011, p. 19).

In other words, good health is not simply biologically determined. Whether or not one experiences good health depends on a number of social factors, such as one's access to adequate food, living conditions, and healthcare services, along with protection from environmental or work related stress (Raphael 2011).

Among many social determinants of health, researchers tend to focus on education. Although income is also considered significant, some suggest that education is a more stable and more fundamental determinant of health (Pearson et al 2012; Simon et al 2005). Unlike income, education is a resource that is attained over the course of an individual's life and cannot be lost or decreased (Simon et al 2005). Education is also less likely than income to be influenced by reverse causality (Delpierre et al 2009). That is, ill health can reduce income level directly by depleting material resources, while health status is less likely to influence education. Finally, education also usually determines income and is thus a means to obtain the resources necessary for good health (Eikemo et al 2008; Herd, Goesling & House 2007; Schnittker 2004).

Some research also has drawn attention to the relationship between education, socioeconomic status and the psycho-social conditions that affect health outcomes (Herd, Goesling & House 2007; Ross & Van Willigen 1997; Ross & Wu 1995). More than income, socioeconomic status refers to one's access to resources, including knowledge and social networks (Link & Phelan 1995; Herd, Goesling & House 2007). Research also suggests that these educational and social resources influence morbidity and mortality; those with higher socioeconomic status individuals experience less stress and more happiness than their less-educated counterparts (Herd, Goesling & House 2007; Ross & Van Willigen 1997; Ross & Wu 1995). Individuals with higher education attainment, for

example, tend to experience greater employment status and stability and also better health (Adler et al 1994). In other words, education not only influences access to the material conditions necessary for positive health, but also contributes to an individual's psychological and emotional experience of the world.

Educational attainment can also affect an individual's health literacy, or knowledge of biomedical information and health-related information. It is argued that health literacy regulates health behaviours, making it more likely that individuals with less education will make poorer health choices (Nutbeam 2008). This has been demonstrated in previous literature which links higher rates of smoking, poorer food and exercise choices, and the higher frequency of chronic health conditions to lower health literacy and lower educational attainment (Baker 2006). Although this body of literature has been criticized for representing health outcomes as determined by individuals and their so-called 'risky' decision-making (Chinn 2011; Coburn 2004; Ross & Wu 1995), choice of health related behaviours are highly associated with education levels.

In short, research on the relationship between education and health clearly demonstrates that less educational attainment negatively influences health outcomes (Baker 2006; Nutbeam 2008; Raphael 2011). It also demonstrates that the effects of education on health are both direct and indirect and occur at both individual and structural levels. While there is some debate about how education impacts health and which level of analysis best explains the relationship, the importance of education as a social determinant of health has been clearly established within the social science literature.

2.2 Education as a Foundation of Habitus and Health

Education is also significant determinant of what sociologist Pierre Bourdieu termed *habitus*. He argues that habitus shapes one's consumption, tastes, and practices (Bourdieu 1984) and is, in turn, shaped by cultural, economic, and social capital. Capital, or accumulated labour, generally refers to material or non-material resources, which can be used to increase social mobility. While social conditions and the distribution of social, economic and cultural capital structure the habitus, these factors also influence how an individual interacts with the social world and themselves (Bourdieu 1984).

Applied in the area of health, habitus influences the likelihood of good and poor health (Veenstra 2000; Veenstra 2007). For example, social class – in part determined by socioeconomic status and elements of cultural and economic capital – is a guiding force for patterns in diet, exercise and physical activity, and health status itself. Different social classes, informed by amount and quality of capital possessed by individuals, may make different health choices based on their access to resources, areas in which they live, or by their learned behaviours. Thus, the accumulation of class-related preferences and tastes can manifest in the form of the body's physical health. Put differently, the body's health is a product of habitus and is oriented by both lifestyle and an individual's social position.

Habitus also shapes how individuals perceive and evaluate their physical and mental health state (Korp 2008; Veenstra 2000; Veenstra 2007). According to Bourdieu, education is as a key component of cultural capital, which refers to non-material assets, including an individual's values, behavioural norms, and formal knowledge, and thus has a significant influence on an individual's social status, social mobility and life-course. It also shapes the ways in which individuals perceive past, present, and future experiences,

including those related to health. In other words, how one perceives health conditions and the norms that guide these perceptions are both influenced by one's education (Bourdieu & Wacquant 1992).

An example of the relationship between education, the perception of health, and health outcomes can be found in Veenstra's work (2007) on social status and health inequalities. In his analysis, educational capital accounted for much of the difference in social class and also influenced preferences in physical activity; individuals with greater educational capital tended to describe their health as better and live in areas that provided better access to physical activities (Veenstra 2007). Korp (2008) also explains that the phrase 'positive lifestyles' implies that kinds of social and cultural capital necessary for good health tend to be afforded to those with high socioeconomic status. That is, the social support networks that encourage physical and mental well-being are typically enjoyed by those who have more and better social and cultural capital. Thus, both maintaining physical health and living a 'positive health lifestyle' depends upon one's habitus.

These studies demonstrated that habitus shapes an individual's health and their perception of health. In other words, individuals' social position, determined by the amounts and types of economic, social, and cultural capital shapes the 'health habitus'. This suggests that different social classes and those with different educational attainment levels will not only have a different health habitus, but that they perceive health through use particular and differing frameworks.

2.3 Health Measurement

Social scientists heavily rely upon subjective measures to evaluate the effect of social determinants of health (Benyamini, Leventhal & Leventhal 1999). One such subjective measure, commonly used in both qualitative and quantitative studies, is self-perceived health status (Adler et al 1994; Bambra et al 2010; Humphries & van Doorslaer 2000; Raphael 2011; Schnittker 2004). Self-perceived health status gauges an individual's feeling about their general health and is usually assessed on an ordinal scale, with responses ranging from poor, fair, good, very good, and excellent (Benyamini, Leventhal & Leventhal 1999). Self-perceived heath is methodologically known as a global health status item, meaning that it measures health with one or several brief questions that rely on the participant to interpret, compare, and report on a complex and multifaceted state of being (Benyamini, Levanthal & Levanthal 1999).

Objective measures of health, on the other hand, are often based on observations and medical data collected by health professionals. Objective measures of health are typically used to measure the occurrence of illness, rate of death, and physical functionality, and do not explicitly involve individuals' subjective experiences or rely on their interpretations (Sen 2002; Barofsky 2012). Some examples of objective measures that are used frequently in social scientific and epidemiological literature include mortality rates and the presence or absence of chronic or other illness (Macintyre 2005).

A commonly-used objective measure in Canadian health research is the Health Utility Index (HUI). Developed as a means to quantitatively assess quality of life, the HUI measures specific levels of health functionality using a preference-based model unique to Canada (Horsman et al 2003). Health functionality refers to an individual's

ability to perform daily tasks and is typically encompassed by "physical, emotional, mental, and social domains, […and measures the] deviation from usual performance or ability [to] indicate dysfunction," (Patrick & Erickson 1993, p. 418). Areas that are measured by the HUI include vision, hearing, speech, ambulation, dexterity, emotion, cognition, and pain (Patrick & Erickson 1993). The result of HUI is an overall score, which combines the individual scores of these aspects of functionality.

There is some debate about self-perceived health status or HUI is a more accurate measure (Barofsky 2012; Humphries & van Doorslaer 2000; Sen 2002). This discussion is driven by which measure most precisely reflects discernable health states that can be verified and tends to favour measures that are more objectively determined. HUI is generally considered more objective because it is calculated using specific standardized weights, specified definitions of physical health, and a uniform and numeric system of classification. However, each of these components depends, essentially, on subjective interpretations. More importantly, critics suggest that objective measure like the HUI do not account for the impact of individuals' experiences of different health conditions (Sen 2002).

While subjective measures of health may be preferable because they are more sensitive to individual experiences of health conditions, the ways in which individuals respond to subjective measures are complex and varied. Subjective measures, if they are to be a reliable measure of health status, require an individual to connect concrete symptoms of their physical state with abstract responses— such as "poor health" — in a single measure (Benyamini, Leventhal & Leventhal 1999; Raphael 2011). To address this issue and assess how individuals summarize their health using subjective responses,

Borawski, Kinney, and Kahana (1996) conducted research that asked elderly participants to first self-rate their health and then describe what the rating meant. Their results suggested that physical health and objective symptoms were only one of many different aspects of health that participants considered when rating their health on a five-point scale. While, Borawski, Kinney, and Kahana did not assess whether social conditions or the homogeneity of their sample influenced which aspects different participants focused on, their work underscored the need for investigation into how individuals understand and respond to subjective measures.

Another issue to consider is that objective and subjective measures do not always produce congruent results. In fact, discrepancies between objectively and subjectively measured health statuses have been widely reported (Dowd & Zajacova 2010; Peersman et al 2012; Ross & Van Willigen 1997). According to existing research, such discrepancies are socially and culturally patterned (Dowd & Zajacova 2010; Sen 2002). In other words, social and cultural factors affect how individuals' respond to questions about their health. Two of the most significant factors that contributed to the gaps in congruency are income and education.

Dowd and Zajacova (2010), for example, compared disease risk factors to self-rated health, using a nationally representative sample in the United States. They found that self-rated health does not result in the same objective health across different socioeconomic groups. They note that the correlation between self-rated health and mortality was higher in individuals with higher socioeconomic status (Dowd & Zajacova, 2010). Others suggest that there are different reporting patterns across income and educational-attainment levels. Layes, Asada & Kephart (2012), for example, found that

individuals with less education tend to be more optimistic about their health while those with more education tend to be more pessimistic, a finding they evocatively sum up with the phrase "whiners and deniers."

Other studies attempt to identify why income and education influence health reporting. After finding that individuals with high educational attainment had the highest expectations for their health, Ross and Van Willigen (1997) suggest that high expectations may elicit a more negative perception of a health condition than it would in an individual with lower educational attainment. Dowd and Zajocova (2010) and Sen (2002) argue that the normalization of illness among low-income groups can impact knowledge regarding specific types of diseases states and can thus lead to the underreporting of health conditions. The *type* of health condition in question may also affect reporting behaviour. Delpierre et al (2009), for example, found that highly educated individuals, particularly women, were more likely to report having poor health when a physical health biomarkers, or medical conditions which are often confirmed by tests conducted by physicians, was present, compared to less educated individuals.

In short, existing research on health reporting shows that health knowledge, norms and expectations of illness, and how an individual copes with illness are each affected by income and education and, in turn, influence the way in which an individual perceives and reports their health. Research indicates that individuals with diminished access to social resources are more likely to deny their health conditions, while those with greater access to such resources are more likely to exaggerate their health problems (Layes, Asada & Kephart 2012). It might be argued therefore that self-perceived health can describe the experiences of social class more than objective measures can summarize

inequalities in health between social classes (Blaxter 1989 in Veenstra 2007). In other words, individuals of a higher social class may be more likely to be disappointed by poor health conditions because they have been exposed to a better lifestyle and have higher expectations for their health. This phenomenon would not be captured through objective measures of health.

Overall, more effort has been made to reveal the gap between objective and subjective health measures than to explain the patterns in such gaps. This study aims to fill this gap in the current state of knowledge by drawing on Krause and Jay's concept of "frames of reference" (1994) to understand what accounts for such incongruencies.

2.4 Frames of Reference:

Several scholars propose that differences in reporting behaviour can be attributed to individuals' different, socially-determined capacities to assess and evaluate their health (Krause & Jay 1994; Peersman et al 2012; Simon et al 2005). Among the most influential of these scholars are Krause and Jay (1994), who argued that different socio-demographic subgroups use different cognitive approaches, or "frames of reference," to answer questions about their own health. Krause and Jay based this hypothesis on the findings of qualitative interviews. They observed that the use of different referents in health evaluation was patterned according to age, race, sex, and education. Each of these sub-groups possessed a shared cognitive approach to understanding health.

When they observed group difference by education, Krause and Jay noted a particularly striking result: Although they hypothesized that individuals with less education would use their poor physical health states and symptoms as a frame of

reference to evaluate their health, this group instead used health behaviours. While Krause and Jay did not investigate this finding in detail, they suggested that low educational attainment itself might have impeded participants' abilities to use medical knowledge to inform their definition of health. They also concluded that education has a particular effect on how different demographic groups assess and measure their health.

After Krause and Jay, the investigation into how social factors influence health beliefs and perceptions expanded (Abel 2008; Dowd & Zajacova 2010; Krause & Jay 1994; Peersman et al 2012; Simon et al 2005). This body of literature basically supports the notion of frames of reference, or that different demographic groups assess and measure their health using different criteria, with education an important determinant of which criteria individuals use. The frames of reference since observed in this literature are numerous, however, they can be thematically grouped into two main types: physical condition and health behaviours.

Physical condition of individuals as a frame of reference is typically comprised of biomedical information that is used by people with access to this knowledge to assess their health. This frame uses symptoms of chronic health conditions and specific health problems, or the presence or absence of disease and illness in order to gauge the use of an individual's physical functions and how various impairments may affect daily life (Dowd & Todd 2011; Krause & Jay 1994). The literature argues that in order for an individual to use this frame of reference when assessing their health, one must have a substantive amount of health literacy (Dowd & Todd 2011; Krause & Jay 1994). If one lacks the knowledge and skills to interpret health condition or diagnosis by medical practitioners, they would not be able to accurately report chronic health conditions or use it as a

reference to gauge their health status. In this sense, the physical condition frame of reference also requires regular access to a physician in order to use diagnostic and biomedical information to assess health (Bago d'Uva, O'Donnel & van Doorslaer 2008; Dowd & Todd 2011; Krause & Jay 1994; Sen 2002). Some literature has suggested that older adults tend to use this referent more to assess their own health, as the biological effects of aging tend to affect this group more than others (Krause & Jay 1994; Peersman 2012; Simon et al 2005).

The health behaviour referent generally refers to the evaluation of health by normative behavioral standards. This reference includes components such as smoking, diet, alcohol consumption, and exercise (Dowd & Todd 2011; Krause & Jay 1994; Layes, Asada & Kephart 2012) in order to rate health status based on lifestyle, rather than health symptoms. Individuals who regularly exercise and limit alcohol consumption tend to perceive their physical well-being solely based on such conscious effort, rather than their actual physical symptoms. Diet and smoking are the two most common variables individuals associate with healthy behaviour and appear most frequently as indicators of this referent in the literature (Dowd & Todd 2011; Krause & Jay 1994; Layes, Asada & Kephart 2012; Peersman et al 2012; Simon et al 2005). While some literature has suggested that health behaviours play a critical role in the manner in which individuals assess their own health, particularly among younger subgroups, (Borawski Kinney & Kahana 1996; Krause & Jay 1994), others have suggested this type of referent is very rarely used when assessing health (Simon et al 2005).

These two popular frames of reference are composed of diverse ways that people conceptualize and perceive health and it is important to investigate if and how they are

used. Given that particular frames are more practical for use in individuals with access to specialized information, these frames may be used in socially patterned manner. In order to better understand how social variables, and particularly education, affects health reporting patterns, further study of these frames of reference is needed.

2.5 Social Patterns of Frames of Reference:

Researchers have yet to reach a consensus regarding which subgroups are likely to use one frame of reference over another when evaluating their health. What has been more clearly established is that the use of different frames of reference is socially patterned, particularly by educational attainment level. Franks, Gold, and Fiscella (2003), for example, compared self-rated health to mortality in U.S. adults and found different socio-demographic relationships between these measures. Self-rated health status and mortality were more strongly associated in individuals with higher educational attainment than those with lower education attainment, supporting Krause and Jay's observation that physical health is more preferred in individuals with higher education. Conversely, Peersman, Cambier, De Maeseneer, and Willems (2012) found that while those with less education tended to experience poorer health more frequently, they were more likely to use past health states to comparatively assess their health rather than physical functioning. Conversely, individuals with more education tended to experience poorer health less frequently and used the absence of illness in their physical functioning as a referent to perceive their health. In this way, the normalization of illness and disease tended to affect how this referent is employed to assess health status. Although consensus about how

education shapes one's frame of reference has yet to be reached, the literature clearly establishes that there is a connection between the two.

This relationship might best be understood by returning to the concept 'health habitus'. As Kawachi, Kennedy, and Glass (1999) suggest, descriptions of a health state may be normalized, as capital (particularly social capital) may influence the health behaviours of neighborhood residents. Social capital groups individuals into geographical locations within communities, and can effect the diffusion of health information, which helps construct norms of health states or what is perceived as normal. In this way, individual-level behaviours are influenced the expectations of those with similar levels of capital. Similarly, Gatrell, Popay, and Thomas (2004) investigated how location, as grouped by material conditions like income and social status, influenced health status. They found that health norms informed by capital and previous experiences help to form outlooks regarding health practices, and that health is partly affected by the difference between expectation and reality.

Therefore, different perceptions of health can influence future health outcomes in a cyclical effect, reproducing inequalities directly and indirectly linked to material conditions. This effect is in many ways comparable to Bourdieu's notion of habitus, which both is structured and is structuring. Much like habitus, frames of reference are formed by the accumulation of social, cultural, and economic capital and guide how an individual interacts with the world around them. It can be argued, therefore, that habitus determines the frame of reference an individual uses to assess their health.

2.6 Summary:

Social factors, and particularly education, directly and indirectly influence health. Education can act as a means to provide the material conditions for improved health and can also indirectly shape the habitus of individual. This habitus then shapes health and can reproduce particular class-related health inequalities. Further compounding this relationship is the discrepancy in capturing health status when objective and subjective measures of health are used, as different perceptions of health can affect the manner in which health is reported.

My thesis will address three specific questions: first, does education influence how individuals report their health? Second, is there a gap between subjectively measured health and objectively measured health by educational attainment level? And third, do different educational attainment groups use different frames of reference to evaluate their health? These questions are important because discrepancies in reporting present a barrier to accurately estimate the extent of health inequality. Health optimism among low educated population and pessimism among high-educated groups may mean, for example, that the social gradient in health is, in fact, greater than we know (Dowd & Zajacova, 2010). The aim of this study is to better understand differences in reporting by education, to help ensure that inequalities in health are neither underestimated nor overestimated.

Chapter 3: Methods

My research aimed to explore how education affected people's health and perception of health. More specifically, I first examined if there was a difference in health status across different education groups and then explored how education affected the perception of health status by comparing the correspondence between these two measures of health. The analysis also examined if educational attainment status influenced the frames of reference an individual used to evaluate their health.

3.1 Population and Data:

The population of this study consisted of Canadians between 25 to 69 years old. This age range was selected because people in this age group have most likely reached their highest level of educational attainment. Also, this age group has been commonly used in the past research (Dowd & Zajacova 2010; Herd, Goesling & House 2007; Huisman et al 2007; Simon et al 2005). Canada is an important population to study because previous research regarding frames of reference has been limited to the United States and European countries. While Canada may share some cultural aspects with these countries, arguments from the previous research may not provide accurate accounts for the Canadian population. By examining the Canadian case, my analysis will contribute to expanding the cases used in this area of literature.

For the analysis, the public use micro-data file (PUMF) of the Canadian Community Health Survey (CCHS) Cycle 2009/2010 was used in order to answer my research questions. The CCHS is a national-level, cross-sectional study that collects

health information by health region in Canada. It excluded individuals living on Aboriginal reserves, individuals who are institutionalized, and individuals serving in the Canadian Forces (Statistics Canada 2010). Although newer cycles of the CCHS were available, this study chose Cycle 2009/2010 because it was the most recent cycle that included HUI scores for all health regions. The original sample size before excluding cases due to missing values was 81,589.

3.2 Dependent Variables:

Two forms of variables were used to measure health and capture differences between subjective and objective measures of it. These include self-perceived health (SPH) and the Health Utility Index (HUI). SPH was used as the subjective measure of health. In the CCHS, SPH was measured with an ordinal level of measurement, with responses of "poor," "fair," "good," "very good," and "excellent." These responses were ranked on a scale ranging from one to five, respectively. Non-responses and missing data consisted of 0.11% of the weighted sample, and were therefore excluded from this study. HUI was used in this study as the objective measure of health. It has been validated as a useful measure of individual's health condition and is considered to be a gold standard measurement (Humphries & van Doorslaer 2000; Patrick & Erickson 1993). Although the CCHS provides raw scores of HUI, it can be collapsed into an ordinal level of measurement. In my analysis, both forms were used depending on the analytic techniques required. The raw score of HUI was used when the impact of education on health status was examined. Then, HUI was grouped into ordinal categories in order to test which frames of references individuals with varying levels of health used to describe their

health. Feng et al (2009) ordinal classification of HUI was used to create this variable. HUI scores of 1.0 indicate no disability in an individual, scores ranging from 0.99 to 0.89 indicate a mild disability, scores of 0.88 to 0.70 indicate a moderate disability, and less than 0.7 are categorized as indicating severe disability (Feng, Bernier, McIntosh & Orpana 2009).

3.3 Independent Variables

Education was used as the key explanatory variable. Education was measured with an ordinal scale, with categories that consisted of less than a high school education, high school, some post-secondary education, and a post-secondary degree. While some studies suggest that measuring education by the exact number of years of education may better illustrate the graded effect of education on health because it provides more data points, such information is not provided by the CCHS (Ross & Wu 1994; Schnittker 2004; Statistics Canada 2005) and the four ordinal categories of education are generally used across academic literature in North America. (Bago d'Uva, O'Donnel & van Doorslaer 2008; Huisman et al 2007). In the first part of the analysis, all four education groups were used. Later they were collapsed into two groups because recent research that has investigated frames of references has collapsed education categories into high, and low groups, clustering groups into high school and post-secondary education categories (Dowd & Zajacova 2010; Herd, Goesling & House 2007; Simon et al 2005). For the purpose of that part of the analysis, individuals with less than high school or a high school education were considered a lower education group (LEG); those with some post-secondary or a post-secondary education were categorized together as a higher education

group (HEG).

3.4 Frames of Reference:

Drawing on previous research, two frames of reference, physical function and health behaviours, were examined. Following other studies (Krause & Jay 1994; Peersman et al 2012; Ross & Wu 1995; Simon et al 2005), I chose four factors to measure physical condition: the number of visits to a doctor, level of mobility and physical function, the impact of pain on daily life, and the impact of health problems on daily basis. For health behavior, I also drew on previous studies (Krause & Jay 1994; Peersman et al 2012; Ross & Wu 1995; Simon et al 2005) to choose four representative variables: food and diet choices, consumption of alcohol, smoking habits, and amount of exercise. These two sets of frames of reference were used in order to examine how education attainment difference may impact the perception of health. Missing data were excluded from analysis.

3.5 Sample Size and Missing Values

This study excluded respondents with any missing information to key variables. Of the total sample of 81,589, 4.28% had at least one missing value in the variables used in the analysis and were excluded as a result. Thus, the analytic sample size was 78,004. For regression models, the sample was reduced to 74,738 (22,275 for LEG and 52,463 for HEG) due to listwise deletion.

3.6 Analysis:

The first objective of this study was to determine the influence of education on health status. This component was necessary because perceived and physical health are both directly and indirectly associated with actual health, and observing how health is distributed by educational attainment group better describes this inequality. To assess the impact of education on health status, I used Ordinary Least Square (OLS) regression. In this process, education was regressed on the two measures of health status (SPH and HUI). To examine the effect of education on health status excluding biological influence, I controlled for age and sex.

In order to determine the association between SPH and HUI across different educational levels, I used Pearson's correlation coefficients and gamma statistics. As previous literature noted, health status and the perception of health are highly influenced by age and sex (Borawski Kinney & Kahana 1996; Krause & Jay 1994; Layes, Asada & Kephart 2012; Peersman 2012; Simon et al 2005). In order to isolate the impact of education on health status, I also conducted the analysis by stratifying the sample by age and sex.

The final objective of my investigation was to determine whether educational attainment resulted in the use of different frames of reference to perceive and evaluate health. Variables selected and thematically grouped to represent physical function and health behaviour frames of reference were regressed in two separate models by self-perceived health status, stratified by education and age and sex were used as control variables.

From these regression models, variables' cumulative probabilities were compared and stratified by education group. Larger gaps observed in the graphs created from the cumulative probabilities indicate a greater difference in the likelihood of one outcome over another by education group. A variable with a larger gap, especially compared to one education group over another, reflects a higher level of impact on one's health. When these variables are thematically grouped to summarize frames of reference, the accumulation of those gaps suggests that a particular reference is preferable to evaluate health.

Based on the literature, it was expected that low education groups would have larger gaps in health behaviour related variables, particularly when compared to the higher education group. Higher education groups, would then have larger gaps in physical function related variables, particularly when compared to the lower education group.

Chapter 4: Education and Health Status

Sociological literature regarding the social determinants of health demonstrates that education impacts health in many ways. Level of education can affect health by influencing access to material conditions, such as higher income and better working conditions, and through social conditions, such as social support and lifestyle. Many researchers have examined health inequality based on education, assuming these causal mechanisms; however, the impact of education on the perception of health status is not fully understood. Moreover, researchers use both subjective and objective measures to examine health inequality but there is some disagreement about the potential impacts of educational differences on the way that health in perceived and reported.

In order to elucidate how education affects the manner in which individuals perceive and describe their health (i.e. how they subjectively rate their health), this chapter first discusses differences in health with two measures of health status by education group. It then examines whether or not subjectively perceived health conditions differs from objective measures of health, and the extent to which the correspondence between the two measures is affected by educational attainment level.

4.1 Sample Characteristics

The characteristics of sample used in my analysis are described first. Table 1 summarizes the distribution of the variables used in the analysis. In order to take into account for complex survey design, the tabular and regression results reported below are estimated with population weights. For the tabular analysis, an analytical weight was applied. This function adjusts the total counts to the actual sample size, while the

proportion is adjusted for the distribution of the population. The descriptive statistics in Table 1 include the samples with missing values in order to show the distribution of the missing values across variables.

In terms of basic demographic characteristics, the distribution of sex and age were balanced. For sex, 49.50% of the adjusted sample was male and 50.50% female. For age groups, one-third of the sample fell in the youngest group of 25-39 years, about 39% in 40-54 years, and 28% in the 55-69 years. Although the proportion of the oldest age category was slightly lower than other age categories, it was still a sizable portion of the sample, and large enough to be used to stratify in further analyses.

Table 1: Univariate Data for Objective 1, weighted

Characteristic		Frequency	Percentage
Sex			
	Male	40,386	49.50
	Female	41,203	50.50
	Total	81,589	100
Age			
	25 to 39 years	27,007	33.10
	40 to 54 years	31,518	38.63
	55 to 69 years	23,065	28.27
	Missing	0	0.00
	Total	81,589	100
Education			
	Less than High School	9,136	11.20
	High School	12,657	15.51
	Some Post Secondary	4,845	5.94
	Complete Post Secondary	52,684	64.57
	Missing	2,267	2.78
	Total	81,589	100
HUI (categorical)			
	Severe disabillity >0.7	9,452	11.59
	Moderate disability 0.70 to 0.88	11,259	13.80
	Mild disability 0.89 to 0.99	39,094	47.92
	No disability 1.00	20,499	25.12
	Missing	1,285	1.57
	Total	81,589	100
Self-Perceived Health			
	Poor	2,076	2.54
	Fair	6,717	8.23
	Good	22,783	27.92
	Very Good	30,758	37.70
	Excellent	19,165	23.49
	Missing	89	0.11
	Total	81,589	100

In terms of the education, Canadians are generally well educated and nearly 70% of the sample had attained post secondary degrees, including "some post secondary" (5.94%) and "complete post secondary" (64.60%). Also, 15.51% of participants reported having a high school diploma, leaving only 11% who had not finished high school.

In terms of health, based on the categorical HUI indicator, a quarter of the sample were living without a disability. About half (48%) of the sample lived with "mild disability," which is classified as a correctable disability that does not impact the daily life of an individual. About three-quarters of the sample, therefore, were generally healthy (Feng 2009). When health was measured more subjectively with self-perceived health, a majority (over 60%) of respondents perceived their health as "excellent" (23.50%) or "very good" (37.50%).

Previous literature suggested that educational attainment level not only affects health status, but also the way individuals perceive their health status. The question then remains, how measurements of health may be impacted by educational attainment level. Presented in the subsequent sections are the results of the examination of the impact of education on health status using both subjective and objective measures, before moving to examine the impact of education on perception of health.

4.2 Education and Gaps in Health

Education as a Determinant of Health:

As the first step of the analysis, which now weights the sample and represents the Canadian population, this study explored the extent to which education affected health status when measured by HUI and SPH. In this part of analysis, HUI was treated as a raw

score and was regressed on education using ordinary least square regression. For SPH, being ordinal level measure, ordered logit regression was used for its analysis. For each set of analysis, two models were examined: The first model examined the effect of education on a health measure without controlling for age and sex (Model 1) and the second model then with the controls (Model 2) in order to isolate the effect of education on health from biological influences associated with those variables. The results for HUI are presented in Table 2, and those for the SPH are shown in Table 3.

The result for HUI (Table 2) indicated that as education level increased, health status also increased. Relative to the lowest education group (less than high school), those who had a high school diploma had higher HUI by 0.0603. Although this coefficient is small, it is a substantial and statistically significant difference. In health research, it is widely acknowledged that a difference of 0.03 or more in HUI has clinically substantial difference in the quality of one's life (Drummond 2001). Individuals with some post-secondary education had higher HUI than those in the less than high school group by 0.0811. These differences were statistically significant.

Table 2: HUI (continuous) Regressed on Education Group, weighted

Characteristic		**Model 1**			**Model 2**		
		Coef.	Std. Err.	P-value	Coef.	Std. Err.	P-value
Education							
	Less Than High School	Reference Category			Reference Category		
	High School	0.0603	0.0047	0.0000	0.0552	0.0048	0.0000
	Some Post Secondary	0.0428	0.0064	0.0000	0.0343	0.0064	0.0000
	Complete Post Secondary	0.0811	0.0041	0.0000	0.0718	0.0042	0.0000
Age							
	25 to 39 years				Reference Category		
	40 to 54 years				-0.0325	0.0026	0.0000
	55 to 69 years				-0.0505	0.0027	0.0000
Sex							
	Male				Reference Category		
	Female				-0.0116	0.0023	0.0000
	_cons	0.8184	0.0038	0.0000	0.8584	0.0044	0.0000
	R-squared	0.0202			0.0330		
	N =78004						

The overall effect of education on health did not change when age and sex were adjusted for in Model 2. While health generally increased at each level of education beyond attainment of less than high school education, the coefficient dipped as education increased from high school education (0.0552) to some post-secondary education (0.0343). All education levels were significantly and positively associated with HUI ($p<0.05$).

Age and sex were examined in this study primarily as control variables. The coefficients generally decreased for older age groups, suggesting that health generally becomes poorer with older age. Identifying as female was significantly and negatively associated with HUI after adjusting for education and age, suggesting that females experience poorer health than males ($p>0.05$). Model 2 accounts for 3.3% of the variance in HUI. This amount was small, but the variation in people's health is tremendous, and education, sex, and age are just a few aspects of an infinite number of variables that influence health. This, however, does not mean that education is insignificant.

Next, health status was examined, measured by self-perceived health, and its relationship to education.

Table 3: Self-Perceived Health Regressed on Education, weighted

Characteristic	Model 1			Model 2		
	Coef.	Std. Err.	P-value	Coef.	Std. Err.	P-value
Education						
Less than High School	Reference Category			Reference Category		
High School	0.6630	0.0493	0.0000	0.5891	0.0493	0.0000
Some Post Secondary	0.6156	0.0623	0.0000	0.5024	0.0632	0.0000
Complete Post Secondary	1.0007	0.0416	0.0000	0.8811	0.0421	0.0000
Age						
25 to 39 years				Reference Category		
40 to 54 years				-0.3078	0.0297	0.0000
55 to 69 years				-0.6258	0.0288	0.0000
Sex						
Male				Reference Category		
Female				0.0492	0.0246	0.0460
/cut1	-2.9624	0.0505		-3.3572	0.0558	
/cut2	-1.3805	0.0402		-1.7675	0.0469	
/cut3	0.3261	0.0387		-0.0423	0.0456	
/cut4	2.0062	0.0418		1.6576	0.0474	
Pseudo R2 =	0.0111			0.0175		
N=78004						

As was the case with the HUI model, the coefficients increased as education level increased (Table 3, Model 1), indicating that those with higher education reported better health status. However, individuals with some post-secondary education had a lower coefficient (0.6156) than those with a high school diploma (0.6630). This means that although individuals with a post-secondary education reported better health status compared to those without high school degree, they had a lower level of SPH than individuals with a high school degree. The tendency of better health among individuals with a high school degree than those with some post secondary education was observed in the analysis of HUI. Individuals with a post-secondary degree had the largest positive coefficient (1.0007), suggesting that they reported as the healthiest group based on SPH.

Model 2 shows the results for this analysis with controls for age and sex. The coefficients of education group indicators remained generally positive and significant, although slightly attenuated. Nonetheless, the effect of education on self-perceived health captures the social gradient of health as HUI did. Again, while health generally increased at each level of education relative to attainment of less than high school, the results

indicated that the "some post-secondary" group's self-perceived health was slightly concentrated on the lower side of the distribution than the perception of individuals with a high school degree.

For age, the coefficients generally decreased as age increased, suggesting that health generally became poorer with older age. This shows the same trend as the results observed in the objective measure. However, women reported better health status than men after adjusting for education and age, despite the fact that women's HUI was lower than men's (Table 2).

In general, as educational attainment level increased, individuals had better health status. This finding was consistent even after accounting for variation due to age and sex. Moreover, positive effect of education on health was evident in both HUI and SPH. These findings are in line with the findings in the previous research. However, whether people's education level affects the way people perceive their health status has yet to be established. If it does, then the magnitude of the health inequality measured with SPH, a subjectively assessed health measures, would be different from the level of inequality based on HUI, a more objectively measured health status. Thus, the next step is to explore whether the gap between HUI and SPH exists and whether the gap varies across education groups.

Measuring Subjective and Objective Gaps:

To test the gap between HUI and SPH, I analyzed levels of association. One of the difficulties in analyzing the correspondence between these two variables was that they do not share the same levels of measurement. Raw HUI is a ratio level of measurement,

while SPH is an ordinal variable. To reconcile these differences and to achieve robust results, two sets of measures of association were used: Pearson's correlation coefficient and gamma statistics. For the correlation coefficient, the SPH was treated as a numeric score, assuming an equal interval between each set of categorical responses, while HUI was treated as raw score. To calculate the gamma statistics, HUI scores were grouped into four categories. In this part of analysis – the correlation between education and health – educational attainment was grouped into two binary response categories, with less than high school and high school consisting of the less education group (LEG) and some post-secondary education and post-secondary education constituting of the higher education group (HEG). The results are summarized in Table 4.

Overall, the results showed that level of correspondence between HUI and SPH were moderately high. When all groups were included in the analysis, shown in the row of "unstratified", Pearson's correlation coefficient was 0.4560, while the gamma statistic was 0.4981 ($p<0.05$).

Table 4: Correlation between Self-Perceived Health and HUI by Education

	Correlation	Gamma	Pr
Unstratified	0.4560	0.4981	0.0000
Education Group			
Low (LTHS & HS)	0.4603	0.5102	0.0000
High (SPS &PS)	0.4412	0.4796	0.0000

n = 78004

Although these numbers were high for research in social science, it is clear that these two measures of health capture people's health with some degree of discrepancy. That is, many people with a perfect HUI (1.0) do not report "excellent health" in SPH. Now, the question is whether this level of correspondence varies across education groups.

When the stratified by education, the results of this analysis showed similarly high levels of correspondence between SPH and HUI as were found in the "unstratified" group. However, differences in Pearson's correlation by education were observable and significant. The Pearson's correlation coefficient of individuals in the LEG was 0.4603, while the gamma statistic was 0.5102 ($p<0.05$). The Pearson's correlation coefficient of individuals in the HEG was 0.4412, while the gamma statistic was 0.4796 ($p<0.05$). This result suggests that the subjective health status of individuals with lower educational attainment level is more closely related to their objective health than individuals with higher educational attainment.

In order to remove the confounding effects from age and sex, this study further examined the correspondence between HUI and SPH for specific groups of age and sex (Table 5 and 6). When stratified by age and sex, HUI and self-perceived health were more highly correlated in the LEG than in the HEG. Men in the LEG had the highest correlation of health measures in the middle age group from 40-54 (0.4565), while men in the HEG steadily increased their health measures correlations with age (Table 5). Women in both the LEG and the HEG experienced higher correlations between health measures as age increased (Table 6). Correlations were higher in females in the LEG in the youngest (0.401) and middle (0.4803) groups, however in women aged 55-69, those in the HEG had a slightly higher correlation.

Table 5: Correlation between Self-Perceived Health and HUI by Education, M

	Male, Age 25-39 (n=10,740)	**Male, Age 40-54** (n=11,875)	**Male, Age 55-69** (n=12,944)
Education			
Low	0.3886	0.4565	0.4238
High	0.3393	0.4110	0.4259

Table 6: Correlation between Self-Perceived Health and HUI by Education, W

	Female, Age 25-39 (n=13,152)	**Female, Age 40-54** (n=13,257)	**Female, Age 55-69** (n=16,036)
Education			
Low	0.401	0.4803	0.4871
High	0.371	0.4773	0.4971

Overall, the correlations indicate that those with lower educational attainment tend to have higher correspondence between HUI and SPH. This result is opposite to what was initially hypothesized. It was anticipated that individuals with higher education would have a better knowledge about health and better skills to assess their health conditions based on their physical symptoms, which, in turn, would lead to higher level of correspondence between HUI (more objective assessment of health status) and SPH. However, the results show that people with lower education have higher degree of correspondence.

To further explore this unexpected outcome, the distribution of HUI for each level of SPH by level of education was examined. Table 7 indicates the mean HUI scores, 10th percentiles along with the first and third quartiles and Inter-quartile range (IQR). These statistics give the central tendency of HUI as well as levels of dispersion, which help us locate the gaps between HUI and SPH.

Table 7: HUI (continuous) and SPH Status by Education

	Mean	P10	P25	P75	IQR
Less than High School					
Poor	0.4047	0.0060	0.2030	0.6170	0.4140
Fair	0.6843	0.2710	0.4880	0.9050	0.4170
Good	0.8409	0.5820	0.7840	0.9730	0.1890
Very Good	0.8950	0.7270	0.8900	0.9730	0.0830
Excellent	0.9334	0.8420	0.9190	1.0000	0.0810
High School					
Poor	0.5157	0.0280	0.2260	0.8380	0.6130
Fair	0.7131	0.3100	0.5750	0.9310	0.3560
Good	0.8585	0.6120	0.8030	0.9730	0.1340
Very Good	0.9208	0.7780	0.9050	1.0000	0.0950
Excellent	0.9506	0.8900	0.9310	1.0000	0.0690
Some Post-Secondary					
Poor	0.3391	-0.1400	0.0710	0.6640	0.5930
Fair	0.6817	0.2580	0.4450	0.9190	0.4740
Good	0.8399	0.5820	0.7780	0.9730	0.1950
Very Good	0.9251	0.8030	0.9050	1.0000	0.0950
Excellent	0.9379	0.8660	0.9310	1.0000	0.0690
Post-Secondary					
Poor	0.4476	-0.0310	0.1650	0.7440	0.5790
Fair	0.7043	0.2960	0.5630	0.9310	0.3680
Good	0.8716	0.6640	0.8380	0.9730	0.1350
Very Good	0.9301	0.8380	0.9050	1.0000	0.0950
Excellent	0.9545	0.9050	0.9450	1.0000	0.0550

According to the results, the mean HUI scores were higher as people self-rated better health status for each education category. The mean HUI for “poor” SPH among the less than highest education group was 0.4047, which gradually increased to 0.9334 among “excellent” SPH responses. Likewise, among the post-secondary education group, the mean HUI for “poor” SPH responses was 0.4476, and increased to 0.9545 among “excellent” SPH responses.

When this study focused on the dispersion measures, the results showed the high levels of variation of HUI among “poor” and “fair” SPH groups, while the variation of HUI were smaller for those who rated their health as “very good” and “excellent”. For

example, among those who have the highest education, the IQR among "poor health" was 0.5790, while IQR among "excellent" was 0.0550.

When these variations of HUI within each SPH group were observed across education groups, it was noticeable that those who rated "poor" SPH among the lowest education group had much smaller IQR (0.4140) than "poor" health individuals with higher education. The IQRs for "poor" SPH among some post-secondary and post-secondary education groups were 0.5930 and 0.5790, respectively. The differences in IQRs in the "poor" SPH group were much greater than among the highly educated group with a difference of more than 0.165 (= 0.5790 - 0.4140). That is, individuals with less education with low health tended to be more consistently reporting poor health than highly educated people with poor health. For those who are well educated, a sizable amount of people with not so severe health problems still claimed to have "poor health" (the third quartile of HUI among "poor" SPH was 0.7740).

For those who had "excellent" health, the variations of HUI were much smaller. The IQRs of this SPH groups ranged from 0.0550 (post-secondary education group) to 0.0810 (less than high school group). For healthy groups, the variation in HUI was greater among those who self-rated "poor", signaling that lower educated people's HUI varies more than highly educated people. However, the gap in IQRs between the lowest education group and highest education group was less than 0.03, which is substantially smaller than the gap for "poor" health group.

Taken together, individuals with lower educational attainment have a higher correspondence between objective and subjective measures and this can be attributed to the tendency that those with high education report "poor" health even if their objective

health is not necessarily “poor”, while lower educated people with bad health are more consistently reporting “poor” health.

Overall, results from the first objective of this study confirmed that education is indeed associated with health. Education was positively associated with health and was statistically significant at each level of educational attainment. As echoed in the literature, a positive gradient between education and health exists regardless of how health is measured. While subjective and objective measures of health were mildly correlated across education groups, HUI was more highly correlated with self-perceived health among individuals with less education. While this result was not anticipated, further analysis suggested that people with higher education tended to report poorer health even if they were not suffering from a severe health condition. Individuals with lower education tended to report their poor health status more in line with their physical condition.

4.3 Situating Education Results

The findings reported so far support literature on the effect of social variables on health status. Education attainment level was significant and generally positively associated with HUI and self-perceived health (Table 2, Table 3). As educational attainment level increases, subjective and objective health status also increases. While education accounted for a relatively low amount of variance in health measured by both subjective and objective measures in each regression model, its contribution is not negligible. This first finding is important as it establishes a link between high education and better health outcomes for this project and because it is adds to the already massive

body of literature that substantiates a measurable social gradient in health (Adler et al 1994; Bambra et al 2010; Raphael 2011).

Overall, HUI and SPH were moderately correlated across all education, age, and sex groups. This suggests that subjective measures of health moderately captured similar results to what objective measures did (Table 4-6). This general result is supported by previous literature, which suggested that SPH, albeit subjective, is a reliable measure of general health (Benyamini, Leventhal & Leventhal 1999; Raphael 2011).

The correspondence between SPH and HUI scores was high, but far from perfect. The discrepancy between HUI and SPH was particularly observable when they were estimated for specific age, sex, and education groups. Similar to the findings of Delpierre et al (2009) the results of this study show that women tended to perceive their health status more in line with objectively measureable health status. Moreover, older adults' tended to have higher correspondence between subjective and objective measures of health (Krause & Jay 1994). Explanations for these outcomes can be found in the work of Krause and Jay (1994) and Simon et al (2005), who stated that women and the elderly in particular may use physical illness as a measure of health more frequently due to their increased awareness of and experience with poorer health conditions, respectively.

Surprisingly, individuals with lower educational attainment tended to have more highly correlated subjective and objective measures of health. This result differs from previous research that suggests lower education groups tend to have a less precise perceptions of their objective health status than individuals with higher education who tend to deny or ignore poor health outcomes (Layes, Asada & Kephart 2012; Sen 2002).

While this result was unexpected, this study's analysis on the variations of HUI within each SPH showed that lower educated people with "poor" SPH tended to report their health status more consistently to their objective health condition than higher educated individuals who reported "poor" SPH. Accounts for this can be found in the previous literature. The LEG's health norms tend to experience in daily life, physical ailments such as pain and disability (Bambra et al 2010; Raphael 2011). These are the very same measures of objective health that this study relied upon. In other words, the likelihood that individuals in the LEG would experience poorer health arguably enables them to better describe physical health problems, and thus self-report their health in a way that closely mirrors their objective health conditions. As Dowd & Zajacova (2010) found, individuals with lower educational attainment tended to be more aware of explicit physical conditions, like those physical functions measured by HUI, than of underlying biological risks typically measured by biomarkers. The decreased difference in subjective and objective health measures suggests, therefore, that individuals with less educational attainment more consistency experience what objective measures capture: poorer physical health.

These arguments have a clear resonance to the sociological literature on health habitus. Veenstra (2007) posits that both high and low levels of capital may negatively or positively influence the perception of health. Veenstra's argument that higher social class, represented by higher educational attainment, results in increased expectations for health outcomes may explain a lower correlation between subjective and objectives measures of health among the higher educated group. Likewise, the lower expectations of health among lower educated people may result in a more accurate perception in groups that

frequently experience poor health. That is, frequent symptoms of chronic physical illness or impairment become the main gauge of overall health.

Further, Peersman et al (2012) noted that previous health experiences tended to affect the way in which individuals with lower educational attainment gauge their health. Given that individuals with higher education tended to have lower rate of morbidity and disabilities, they expect to experience an extremely high level of health. As a result, the experience of even marginally poorer health may influence higher educational attainment groups to be more negative about their health.

While previous literature has posited that differences in the experience of poor health symptoms may contribute to the discrepancy between subjective and objective measures of health, more research is needed to understand and reach a consensus on why this gap exists. Health knowledge, cultural capital, and lifestyle decisions may influence how individuals formulate health norms and values in the form of habitus (Kawachi, Kennedy & Glass 1999; Korp 2008; Veenstra 2007). In order to better understand the gap between subjective and objective measures of health, this study also examined the relationship between educational attainment level and the frames of reference individuals use to evaluate their health (i.e. self-perceived health status). The results of this examination and a discussion of these results will be the focus of the next chapter.

Chapter 5: Frames of Reference and Self-Perceived Health Status

Thus far, results have confirmed that educational attainment affects health outcomes. As education increased, health status also increased. Moreover, this study also observed patterns in reporting differences using subjective and objective measures that are linked to education. Subjective and objective measures of health were more highly correlated in individuals with lower educational attainment than individuals with higher educational attainment. These findings suggest that it is important to examine how education influences individuals' perceptions of their health. The second objective of this study was to examine *how* educational attainment affects the ways in which individuals perceive health, and this perception of health, in turn, affects the way individuals report their health status.

This chapter specifically explores the idea that different groups use different 'frames of reference' to assess their health depending on their educational attainment level and that this, in turn, influences self-perceived health status. In doing so, this study focused on two specific frames of reference: health behaviours and physical conditions. These two general frames were derived from the existing body of literature (Dowd & Zajacova 2010; Krause & Jay 1994; Peersman et al 2012; Simon et al 2005). Generally, this body of literature suggested that those with lower educational attainment rely on their health behaviours more than physical functioning to assess their health. The findings of this study suggests, to the contrary, that those with higher educational attainment levels are more likely to rely on health behaviours to assess their health. As I will outline, these findings challenge the cognitive bias in the frames of reference literature, namely by

highlighting the influence of ill health on individuals' health perceptions. They nonetheless lend support to the idea that education shapes the health habitus and the frames of reference individuals use to evaluate their health.

5.1 Sample Characteristics

Physical Condition

To examine the frames of reference theory, two specific frames of reference were investigated, focusing on the physical function of an individual first. Physical condition was measured using common variables that capture the condition of the physical body, including the experience of trouble with mobility, difficulty with daily activities, pain level, and the impact of health problems on daily life. Table 8 shows the weighted distribution of these variables.

Table 8: Univariate Data for Physical Condition Reference, weighted

Characteristic		Frequency	Percentage
Mobility Trouble			
	Requires Help/Cannot Walk	475	0.61
	Requires Support/Wheelchair	1045	1.34
	Problem w/ No Aid Req.	509	0.65
	No Problems	75975	97.40
	Total	78004	100.00
Difficulties with Activities			
	Often	6088	7.81
	Sometimes	10212	13.09
	Never	61680	79.07
	Missing	24	0.03
	Total	78004	100.00
Pain Level			
	Pain prevents most activities	2328	2.98
	Pain prevents some activities	3477	4.46
	Pain prevents few activities	4462	5.72
	Pain does not prevent activity	3880	4.97
	No pain	63856	81.86
	Total	78004	100.00
Impact of Health Problems			
	Often	6622	8.49
	Sometimes	10934	14.02
	Never	60401	77.43
	Missing	47	0.06
Total Missing		71	
Total		78004	100.00

A vast majority of the sample (97.4%) reported no mobility issues. Few Canadians reported that they needed help walking or could not walk at all (0.61%), required some support or a wheel chair (1.34%), or had a problem but did not require aid (0.65%). Thus, very few Canadians have mobility issues. In contrast, there were a greater proportion of individuals who reported having difficulty with daily activities, 14% reported having a problem sometimes, and another 8% reported having a problem often. However, the majority of the individuals reported no difficulty with activity (80%). Pain level generally corresponded with difficulty with daily activities, as nearly 82% reported having no pain. The overall impact of health problems on participant's daily life was fairly low as well. Much of the sample reported never being impacted by health problems (77.4%), while 14% reported sometimes being impacted, and approximately 8.5% reported often being affected.

Notably, most variables grouped as thematically representing physical condition showed that the majority of individuals experienced little physical disability. This result corresponds with univariate data outlined in chapter four, which indicated most of the sample experienced "very good" health.

Health Behaviours

Commonly used health behaviour variables were grouped together to form the health behaviours frame of reference. These included variables regarding lifestyle decisions that are commonly known to impact health; smoking status, intake of fruits and vegetables as an indicator or healthy diet, drinking status, and amount of exercise. Table 9 shows the univariate distribution of lifestyle decision variables.

Table 9: Univariate Data for Health Behaviours Reference, weighted

Characteristic		Frequency	Percentage
Type of Smoker			
	Daily	14123	18.11
	Occasionally	3741	4.80
	Not At All	60127	77.08
	Missing	12	0.02
	Total	78004	100.00
Daily Fruits and Vegetables			
	Less than 5	43009	55.14
	5 to 10	29472	37.78
	More than 10	3007	3.86
	Missing	2516	3.23
	Total	78004	100.00
Type of Drinker			
	Regular Drinker	51783	66.39
	Occasional Drinker	12140	15.56
	Did not drink in last 12 months	13902	17.82
	Missing	179	0.23
	Total	78004	100.00
Monthly Exercise (>15 min.)			
	No Exercise	9129	11.70
	Once a Month	1831	2.35
	2 to 4 times	5188	6.65
	5 to 10 times	9068	11.62
	11 to 20 times	14273	18.30
	21 to 31	13389	17.16
	More than 32 times	24259	31.10
	Missing	867	1.11
Total		78004	100.00

The variables representing health behaviours ranged more than the physical condition frame of reference. Most respondents indicated that they were non-smokers (77.08%), with just 18.11% reporting that they smoked daily. Approximately four-fifths identified consuming alcohol, either drinking on a regular basis (66.39%) or occasionally (15.56%). About a third (31.10%) of participants reported exercising the maximum monthly exercise of 32 times a month for 15 minutes or longer a day, while 11.70% reported never exercising. More than half of individuals indicated in their diets that they consumed less than the recommended seven to ten servings of fruits and vegetables per day (55.14%). This information generally suggests that Canadians practice mostly healthy behaviours.

As these tables show, there were a few individuals whose values for these variables were missing. These observations with missing values in at least one variable

were excluded from all the regression analysis in this section. Because the total number of missing observations in the sample was low, the deletion would not skew the overall findings across the regression models. The total sample used when for the analysis of both frames of reference was 74,738.

5.2 Utilization of Frames of Reference for Health Assessment

Physical Condition by Education

Ordinal logistic regression was used to test if one frame of reference was linked more closely to the SPH than the other frame of reference, depending on education. To do so, the association and then observed the predicted probabilities are examined, beginning with physical condition. Models 1 through 5 are the reduced models, which included one variable that captured a frame of reference, controlling age and sex. Model 6 included all the variables from the same frame of reference. The same models are run separately for low education group (LEG) (Table 10) and high education groups (HEG) (Table 11).

Table 10: Ordinal Logistic Regression of Physical Condition Health Frame of Reference in Low Education Group

	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6		
Physical Condition Indicator	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z
Doctors Visits	-1.3905	0.0618	0.0000													-0.8357	0.0637	0.0000
Mobility Trouble				-2.3331	0.1247	0.0000										-1.0332	0.1287	0.0000
Difficulty with Activity							-1.5529	0.0589	0.0000							-0.4358	0.0740	0.0000
Pain										-1.9926	0.0680	0.0000				-1.0048	0.0832	0.0000
Impact of Health Problems													-1.7383	0.0595	0.0000	-0.7710	0.0823	0.0000
Control																		
Age	-0.5655	0.0511	0.0000	-0.5070	0.0508	0.0000	-0.3899	0.0512	0.0000	-0.4553	0.0518	0.0000	-0.4397	0.0512	0.0000	-0.3890	0.0522	0.0000
Female	0.1127	0.0483	0.0200	0.0195	0.0475	0.6810	0.0223	0.0475	0.6400	0.0760	0.0478	0.1120	0.0451	0.0473	0.3400	0.1446	0.0486	0.0030
N	22275			22275			22275			22275			22275			22275		
Pseudo R2	0.0355			0.0230			0.0491			0.0561			0.0598			0.0914		
Wald chi2(df)	657.26 (3)			486.27 (3)			823.12 (3)			1039.27 (3)			963.17 (3)			1730.96 (7)		
Prob > chi2	0.0000			0.0000			0.0000			0.0000			0.0000			0.0000		

Table 11: Ordinal Logistic Regression of Physical Condition Health Frame of Reference in High Education Group

	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6		
Physical Condition Indicator	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z
Doctor's Visits	-1.2435	0.0419	0.0000													-0.7285	0.0416	0.0000
Mobility Trouble				-2.7667	0.1254	0.0000										-1.1529	0.1261	0.0000
Difficulty with Activity							-1.5398	0.0426	0.0000							-0.4408	0.0528	0.0000
Pain										-2.0763	0.0526	0.0000				-1.0806	0.0580	0.0000
Impact of Health Problems													-1.6608	0.0393	0.0000	-0.7515	0.0514	0.0000
Control																		
Age	-0.4114	0.0301	0.0000	-0.3590	0.0298	0.0000	-0.2270	0.0305	0.0000	-0.2826	0.0302	0.0000	-0.2602	0.0305	0.0000	-0.2134	0.0311	0.0000
Female	0.2015	0.0308	0.0000	0.0843	0.0299	0.0050	0.1046	0.0304	0.0010	0.1423	0.0303	0.0000	0.1474	0.0305	0.0000	0.2192	0.0310	0.0000
N	52463			52463			52463			52463			52463			52463		
Pseudo R2	0.0288			0.0184			0.0407			0.0480			0.0505			0.0780		
Wald chi2(df)	1037.21 (3)			685.62 (3)			1464.40 (3)			1719.93 (3)			1958.91 (3)			2747.51 (7)		
Prob > chi2	0.0000			0.0000			0.0000			0.0000			0.0000			0.0000		

All variables were significantly associated with education ($p<0.05$). In lower-education groups (LEG), coefficients in number of doctors' visits were -1.39, mobility trouble -2.33, difficulty with activity -1.55, and impact of health problems -1.73, indicating that fewer incidences of these problems in physical health resulted in higher self-perceived health ratings. Even when all of the variables were included in the same model (Table 10), the overall trend remained (Model 6 in Table 10). Age also had a significantly negative effect in every model, suggesting individuals in the youngest group tended to rate their health better in the physical model, a result that can be explained by the aging process. Sex had a significant effect, suggesting that women reported their health as better.

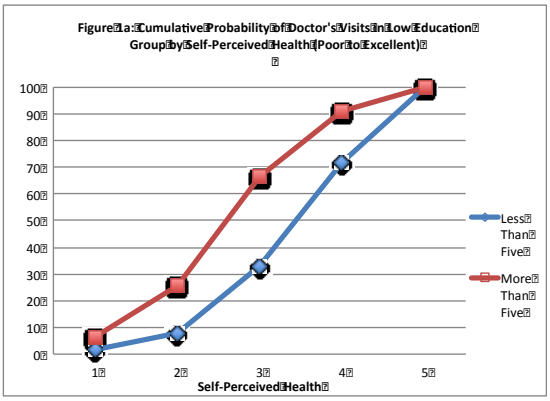
Similar patterns were observed for the high education group (HEG). For this group as well, those with more frequent visits to a doctor reduced the likelihood of rating better health, which is reflected in the negative coefficient (-1.2435). Likewise, more troubles in mobility (-2.7667), more difficulty in activity (-1.5398), more pain (-2.0763), and more impact of health problems (-1.6608) reduced the likelihood of positive health rating (Table 11). Although the general patterns were similar between the LEG and HEG, the effects of the visits to doctor and impacts of health problems were greater among the LEG, while the effects of mobility troubles and pain were greater among the HEG.
To show the differences in effect visually, I converted the coefficients to the cumulative predicted probabilities (Figures 1a - 5b).

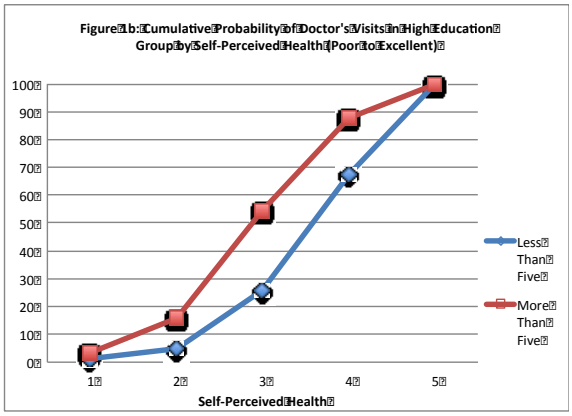
Cumulative predicted probabilities for each education group showed differences in how physical condition variables influenced self-perceived health. Cumulative probability measures the probability that responses fall within or below a certain category.

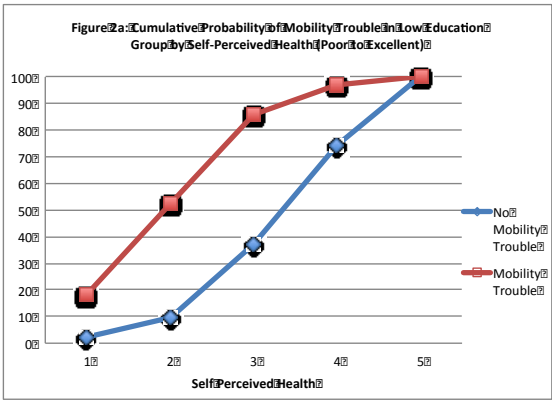
In the figures, larger gaps between the two lines suggest a greater difference in how the occurrence of each health risk (in the form of a physical condition or health behaviour) influences how an individual rates their health.

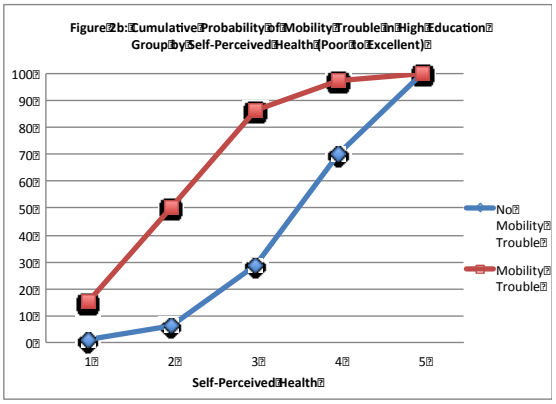
In this case, LEG had significantly larger gaps in figures that describe mobility trouble, doctors' visits, and health problems. This indicates that incidence of poorer physical health conditions in these areas more strongly influenced how health was perceived and rated. It suggests that LEG would probably describe their self-perceived health using these markers of physical condition than the HEG, particularly when describing their health as poor, fair, or good.

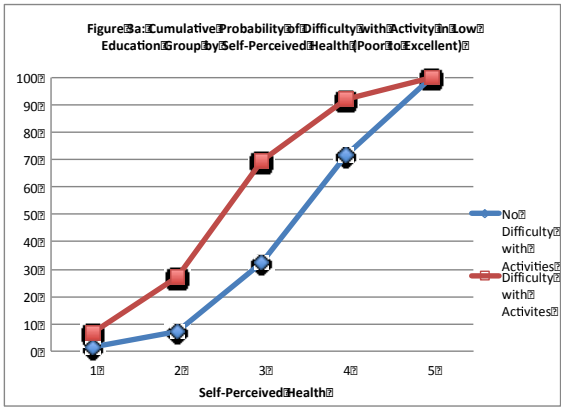
Figures 1a – 5b: Cumulative Probabilities for Physical Condition Frame of Reference (Table 10, Table 11):

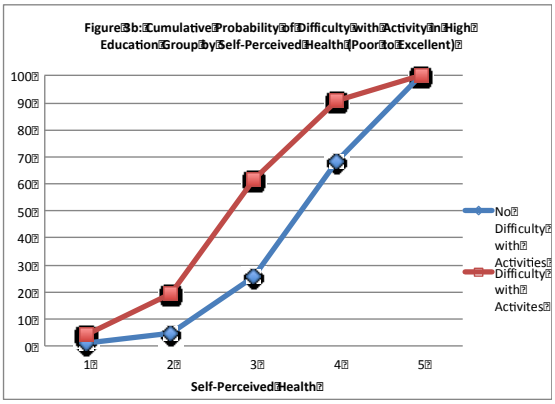












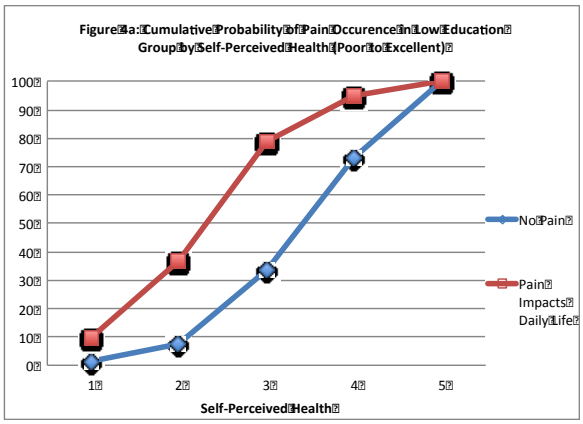


Figure 4a: Cumulative Probability of Pain Occurence in Low Education Group by Self-Perceived Health (Poor to Excellent)
100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
5
Self-Perceived Health
No Pain
Pain Impacts Daily Life

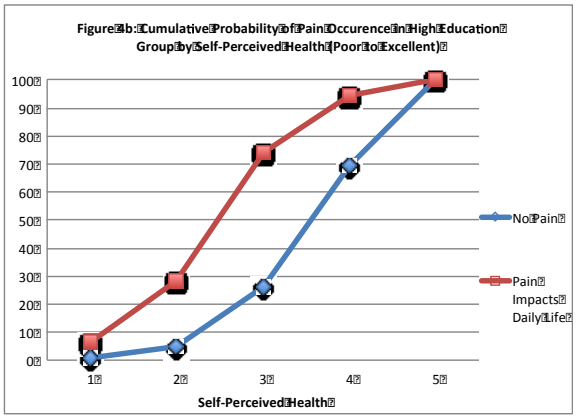


Figure 4b: Cumulative Probability of Pain Occurence in High Education Group by Self-Perceived Health (Poor to Excellent)
100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
5
Self-Perceived Health
No Pain
Pain Impacts Daily Life

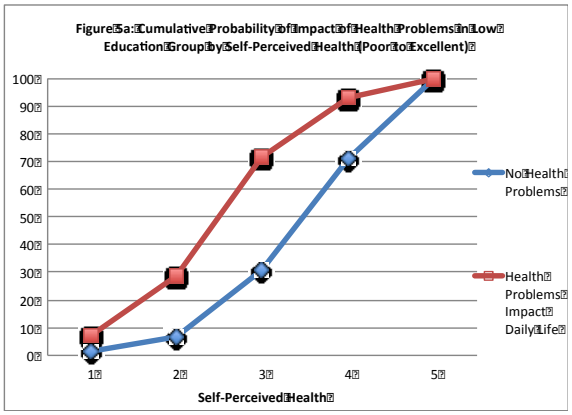


Figure 5a: Cumulative Probability of Impact of Health Problems in Low Education Group by Self-Perceived Health (Poor to Excellent)
100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
5
Self-Perceived Health
No Health Problems
Health Problems Impact Daily Life

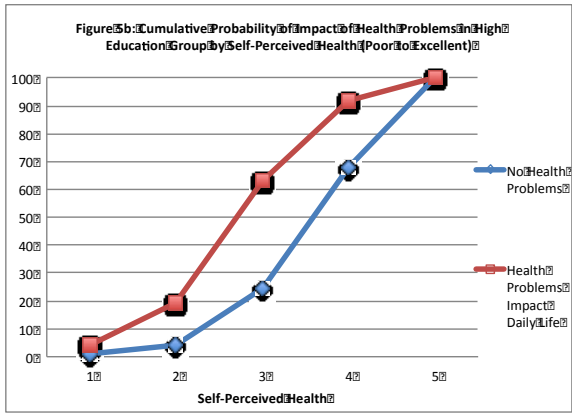


Figure 5b: Cumulative Probability of Impact of Health Problems in High Education Group by Self-Perceived Health (Poor to Excellent)
100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
5
Self-Perceived Health
No Health Problems
Health Problems Impact Daily Life

Health Behaviours by Education

Next, the association of health behaviours and education level was examined and then predicted probabilities were observed. Table 12 and 13 show the results of the ordinal logistic regression. Models 1 through 4 are the reduced models, which include one variable that captured a frame of reference, controlling age and sex. Model 5 included all the variables from the same frame of reference. The same models are run separately for low education group (LEG) (Table 12) and high education groups (HEG) (Table 13).

Table 12: Ordinal Logistic Regression of Health Behaviours Health Frame of Reference in Low Education Group

		Model 1			Model 2			Model 3			Model 4			Model 5		
Health Behaviour Indicator		Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z
	Smoker	-0.4361	0.0514	0.0000										-0.4035	0.0512	0.0000
	Diet				-0.3508	0.0511	0.0000							-0.2714	0.0528	0.0000
	Drinker							0.3852	0.0632	0.0000				0.3529	0.0638	0.0000
	Exercise										-0.7108	0.0698	0.0000	-0.6158	0.0707	0.0000
Control																
	Age	-0.6187	0.0507	0.0000	-0.5720	0.0501	0.0000	-0.5539	0.0505	0.0000	-0.5517	0.0505	0.0000	-0.6091	0.0511	0.0000
	Female	-0.0419	0.0469	0.3720	-0.0512	0.0472	0.2790	0.0424	0.0463	0.3600	0.0126	0.0470	0.7890	-0.0197	0.0471	0.6760
	N	22275			22275			22275			22275			22275		
	Pseudo R2	0.0106			0.0092			0.0089			0.0144			0.0220		
	Wald chi2(df)	191.92 (3)			183.77 (3)			155.57 (3)			217.03 (3)			346.93 (6)		
	Prob > chi2	0.0000			0.0000			0.0000			0.0000			0.0000		

Table 13: Ordinal Logistic Regression of Health Behaviours Health Frame of Reference in High Education Group

		Model 1			Model 2			Model 3			Model 4			Model 5		
		Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z
Health Behaviour Indicator																
	Smoker	-0.6034	0.0378	0.0000										-0.5515	0.0384	0.0000
	Diet				-0.4167	0.0303	0.0000							-0.3337	0.0306	0.0000
	Drinker							0.4340	0.0440	0.0000				0.3878	0.0450	0.0000
	Exercise										-0.8475	0.0606	0.0000	-0.7104	0.0617	0.0000
Control	Age	-0.4226	0.0296	0.0000	-0.4005	0.0295	0.0000	-0.3986	0.0297	0.0000	-0.3918	0.0298	0.0000	-0.4144	0.0300	0.0000
	Female	0.0526	0.0299	0.0790	0.0167	0.0303	0.5820	0.1057	0.0300	0.0000	0.0925	0.0301	0.0020	0.0302	0.0305	0.3230
	N	52463			52463			52463			52463			52463		
	Pseudo R2	0.0109			0.0093			0.0072			0.0124			0.0231		
	Wald chi2(df)	427.27 (3)			400.74 (3)			297.97 (3)			394.13 (3)			806.79 (6)		
	Prob > chi2	0.0000			0.0000			0.0000			0.0000			0.0000		

All health behaviour variables were significantly associated with perceived health status ($p<0.05$), indicating that fewer incidences of these problems in health behaviours resulted in higher self-perceived health ratings. While health behaviours generally reduced SPH across education levels, lone exception was the alcohol consumption. The effect of consuming alcohol was positive in relation to self-perceived health. This means

that people who were identified as consuming alcohol regularly or occasionally were more likely to rate better health.

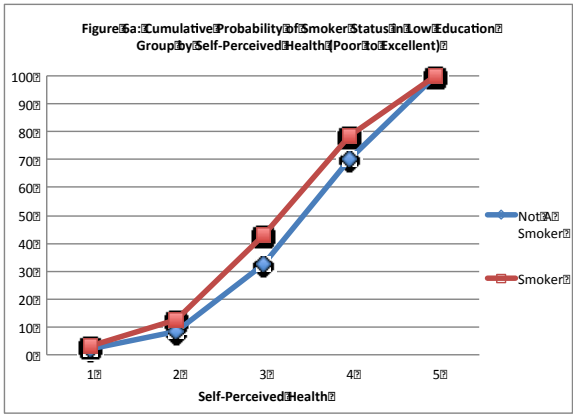
Unlike the physical condition frame of reference, the effects of health behaviour variables on SPH were greater among HEG than the LEG. The coefficient of the variable used to measure alcohol consumption was higher in the HEG, suggesting that alcohol consumption resulted in better self-perceived health, particularly in the HEG. The coefficient of smoking status was -0.6034, diet -0.4167, and exercise -0.8475 (Table 13), which were greater than in the corresponding LEG (-0.4361, -0.3508, and -0.7108, respectively, Table 12). While the occurrence negative health behaviours in general reduced the SPH of individuals regardless of educational attainment level, these health risks reduced the SPH of individuals in the HEG more than in the LEG.

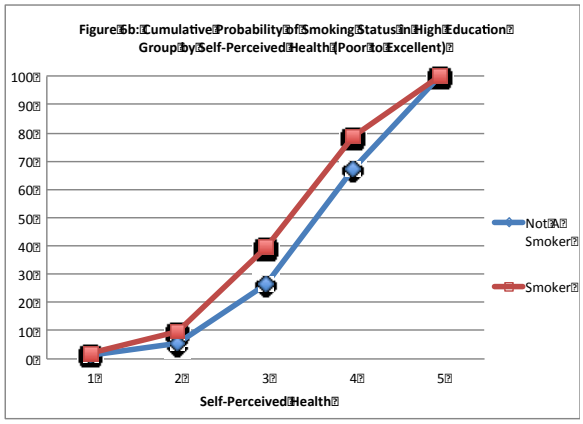
Age also had a significantly negative effect in every model, suggesting individuals in the youngest group tended to rate their health better by these variables ($p<0.05$). Sex, was not significantly associated with any of the health behaviour variables for the LEG (Table 12), however, it was significant factor for drinking behavior and exercise (Table 13). Thus, in general, sex did not significantly affect the SPH, but highly educated women tended to have a better health rating than men when controlling for levels of drinking and exercise.

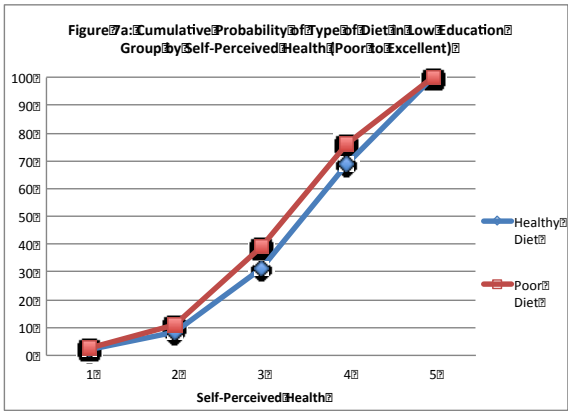
Differences in cumulative predicted probabilities for each education group by health behaviour were less remarkable in those found in physical condition variables, however subtle differences were observed (Figure 6). HEG had larger gaps in the cumulative probabilities of the SPH between smokers and non-smokers, as well as those who exercised regularly and those who do not. This indicates that incidence of harmful

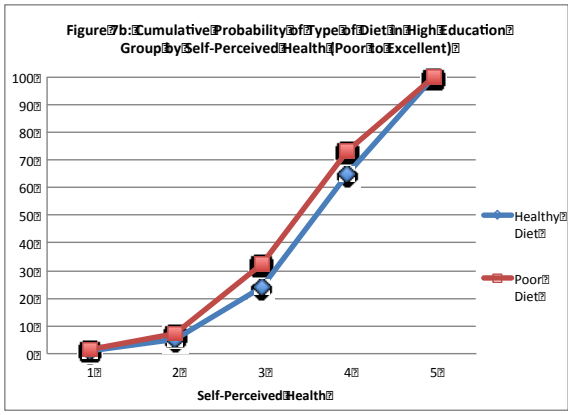
health behaviours (smoking and no exercise) more strongly influenced individuals' perception of health with more education. That is, while harmful health behaviours negatively impact SPH of all individuals regardless of education, the effects are more negative on individuals in HEG. Based on these results, it can be concluded that HEG generally use health behaviours more than LEG to perceive and rate their health.

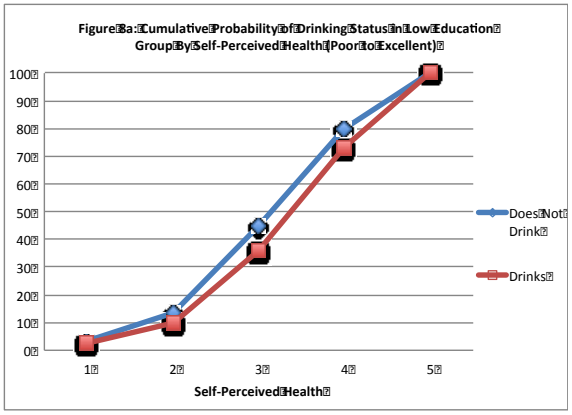
Figures 6a – 9b: Cumulative Probabilities for Health Behaviours Frame of Reference (Table 12,Table 13):

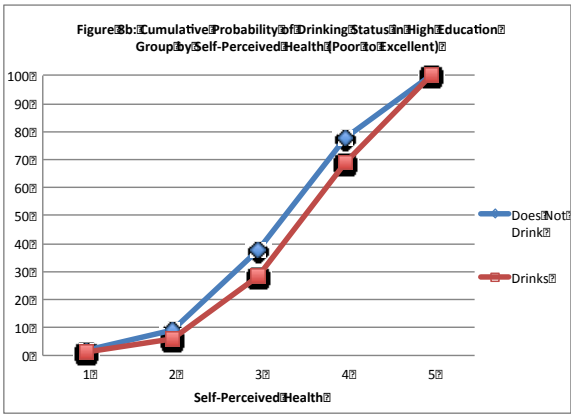












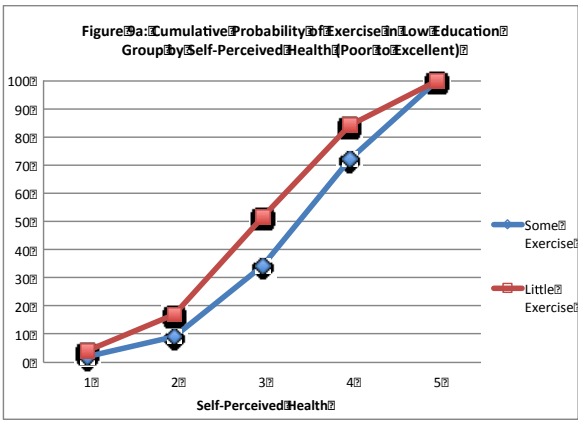


Figure 9a: Cumulative Probability of Exercise in Low Education Group by Self-Perceived Health (Poor to Excellent)
100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
5
Self-Perceived Health
Some Exercise
Little Exercise

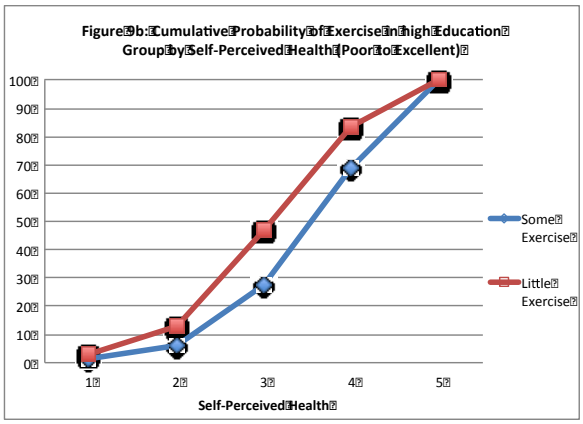


Figure 9b: Cumulative Probability of Exercise in high Education Group by Self-Perceived Health (Poor to Excellent)
100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
5
Self-Perceived Health
Some Exercise
Little Exercise

5.3 Situating Frames of Reference within Health Habitus

Education influences the frame of reference used by individuals to perceive their health, however, not in the hypothesized manner. The results of this study suggest that LEG individuals tend to rely on physical condition to assess their health more than HEG, whereas HEG rely on health behaviours marginally more than LEG to assess their health.

Based on the effect size of the multiple ordinal logistic regression models and cumulative probabilities, the physical condition and health behaviour frames of reference affected the perceptions of health status across educational groups. These findings show that, regardless of education groups, people generally self-reported having better health when they experienced fewer physical limitations and had positive health behaviours. This is in line with the some previous literature. Simon et al (2005) suggested that the pervasiveness of physical ailments drive an individual's perception of health. Also the LEG and HEG in this study both generally self-reported having better health when they experience fewer physical limitations and have positive health behaviours. It is important to remember that though gaps in objective and subjective health measures do exist, those unfettered by physical impediments report having better health (Adler et al 1994; Raphael 2011).

This study also found that the LEG were *more* likely to assess physical conditions to base their general perception of health than the HEG, while subjective health perceptions among HEG are more influenced by health behaviours. These findings challenge previous studies that suggested physical condition was less relied upon by those with lower educational attainment in assessing their health due to a propensity to deny poor health symptoms and for lower health literacy (Krause & Jay 1994; Layes,

Asada, & Kephart 2012; Peersman et al 2012). It should be noted that these studies do not explore *how* educational differences influence health perceptions, and often rely on the explanation that individuals with less education have diminished skills and lack the knowledge required to assess their health status based on physical conditions. It is also worth noting that there was little evidence in this study to support the idea LEG are more likely than HEG to deny and/or incorrectly identify poor health symptoms. In fact, the study found that HUI, which measures physical disability, and SPH were more highly correlated among those with lower educational attainment. In other words, in this study, LEG's assessments of their health using subjective and objective measures were more closely related than HEG.

It is quite possible that individuals with low educational attainment were more likely to rely on physical condition to inform their perception of health because they were more likely to experience poorer physical health (Adler et al 1994; Bambra et al 2010; Raphael 2011). It follows, in other words, that the frame of reference that LEG used to self-report health may be informed by their experience of poorer physical health, rather than the factors that may contribute to it (i.e. health behaviours). The stronger correlation between objective and subjective measures found in LEG can also be attributed to the phenomenon being measured. If LEG experience poorer physical health than HEG (captured by the social gradient in health) and HUI explicitly measures physical function, then it follows that LEG would in fact use physical condition as a frame of reference more readily that HEG.

While the gap was small, the perception of health among the HEG was more affected by health behaviours than the LEG. Negative health behaviours may influence

the health perceptions of HEG more than LEG perhaps because the former has the resources to access "healthy lifestyle"(Korp 2008; Veenstra 2007). Positive health behaviours can be inherently bound with a high level of cultural capital only possessed by individuals with high educational attainment and socioeconomic status (Korp 2008). Therefore, individuals with high educational attainment who deviate from health norms and behaviours may consider this to have a more significant impact on their health, leading them to rate their health as poorer than can be measured with observable physical conditions. Those with more education may also be using a different set of standards that inform their health habitus that were not included in this study. For example, literature in health habitus suggests that class may be more significantly implicated in the assessment of mental health rather than physical health (Gatrell, Popay, & Thomas 2004; Veenstra 2007). In this way, this study may not have accurate captured all frames of reference used to capture all types of health.

In general, the results of this study provide support for the idea of health habitus, which expands in some important ways from the frames of reference framework. The concept of health habitus suggests that different social conditions and distributions of the forms of capital structure habitus and regulate how an individual interacts with the social world and their own health (Veenstra 2007). Cultural capital has been noted to specifically influence the life-course, access to social capital, and to inform habitus that can impact perceptions of health (Veenstra 2007). The concept of health habitus also draws our attention to the fact that when individuals use their physical condition as a measure of their health, they are not simply relying upon assessments of their physical characteristics; they are also drawing on a set of health norms, attitudes towards illness,

and knowledge of health conditions (Simon et al 2005). The findings of this study suggest that the health habitus of groups who are more likely to experience poor health may involve having more overall health knowledge, more accurate expectations of illness, as well as a better understanding, perhaps, of how well an individual can cope with illness. In a similar fashion, this study's findings suggest that the health habitus of groups who are more likely to have access to the material and social resources that support 'healthy' lifestyles also influences their subjective understanding health.

The second objective of this study was to examine whether differences in health perceptions can be attributed to difference in educational attainment. This study accomplished this objective by testing the 'frames of reference' hypothesis and the idea that individuals with lower educational attainment are more likely to rely on their health behaviours rather than physical functioning to assess their health. Using regression models and cumulative probabilities, this study found that, in fact, the physical condition frame of reference substantially shaped the perceptions of health across educational groups, but that it influenced it more so among the lower education group than the high education group.

The contention in this chapter is that these findings provide support for the general idea of health habitus and increase our understanding of the patterned use of frames of reference. While education may or may not directly impact health by guiding tastes or health behaviours, it does seem to affect how individuals perceive and understand health in ways that inform how they report it. Improved health lifestyles contribute to the health habitus of individuals with higher education, which appears to increase the influence health behaviours on their subjective understandings of health. The

health habitus of those with lower levels of education unfortunately often includes experiences of ill health, which appears to influence the frame of reference—physical functioning— that they commonly use to assess their health, as well as the consistency with which they self-report their health (as identified in Chapter 4).

Chapter 6: Conclusion

Generally, Canadians are highly educated and healthy. However, like other countries, Canada is not free from inequality. While health varies due to a myriad of biological and non-biological factors, education has a significant influence. As a determinant of health, which many researchers have attempted to unpack various ways, inequalities in educational attainment closely mirror inequalities in health status. While previous research has provided valuable information for social policies to improve health conditions, the ways in which people with different levels of education perceive and report their health status has not been rigorously engaged. My thesis research attempted to address this knowledge gap. In particular, the study considered how education contributes to the different results produced by the use of subjective and objective measures of health status.

One the key findings is that increased educational attainment levels positively influence health and that this influence can be found using both subjective and objective measures. Canada's population generally enjoys good health and regardless of educational attainment level, individuals with very good or excellent health could be found in all groups investigated in this study. However, as my analysis reaffirms, individuals with lower educational attainment have poorer health on average than those with higher educational attainment levels. In other words, despite having a largely healthy population overall, social inequalities in education continue to affect health outcomes in Canada (Adler et al 1994; Bambra et al 2010; Humphries & van Doorslaer 2000; Raphael 2011). Results support existing literature that suggested that the influence

of education on health extends beyond the ability to acquire material resources necessary for good health (Link & Phelan 1995; Herd, Goesling & House 2007), and goes even further to suggest that the social gradient in health influences the means by which health is measured.

Results also show that there is a gap in subjectively measured health and objectively measured health. Specifically, subjective measures of health were more consistent with objective measures of health in individuals with lower educational attainment than those with higher educational attainment. This result stands in contrast to previous studies that suggest individuals with less education attainment may deny or fail to comprehend their physical health status due to a lack of knowledge (Layes, Asada & Kephart 2012; Delpierre 2009; Idler & Leventhal 2004).

While it is possible that these results depart from the previous literature because of differences in study design (i.e. population, sample size, and/or methodological approach), it is also possible that the experience with poor physical health conditions makes individuals' perceptions of their overall health more congruent with objective measures. Objective measures of general health, and in particular HUI, measure the physical symptoms of disease and illness that influence daily life (Horsman et al 2003). Individuals with less education often suffer from poorer health and familiarity with such physical symptoms of poor health may align their subjective perception of their health with objective measures.

My analysis likewise shows that when assessing their health, lower and higher-educated people do not refer to exclusively one frame of reference or another, but that they do rely on different frames to different degrees. Health behaviours contributed more

to the subjective perception of health in individuals with higher education than in individuals with lower education. Equally, the experiences of poor physical health conditions tend to drive the subjective understanding of health for individuals with less education, and also appears to affect the consistency by which they self-report their health using objective and subjective measures.

Previous research attributing the use of one frame of reference over another is divided: While some that suggest individuals with less education use physical condition to gauge their health (Peersman et al 2012; Simon et al 2005), others who argue that unfamiliarity with biomedical information drives this group to use health behaviours to assess their health (Bago d'Uva, O'Donnel & van Doorslaer 2008; Dowd & Todd 2011; Krause & Jay 1994). Although poor health behaviours seemed to have a greater impact on the self-perceived health of individuals with high educational attainment, both educational groups overwhelmingly relied on physical health conditions to inform the assessment of their health.

These findings provide support for the concept of health habitus in explaining why particular frames of reference are used more than others by particular education groups. The values and norms comprising health habitus used to assess health are in part constructed from previous experience, understandings of health, and expectations; in other words, health norms (Gatrell, Popay, & Thomas 2004; Veenstra 2007). While one educational group or another did not exclusively use particular referents, individuals with higher educational attainment considered health behaviours more when assessing their health compared to those with lower educational attainment. As previous literature has suggested, access to the material and social necessities of what is considered a 'healthy

lifestyle' may be more readily available to individuals with higher educational as a result of their habitus. As Korp (2008) argues, 'positive health' and the behaviours associated with it may imply more than the absence of illness or condition. Instead, positive health lifestyles may refer to the types of social supports afforded to individuals with high socioeconomic status, such as a social support system, a higher level of physical fitness, and the relative absence of psychological stressors. Differing orientations, influenced by cultural capital, accumulate to form health habitus. Therefore, different social classes and those with different educational attainment levels will have both a different health habitus and perceive their health through the use of diverse frames of reference.

In applying the lens of health habitus to the results of this study, we can increase our understanding of health measurement. The findings of this study suggest a more nuanced approached might be needed to measure health and that accurate measurement is not merely a question of whether to use subjective or objective measures. In this way, the question of which measure to use depends on who and what is under examination. The experience of poor health may contribute to the value orientation and habitus used to perceive health status among individuals with lower education attainment, however the idea that such disadvantage impacts knowledge regarding health status (Dowd & Zajacova 2010) was not supported by this study. While education is undoubtedly necessary for cognitive and social development (Chinn 2011; Nutbeam 2000), higher education does not determine one's ability to accurately assess one's health. Moreover, the use of subjective measures alone could potentially underestimate health inequalities between education groups. While previous literature asserted that subjective measures, such as self-perceived health status, were valid measures for general health (Idler &

Benyamini 1997), they may not be entirely comparable to objective measures across all socio-demographic and socioeconomic groups. In this way, future research should not use one subjective measurement to assess health across diverse socioeconomic and other classed groups.

This study's results are tempered by its limitations. Firstly, variable selection may have influenced how each frame of reference was captured. Using a PUMF effected the inclusion and exclusion of variables based on their availability. In order to avoid excluding large numbers of participants from this study, some variables used in previous literature to analyze different frames of reference could not be used because they were not available in the PUMF format. Moreover, some groups excluded from this survey, including Aboriginal populations living on reserves and individuals who are institutionalized, represent marginalized communities that may benefit from research involving the influence of education on the measurement of health.

In addition, the manner in which education data is provided in the CCHS PUMF format may have influenced the results of this study. The CCHS groups individuals with completed post-secondary qualifications together. In this case, the type of education in this group can range from college and to doctoral and professional degrees. While increased educational attainment alone does contribute to higher income and improved worked conditions, fundamental differences in habitus may exist at this range of post-secondary qualification. Future research would benefit from examining educational attainment at each separate level in order to gain a more nuanced understanding of how education influences the perception of health.

Finally, because the four most common frames of reference were collapsed into two frames of references for this project, some nuance may have been lost in attributing which groups used what frames. While some compelling results were found regarding the lower education group, alternative frames of reference were not identified. Future research would benefit the existing body of literature by identifying and testing more frames of reference by educational group.

Despite these limitations, my findings make a contribution to the existing literature on this topic. This study is the first in Canada that identifies patterns in self-perceived health status; it therefore provides new data in a field dominated by American and European studies (Bago d'Uva, O'Donnel & van Doorslaer 2008; Idler & Benyamini 1997; Krause & Jay 1994; Peersman et al 2012; Simon et al 2005). Although there are similarities in some aspects of culture among Western countries, the healthcare systems, social welfare, and social values around health and health inequality varies significantly between Canada, Europe and the United States. To the extent which perception of health is influenced by the larger social values and socioeconomic positions in a given society, it is important to examine the mechanisms specific to each country.

Further, the quantitative approach taken by this study distinguishes it from previous research. Previous studies of health perceptions tend to be based on qualitative research. While the findings from this research greatly benefitted my project by helping to shape my research design and questions, it is important to validate the generalizability. In this sense, the large sample size included in this study complements previous qualitative research, to further understand how social factors influence perceptions of health

Investigation into the influence of social characteristics on health measurement is necessary in order to better understand population health. This study explored how academic research can better understand the influence of education as an influence on individuals' perceptions of their health. In fact, the results of this study have shown that objective measures may be more reflective of the health of Canadians than previously estimated. This study, and future research like it, might encourage a more thoughtful application of health measures to particular populations based on the social factors that influence health perceptions and outcomes. Knowledge imparted from this study can be incorporated into future research and policy to include more sensitive measures and more detailed understandings of the experience of health, ultimately providing a more thorough accounting of health status in Canada.

Moreover, this study and future inquiry are important for expanding our knowledge and understanding of the direct and indirect effects of the social determinants of health. While social factors have been strongly linked to health outcomes, it is also important to acknowledge how these forces can permeate and shape the way health is conceptualized. Further research into other socioeconomic factors that contribute to the stratification of people by class and construct values and orientations that influence how individuals perceive and interact with the world may provide valuable insights into health inequality.

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