HEALTH IN A CANADIAN OLD ORDER MENNONITE COMMUNITY

HEALTH STATUS AND THE DETERMINANTS OF HEALTH IN A CANADIAN OLD ORDER MENNONITE COMMUNITY

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ABSTRACT

This thesis presents the results of a study exploring the health status and health determinants in two farming groups in Waterloo, Ontario, Canada: Old Order Mennonites (OOMs) and non-OOM farmers. Physical health and mental health are examined, and Canada's 12 health determinants (excluding genetics) are included in the analysis. A survey was distributed to both groups in 2010 to obtain information on health status and determinants. Comparing the two groups reduces the likely impact of contextual features impacting both, such as local economic conditions. The mental component summary (MCS) and physical component summary (PCS) of the SF-12 were used to measure mental and physical health. The study compares health in the two populations, and uses ordinary least squares (multiple) regression to determine the relative importance of the determinants in shaping health. The study found that mental health is better in OOMs, mainly due to OOM women's strong mental health. Physical health was worse in OOMs, and while true for both genders, OOM women appear to be particularly disadvantaged. There is overlap between the groups in the determinants shaping physical and mental health. In both groups, mental health is shaped by social interaction, stress and coping; and physical health by age, childhood disease history, coping and body mass index. This suggests these factors may be important across many populations facing different life circumstances, thus representing priorities for policy action. Interestingly, the key determinants shaping physical health in both groups do not include social factors such as social capital, although social factors do shape mental health (especially in OOMs). This may be due to the rural or farming status of the two groups, or differences between physical and mental health. Determining which is more likely requires reconciling the results of this study with others, an effort hampered by differences in models, methods and health outcomes employed.

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I would also like to thank the Waterloo Old Order Mennonite community for their participation in this research study. There were many members of this community who helped in various ways, from providing feedback on survey drafts to distributing the survey in their meeting houses. In particular, I would like to thank the Senior Bishop and his wife, who supported and trusted me throughout this project. I have learned a great deal from the Old Order Mennonites, and deeply respect them for their commitment to peace, community and God.

PREFACE

All three papers included in this thesis are multiple-authored papers. All members of my PhD Committee are included as authors on the first two papers, and my PhD supervisor is the second author on the final paper. The work represented in each of the papers is substantially my own, with my supervisor and other PhD Committee members providing feedback as a standard outcome of their role in supervising the thesis research. Specifically, my role in the thesis research included: development of the research topic (2008-2009), study design including survey development (2009-2010), data collection (2011), statistical analysis (2011) and preparation of the first drafts of the three papers (2011-2012). My co-authors were responsible for supervising these activities and providing feedback on the first drafts.

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LIST OF ABBREVIATIONS AND SYMBOLS

Abbreviation/Symbol	Definition
BMI	Body Mass Index
BP	Bodily Pain Domain (SF-12)
CBC	Canadian Broadcasting Corporation
CIHI	Canadian Institute of Health Information
CSDH	Commission on Social Determinants of Health
DSES6	Daily Spirituality Experience Scale (6 Item)
GH	General Health Perception Domain (SF-12)
GHQ (GHQ12)	General Health Questionnaire (12 Questions)
HBV	Hepatitis B Virus
HPV	Human Papillomavirus
MCS	Mental Component Summary (SF-12)
MH	Mental Health Domain (SF-12)
MMR	Measles, Mumps and Rubella Vaccine
non-OOM	non-Anabaptist (not Mennonite, not Amish)
OLS	Ordinary Least Squares (Regression)
OOA	Old Order Amish
OOM	Old Order Mennonite
PCS	Physical Component Summary (SF-12)
PF	Physical Functioning Domain (SF-12)
PHAC	Public Health Agency of Canada
RE	Role Limitations due to Emotional Problems Domain (SF-12)
RP	Role Limitations due to Physical Problems Domain (SF-12)
SAS	Statistical Analysis Software
SC	Social Capital
SDOH	Social Determinants of Health
SES	Socio-economic Status
SF	Social Functioning Domain (SF-12)
SF-12	Short-form Health Survey (12 Questions)
SF-36	Long-form Health Survey (36 Questions)
SNI	Social Network Index
SoP	Sense-of-Place

Abbreviation/Symbol	**Translation**
UK	United Kingdom
US (USA, U.S.)	United States of America
VT	Energy and Vitality Domain (SF-12)
QUAL	Qualitative methods
QUAN	Quantitative methods
WHO	World Health Organization
χ^2	Chi-squared (significance test)
%	Percent

DECLARATION OF ACADEMIC ACHIEVEMENT

As documented in the (preceding) Preface, I am the primary contributor to the body of work presented in this thesis. I designed the research study, collected the data, conducted the statistical analyses, and prepared the first drafts of all written material. My PhD Committee supervised these research activities and provided feedback on my written work.

CHAPTER 1

INTRODUCTION

1.0 Introduction

A population's health is influenced by social, economic and physical conditions, health behaviours, coping skills, biological and genetic factors, early childhood development and health care services (PHAC, 2012). These factors, commonly referred to as the "determinants of heath", are interrelated and reflect a range of individual and collective conditions most of which reside outside the health care sector. Different populations have been studied to identify and understand the influence of the factors, but the more ubiquitous the factors are in a population the more difficult they are to identify because variation is needed to detect their influence. Unfortunately, the factors thought to cause contemporary disease patterns are often ubiquitous in many populations. One strategy that retains variation is to compare two populations that contrast one another with respect to the factors of interest. This was the strategy used in this thesis, with the study population chosen because their lifestyle contrasts the general population regarding a number of factors (determinants) thought to influence health. The study population is the Old Order Mennonite (OOM) community of Waterloo, Ontario, Canada. Although this study is situated within the field of Health Geography, it is also "determinants of health" research and adds to the growing body of literature within this broader field.

I begin with a discussion of the nature of contemporary epidemiology and the complex causal web characterizing current disease patterns. One of the strategies for dealing with this vast causal network is prioritizing pathways and selecting study populations that best illustrate the potential role that the pathways play in shaping health. The discussion on OOMs is placed within this context, with selection of OOMs as a study group representing an effort to focus on the social environmental pathways. The risk factors distinguishing them are discussed, as well as the control group selected to enhance our understanding of the role the risk factors play, and the study design used to obtain health information for both groups. This is followed by a brief overview of the analyses undertaken in this thesis.

1.1 Contemporary Epidemiology and Priority Pathways

Susser and Susser (1996a) identify three historical periods for epidemiology, each period reflecting the predominant health threats and knowledge prevailing at the time: the *Miasma paradigm and sanitary* era, followed by the *germ theory and infectious disease* era, which lead to the current *risk factor theory and chronic disease* era. The first two periods were characterized by major risk factors which paved the way for relatively clear hypotheses regarding the exposure-outcome pathway. Some regard the epidemiological successes during these periods as easy hits, because the effect sizes were large, the risk factors were few, and the pathways obvious (Maziak, 2009a). By comparison, the current chronic disease era is challenging for epidemiologists, because the complex causal web, comprised of many small, interconnected risk factors, does not lend itself to simple conceptualizations and hypotheses regarding exposure-outcome relations (Maziak, 2009a).

Many contemporary epidemiological studies have proceeded within a "black box" paradigm, where studies of exposure-outcome relations are often undertaken in the absence of biological understanding and clearly-formulated hypotheses about underlying causal mechanisms (Skrabanek, 1994). Some researchers, such as Greenland et al. (2004: 529-530), support the publishing of observations in the absence of a theoretical framework because it can aid in theory formulation and can "supply data for the scientific community to use in tests of theories, including theories not even conceived of at the time of publication". Other researchers oppose this "black box" approach, seeing it as little more than a fishing expedition, with accusations including few concrete *a priori* hypotheses and studies being ill-conceived.

The contradictory nature of epidemiological findings on chronic illness and the absence of a single basic cause have led to concerns about how to conceptualize the complex causal web in order to ground studies in stronger causal inference. This has led to the development of the multilevel paradigm; this paradigm has been used to help conceptualize the complex causal web, and is represented by a number of models that generally acknowledge that distal (societal), proximate (individual) and microbiological (genetic) factors interact in the production of disease (e.g., WHO, 2007; Gibbons et al., 2006; Kreiger, 2001; Susser and Susser, 1996b). Perhaps most importantly, the multilevel paradigm reminds us that the causal variables extend beyond individual risk factors to include many contextual

factors such as political, economic, cultural and social environments (Kreiger, 2000; McMichael, 1999).

The multilevel paradigm has opened the door to the inclusion of many risk factors, thereby reducing the likelihood of missing confounders, which is critical in moving from observation to causation in epidemiological studies (Rutter, 2009). However, multilevel studies also increase complexity in that they involve "many-to-many" risk factors to account for resulting from the vast causal universe of chronic illness (Buchanan et al., 2006). It would be useful to identify priority causal pathways to work on rather than attempting to unravel the entire complex relation between exposures, genes and chronic disease (Maziak, 2009a).

A number of epidemiologists have suggested that priority should be placed on environmental factors when looking at the cause of contemporary diseases. For example, Pearce et al., (2004, pg. 1070) note:

> "The constant interaction between genes and the environment mean that few diseases are purely hereditary (even if they are genetic). Purely hereditary diseases are very rare…and account for a small proportion of overall disease."

Pearce et al. (2004) acknowledge that genetic research may lead to some important discoveries, but suggest that these will likely benefit a few high risk individuals rather than the population as a whole. Rose (2001: 429) further acknowledges that genetic factors have a broad tendency to explain individual susceptibility "but to explain rather little of population differences in incidence." When viewed from a population perspective, the ubiquity and rapid increase of contemporary diseases (chronic conditions) in recent years in the majority of populations across the globe also suggest that an explanation lies in a closer examination of the environmental factors. Why? Firstly, most populations are showing similar increases in chronic illness despite genetic differences. Secondly, the time scale of genetic evolution is considered to be far greater than environmental change, hence the rapid increase in chronic illness in the recent past is unlikely to be the result of a rapid change in genetics (Maziak, 2009a; Pearce et al., 2004). Consequently, environmental (non-genetic) factors appear to be priority targets for exploration of the causes of contemporary disease patterns, and these represent the focus of this research study.

1.2 Population Health and the Study Group

The rapid rise of chronic disease in many populations suggests a mass influence (or group of influences) acting on populations as a whole. Unfortunately, as Pearce (2011) and Rose (2001) both note, the more widespread the influence within a population, the more difficult it is to detect, with the hardest cause being the one experienced by everyone. Rose (2001) uses cigarette smoking as an example, noting that if everyone in a population smoked, then all studies (clinical, case-control, cohort) would conclude that lung cancer was genetic - everyone is exposed to the causal factor and the case distribution reflects individual susceptibility only. Therefore, sufficient variation in exposure to the causal factor(s) needs to exist within populations in order to detect them. How then can we study the aetiology of chronic illness when the causal factors are ubiquitous or near-ubiquitous in so many populations?

Pearce (2011) and Rose (2001) suggest looking at either populations over time or different populations. The idea is to choose either a population that over time shows variation in exposure to the risk factor(s) of interest (and compare the population at different time periods), or choose two populations having different variations in exposure (and compare the two populations at the same point in time). Pearce (2011) notes that many discoveries in cancer aetiology have resulted from systematically comparing populations with different risk factor profiles (e.g., dietary factors and colon cancer, HBV and liver cancer, HPV and cervical cancer). Pearce (2011) emphasizes that such ecological studies have been an essential part of a wider scientific process, and they may be the best (or only) way of identifying population-level determinants (whose causality can be then confirmed with more focused study designs).

Maziak (2002: 417) also suggests comparing different populations, emphasizing a "population-level approach, comparing various populations at clear contrast in relation to the factors of interest." Maziak (2009a: 397) further suggests that an evolutionary perspective could guide the selection of risk factors and priority pathways relevant to chronic illness, focusing on the factors that "underwent a rapid change within a short period of time, or represent an obvious diversion from the environments that prevailed during most of our evolution." For example, among the rapidly changing exposures that Maziak (2009a) identifies as

particularly relevant for chronic illness are: "eating, mobility, recreation, socialization and communication patterns, as well as our increasingly indoor existence." Using Maziak's evolutionary perspective as *the* fundamental framework guiding all chronic illness epidemiology in the 21st century is inadvisable for a number of reasons (Dunn, 2009; Pearce and Douwes, 2009), and Maziak himself does not advocate this (2009b). However, his perspective is consistent with historical and archaeological evidence, and merits consideration as a possible way forward that offers a framework for reducing the complexity of multilevel studies and developing better aetiological theories (Maziak, 2009b; Pearce and Douwes, 2009). Some see Maziak's perspective as an extension of the life-course approach (Lynch and Smith, 2005), where the life-course is not just childhood circumstances but also those of parents and more distant ancestors (Pearce and Douwes, 2009).

One population that differs significantly from the current general population is the Old Order Mennonites (OOMs). They are certainly not the hunters-gatherers that Maziak is referring to in his evolutionary perspective. However, the OOM lifestyle is characteristic of traditional rural populations living over 100 years ago, and as such differs from mainstream populations in many of the factors that have undergone rapid change during the past century – e.g., the patterns of socialization, recreation, communication, indoor existence and mobility that Maziak suggests may be relevant to contemporary disease patterns. The OOM lifestyle features horse and buggy transportation, little/no alcohol consumption, no smoking, a high level of religiosity (Christian), strong family and community support, a patriarchal structure, a traditional farming culture, and minimal reliance on technology (Loewen Reimer, 2008). OOMs engage in certain behaviours with obvious health benefits (e.g., no smoking, higher levels of physical activity), and there is a substantial literature supporting the health benefits of religiosity (summarized in the edited collection by Koenig et al., 2001). A number of social factors arising from the community-clan-family structure of OOM society may also benefit health, such as reciprocity, trust and altruism (Maziak, 2009b).

OOM communities possess other beneficial properties, from a study design perspective. The communities are relatively isolated (culturally), living separately from the mainstream populations surrounding them (Loewen Reimer, 2008). This helps to identify them and study them as a separate entity. Also, their behaviours and cultural practices are relatively homogenous and stable. Fretz (1989) notes

that the community concept applicable to OOMs is *Gemeinschaft* – a cohesive society characteristic of preindustrial rural communities and organized on the basis of shared, communal values rather than individual rights (Fretz 1989). This contrasts with *Gesellschaft*, which is more characteristic of modern industrial society with its emphasis on impersonal relations, continued change, individual gain, and little consensus on norms, values or group commitment (Fretz 1989). As a result of the *Gemeinschaft* nature of OOM communities, communal norms and practices are adopted by individual members, resulting in a high degree of homogeneity within the community. As Fretz (1989) notes, stability and less frequent change also characterizes this community.

Ultimately, the following four features of OOM communities result in a favourable study situation: 1) distinct characteristics of potential relevance to chronic illness, 2) homogeneity of the characteristics across the population, 3) stability of the characteristics over time due to slow rates of change, and 4) cultural isolation allowing the population to be identified and separately studied. These features offer a study environment with better control over confounding, which has long been recognized as one of the central problems with epidemiological research (Rutter, 2009). Confounding is even more problematic when studying contemporary disease (chronic illness), because causal factors change over long latency periods making it more difficult to control for them (Meade and Earickson, 2000), and the effects of causal factors are small and interconnected, further complicating study designs (Maziak, 2009).

OOM communities can be likened to a natural experiment, with their distinct cultural/lifestyle features being the characteristics experienced by the entire population in contrast to mainstream populations. OOMs only approximate natural experimental conditions of course, as there is still some degree of freedom and individual choice regarding many cultural practices. However, natural experiments in general vary in terms of exposure to the risk factors of interest, with few (if any) representing an ideal scenario or offering control levels equivalent to those achieved in laboratory experimental settings. Rutter (2007) cites a number of examples of natural experimental studies where cultural differences were the focal point, such as the Dutch famine in World War II and its impact on psychopathological outcomes in offspring, the removal of the MMR vaccine in Japan with no impact on the rising trajectory in autistic disorders (thus disproving the suspected link), and the opening of a casino on an Indian

reservation and its impact on poverty alleviation. Natural experiments typically represent very special situations where entire populations experience a hazard or beneficial factor in comparison to other populations, and are recognized as offering better confounder control and causal inference than typically available in traditional epidemiological designs (Davey Smith, 2011; Rutter, 2009; Rutter, 2007).

One of the key features of natural experimental populations is isolation, which allows the population experiencing the beneficial or hazardous factor to be identified and studied separately from comparison populations (that differ in their exposure to the factor). In addition to better confounder control, population isolate studies are seen as attractive because isolates often possess distinct lifestyle practices (or environmental or genetic features), exposing health risk factors less easily identified in large general populations (Rudan, 2006). Examples of population isolate research that has improved our understanding of health risks/benefits include studies linking the dietary habits of the Japanese with gastric cancer, diet and a strong sense of community in the Sardinia population with longevity, sun exposure in UK migrants living in Australia to melanoma, and circumcision in the Jewish with decreased risk of cervical cancer (Rudan, 2006).

In summary, OOMs are a study population that differ from the general population on a number of social risk factors that may be relevant to contemporary disease patterns. They are a cultural isolate that can be likened to a natural experiment, with their distinct lifestyle characteristics being the risk factors experienced by all members of the community in contrast to the general population. For this research study, the specific OOM population selected was the OOM community in Waterloo, Ontario, Canada.

1.3 The Research Question(s)

The study was intended to address the following two research questions:

1. Does the general health status differ between Waterloo OOMs and non-OOM farmers?
2. Do non-genetic risk factors explain the similarities and differences in general health status between the two populations?

General health status was measured using the physical and mental health scores from the short-form health survey (SF-12), specifically: the Mental Component Summary (MCS) and Physical Component Summary (PCS) scores. The study focused on environmental (non-genetic) risk factors because of their suspected (primary) role in the aetiology of contemporary diseases (see Section 1.2). Health determinants is another term for risk factors, and the Public Health Agency of Canada (PHAC) currently recognizes 12 such determinants: (1) income and social status, (2) social support networks, (3) education and literacy, (4) employment and working conditions, (5) social environments, (6) physical environments, (7) personal health practices and coping skills, (8) healthy child development, (9) biology and genetic endowment, (10) health services, (11) gender and (12) culture (PHAC, 2011). PHAC`s list of health determinants (except for genetic endowment) were included in the study. They are consistent with the multilevel paradigm used in contemporary health epidemiology, in that some are characteristics of individuals (e.g., education, income, personal health practices) and others of the broader communities within which they live (e.g., social and physical environments, culture).

PHAC`s list is simply that - a list offering guidance on the range of risk factors (determinants) that should be taken into account in exploring disease causation. It reflects a general population health perspective that is consistent with the level of information conveyed in most multilevel models (e.g., WHO, 2007; Gibbons et al., 2006; Kreiger, 2001; Susser and Susser, 1996b), which tend to exclude the "many-to-many" relations between the factors and how they combine to shape specific health outcomes. This is not intended as a criticism of the models, but rather to highlight their complexity and the limits of our current state of knowledge. As Krieger (2001: 672) notes: most multilevel models are still emerging and represent the "bare beginnings of a mental map". The most helpful perspective is likely to be one that acknowledges temporal (life-course) factors and hierarchical (societal, individual) factors. Practical study limitations often preclude comprehensive exploration of these factors and full integration of biological and social risks, but attempts can be made to capture aspects of these in many studies. For example, this study involves one social science researcher working within a limited timeframe, thus necessitating a cross-sectional (rather than longitudinal) approach and precluding the ability to obtain detailed life-course information (e.g., height or socio-economic status at various stages in the life-course). However, data can be obtained on childhood diseases, offspring birth

weight and adult components of stature, which may suggest the presence of life-course risks.

The control group used in this study are non-OOMs living in Waterloo. Comparing OOMs to the general population of Canada or Ontario is difficult because there are many individual and contextual differences that could explain health differences between the two populations, with little hope of choosing among the candidate explanations. Comparing OOMs to another Waterloo population significantly reduces the possible explanations of health differences by eliminating many of the contextual factors shared by both, such as economic conditions, the political climate, and physical environmental conditions such as air and water quality. Therefore, selecting non-OOM farmers as the control group enhances the explanatory power of the study by reducing the number of potential differences between the two populations being compared while at the same time preserving the essential (social or cultural) differences that may influence health. Waterloo OOMs and farmers are similar in that both occupy the same physical space, live in a rural environment, and are farmers. The two groups differ in what might be loosely referred to as "Mennoniteness" – i.e., the cultural and lifestyle characteristics unique to OOMs. While somewhat of an oversimplification, the two groups can be thought of as sharing the same physical space but different social space.

Health status is compared between the two groups, with differences potentially pointing to the importance of the social space occupied by OOMs. Health differences may also be unrelated to social factors, and more linked to biological factors such as age. It is also possible that health status in the two groups is similar, perhaps because their rural or farming status dominates health with the social space being either less important or offset by other risk factors. Support for these and other interpretations is sought in the study's results.

1.4 Existing Health Information for the Study and Control Group

A review of the broader determinants literature as it pertains to the three specific papers contained in the body of the thesis (Chapters 2, 3 and 4) is provided within each paper. Here, the discussion is restricted to what is known about health in the study and control groups.

1.4.1 Study Group

Genetic Studies

The OOMs are a closed community with little to no in-migration, increasing the likelihood of population bottlenecks combined with genetic drift, inbreeding, and thus genetic diseases (Puffenberger, 2003). While more genetic research exists for the Old Order Amish (OOA), comparisons have been made between the OOA and OOM because of their common religious and geographic history (both originating from the 16th century Anabaptist movement). The two groups display a surprisingly unique genetic heritage, with only a few diseases common to both.
Studies of the southeastern Pennsylvania OOMs (the Swiss-German lineage also residing in Ontario) have identified a number of genetic disorders in this group, most notably Maple syrup urine disease (MSUD), Hirschsprung disease (HSCR) and Congenital nephrotic syndrome (Puffenberger, 2003). MSUD is the most studied, and the incidence rate is estimated at 1/358 births (Puffenberger, 2003). It is uncertain whether genetic disorder incidence rates in Pennsylvania OOMs are representative of the Ontario OOMs, although the two communities are about the same size (i.e., 5,800 OOMs in Ontario versus 5,000 in Pennsylvania). Puffenberger (2003) cautions against underestimating genetic diversity in OOMs because the Pennsylvania evidence shows only a modest reduction, suggesting genetic disorders are likely to be rare.

Of the known genetic disorders in OOMs, the majority are lethal or invariably cause full disability (Morton et al., 2003). Moreover, they are primarily physical disorders. There is little evidence of an increased frequency of mental disorders in OOMs. For example, Fretz (1989) found a broad-based discouragement of close marriages and no evidence of higher rates of mental illness in Waterloo OOMs compared to the general population. Fretz's (1989) work, while dated and lacking statistical validity, is nonetheless consistent with broader genetic research on OOM mental health.

Non-Genetic Risk Factor Studies

Research on Old Order children's physical fitness levels have been ongoing in the Waterloo area since 2005, with the studies consistently observing higher physical fitness and activity levels in OOA and OOM children compared to their urban counterparts (Esliger et al., 2010; Tremblay et al., 2005; Bassett et al., 2004). The remaining (non-genetic) health information comes mainly from (often dated) studies on Pennsylvania OOAs, and indicates health differences largely in favour of Old Orders in relation to: death rate and life span (Fisher and Newbold, 2012; Hewner, 1998; Miller, 1980), *women's* mental and reproductive health (Miller et. al., 2007), physical fitness and the risk of cardiovascular disease and hypertension (Glick et. al., 1998; Fuchs et. al., 1990), certain types of cancer (Westman et al., 2010; Troyer, 1988; Hamman et. al., 1981) and type 2 diabetes (Hsueh et. al., 2000).

1.4.2 Control Group

Not surprisingly, there are no health studies specific to the (non-OOM) Waterloo farming population. However, there is a broader literature on rural and farming populations in Canada and other developed countries. Smith et al.'s (2008) comprehensive review of this literature concluded that much variation exists in both urban-rural and intra-rural health differentials within and between countries. In Canada, life expectancy decreases as rurality increases, but this is significant only in men (CIHI, 2006). This suggests mortality rates may be higher among rural Canadians, although studies on US, UK and Dutch populations report lower rates in rural residents (van Hoojidonk et al., 2007). Asthma and certain respiratory diseases appear to be lower in rural Canada, yet certain cancers, cardiovascular disease, obesity and motor vehicle accidents are higher (CIHI, 2006). This variability is common to most developed countries, with some health conditions being more prevalent in rural areas and others in urban locations (Smith et al, 2008). Farming locations and areas with high exposure to pesticides may be particularly at risk for cancer (Clapp et al., 2006). Regarding mental health, Wang (2004) and Romans, Cohen and Forte (2011) found lower rates of depression among rural residents, with the former attributing this to restricted service access and the latter to a stronger sense of community. Kelly et al. (2011), in a recent study focused solely on rural populations, found sense of community to be important in shaping mental health.

1.5 The Study Design

1.5.1 Overall Design: Mixed Methods (Nested qual-QUAN)

Because information on health status and health determinants for members of the study and control groups was not available from public sources, a survey was designed to obtain primary data on the two populations. The main emphasis in the research was on the survey and the analysis of the data obtained from it, and as such, traditional study designs would classify this study as quantitative. However, as discussed in the third research paper (Chapter 4), various qualitative methods and the information acquired using them were critical to the success of this study, from developing the survey instrument, to securing participation from members of the study and control group, through to interpretation of the results. Therefore, perhaps this study should be classified as mixed methods, specifically "nested qual-QUAN" using the mixed methods typology described by Collins et al. (2007). In this typology, capital letters denote high priority or weight, the order of the terms matches their sequence in conducting the research, and "nested" refers to the sampling design. For this study, "qual" refers to the qualitative methods and these mainly preceded the survey component (QUAN), with the people involved in the qualitative research being a subset (nested) of the larger survey sample.

1.5.2 Survey Instrument

A copy of the survey instrument is provided in Appendix 1. The survey contains questions pertaining to:

- general health status;
- prevalence of chronic conditions, including the main four identified by WHO (2005) and selected others (allergies, asthma, farmer's lung, bronchitis, emphysema, arthritis, high blood pressure, bowel and colon disorders, depression);
- non-genetic health determinants; and
- determinants such as age, gender, education, childhood disease history, social support, social capital (trust, reciprocity, participation), and spirituality.

The majority of survey questions were taken from existing surveys (e.g., Canadian Community Health Survey, World Values Survey) and academic

literature addressing similar determinants research and/or populations (e.g., the recent women's health survey of Pennsylvania OOAs by Miller et al., 2008). The surveys for the study and control groups contain identical questions, except for questions pertaining to cultural attributes associated with one group and not the other. For example, only OOMs were asked about the use of horse and buggy for transportation, horses and ploughs in farming, and the name of the meeting house they belonged to.

It was uncertain whether OOMs were regular users of the traditional health care system (because they lack public health insurance), and if they were not then they would likely be unaware of having a health condition. This turned out to not be a concern, as the vast majority of participants in both groups reported having access to a family doctor and routinely accessing the traditional health care system. Our survey results were also consistent with the literature, which indicates that faith healing is not common among OOMs, with the community instead preferring to consult traditional doctors, use pills and medicines, and enter hospitals as necessary (Good and Good, 1995).

It is important to note that the first page of the survey (both groups) represents the short-form health survey (SF-12). This was included to provide an alternate measure of health status, in the event that survey information on health conditions was unreliable. The SF-12 is a shorter alternative to the long-form SF-36, and it was developed for use in large-scale surveys like the one used in this study. The SF-12 is one of the most widely used instruments for measuring general health status in both general populations and disease groups, and has a high test/re-test validity (Kontodimopoulos et al., 2007). It has been shown to be reliable in measuring health in the U.S., Australian, Israeli, Greek and Iranian populations, and many clinical groups (Fleishman et al., 2010; Gandek et al. 1998). It measures eight domains of functioning which can be further summarized into two continuous measures - a physical component summary (PCS) and mental component summary (MCS) score. The PCS and MCS scores are created using a scoring algorithm empirically derived from a US general population survey (Kontodimopoulos et al., 2007), with Hopman et al. (2002, 2000) confirming the validity of this algorithm in scoring Canadian applications of SF-36 (and thus SF-12).

1.5.3 Minimum Sample Size

The sample within each group was restricted to the adult population, defined as those 18 years of age and older. The minimum sample size was calculated based on the size of the OOM adult population (about 2,000), which was determined from a review of the birth dates of Waterloo OOMs listed in the Ontario OOM Directory (January, 2008). An estimate of the required sample size can be generated based on specification of the following parameters: total population size (2,000), confidence interval, type I error rate and response distribution. Response distribution refers to the extent to which responses to survey questions are expected to be similar; the minimum value of this parameter is 0% indicating a high degree of anticipated *homogeneity* in survey responses, and the maximum value is 50% indicating a high degree of anticipated *heterogeneity*. It is expected that the OOM population would exhibit considerable homogeneity in their responses, given the (anticipated) high levels of social cohesion and conformity with respect to cultural norms. Assuming a total population of 2,000, a 95% confidence interval, a 5% type I error rate and 50% response homogeneity (the most conservative value), the estimated sample size would be 323 (Raosoft Sample Size Calculator, 2012). A sample size of 323 applies to both the study and control group, and is relevant for the survey and analysis of the survey data.

1.5.4 Survey Package and Administration

The survey package given to all adults in the study and control groups consisted of the survey (Appendix 1), a letter of support from the Senior Bishop of the OOM community (Appendix 2) and a cover letter printed on university letterhead (Appendix 3). The package also included a self-addressed, postage-paid envelope for participants to use in mailing the completed survey back to us, which was numbered to enable the allocation of completed surveys to either the study or control group (because surveys were anonymously completed by participants).

The OOM surveys were distributed using the church system, as a result of an unsolicited offer from the Senior Bishop. The Senior Bishop distributed the survey packages to the deacons at the Spring Laity Conference in April, 2010. The deacons distributed the surveys to all 2,000 adults in each of the 13 meeting houses following various church services in the spring of 2010, with most OOMs receiving the survey package just prior to spring planting season. This assistance was offered by the Senior Bishop, which was accepted because it was seen as critical in boosting the credibility of the study and securing participation from the broader OOM population. There was also a concern that a mailed survey would

have a very low response rate, and the alternative of "knocking on doors" might be unwelcomed, unsuccessful and very time consuming given the large distances between farms in rural Waterloo. Twelve hundred (1,200) completed surveys were received, of which 1,171 were usable. This was well above the 323 minimum required and represented a 60% response rate, based on estimates of the size of the OOM population using the OOM Directory (January, 2008).

The survey package was mailed to non-OOM farmers. A list of these farmers was compiled using the municipal tax rolls available at the Wilmot, Wellesley and Woolwich Township offices. Farmers were identified by their "farm" tax status. Members of known Mennonite and Amish groups in the Waterloo Region were eliminated from the list of farmers to avoid contamination of the control group. Members of these groups were identified using publicly-available directories that list the names and contact information for their members. Since not all groups publish a directory, not all Mennonites and Amish people in the control group were able to be identified (and removed). For this reason, a question on religious affiliation was included in the non-OOM survey, which allowed us to identify the Mennonites and Amish that completed the survey and exclude them from the control group. A second mailing was required because our first mailing resulted in fewer than 323 surveys (the minimum sample size), after elimination of many (197) surveys completed by Mennonites or Amish people. The second mailing was to farmers in Drayton Township (directly north of Waterloo Region), because the first mailing had included all farmers in the Waterloo Region. These efforts resulted in 344 completed surveys for the control group, which may represent an estimated 40% response rate. The response rate can only be very roughly estimated, because the exact number of adult Mennonites and Amish is unknown.

1.5.5 Analysis

The two groups are compared with respect to health outcomes and the factors (determinants) shaping them. The primary health outcome measures for each group used in this thesis were the MCS (mental health component score from SF-12) and PCS (physical health component score from SF-12). Small numbers and the availability of more sensitive health measures (MCS and PCS scores) resulted in not using the survey data on the prevalence of chronic conditions in the thesis analyses. Age and gender patterns for each measure are also examined within and between the two populations. Comparisons are also made with the broader SF-12

literature, as certain patterns are frequently observed in general populations, such as men`s PCS scores being higher than women`s, PCS scores declining with age and MCS scores peaking before the oldest age cohorts. T-tests are used to judge *statistical significance* between MCS or PCS score differences. In addition to statistical significance, score differences are also examined with one being the cut-off point for *interpretation* recommended by the SF-12 developers, with differences in excess of one being viewed as potentially "clinically, economically and socially relevant" (Taft, 2001: 418).

The distribution of the determinants is also compared for the two groups. Chi-square tests were used to judge statistical significance for most determinants because they were categorical. T-tests were used for continuous variables, such as age, and body mass index (BMI).

Multiple regression was used to explore how the determinants shaped MCS and PCS outcomes. Because the MCS and PCS measures are continuous variables, regular OLS regression was used with these measures chosen as the dependent variable and the various determinant measures representing the independent variables. The same set of independent variables was included in the regressions for both groups (rather than step-wise selection of the optimal model), in order to judge the significance of the variables in the presence of the same set of co-measures.

1.5.6 Chapter Structure

Following the current, introductory chapter, the next three chapters present the statistical analyses and results. Chapters 2 and 3 present the results for the MCS and PCS analyses. Chapter 4 presents reflections on the fieldwork experience in working with the two populations, and is intended to address the demand for more literature discussing what actually happens in the field, including practical strategies for succeeding in working with cross-cultural populations (DeLyser and Karolczyk, 2010). Chapter 5 presents the conclusions, drawing on the key results from each of the three papers (Chapters 2, 3 and 4), and mapping the direction of future research that builds on the results of this study.

CHAPTER 2

MENTAL HEALTH IN A CANADIAN OLD ORDER MENNONITE COMMUNITY

Status

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Introduction

This first paper explores the mental health status and the determinants of mental health in the Waterloo Old Order Mennonites (the study group). The control group is the Waterloo non-Anabaptist (not Mennonite, not Amish) farming population. Comparing these two Waterloo groups reduces the likely impact of the many contextual factors common to both groups, such as air/water quality and local economic conditions. Mental health status is the first of the two measures used in this study to evaluate general health status (physical health is the second, Chapter 3). The mental component summary (MCS) score of the short form health survey (SF-12) is used to measure mental health status. The SF-12 is the first 12 questions of the larger health survey distributed to the study and control groups (Appendix 1). Supplemental analyses confirm the reliability and the validity of the SF-12 instrument in the study and control groups. These analyses include factor analyses confirming the two-factor conceptual structure, strong correlations of mental health items with the MCS scores, and known-group tests showing expected patterns between MCS scores and other socio-demographic and health-related variables. The results of these supplemental analyses suggest that the MCS score is a valid indicator of mental health in both populations.

The results of the mental health component of the study show that mental health is better in the Old Order Mennonites, particularly amongst the women. Mental health in both groups is shaped by coping, stress and social interaction, suggesting that these determinants may be important across many populations with varying life circumstances. Mental health in the Old Order Mennonites is also shaped by some of the social factors that are known (and confirmed in this study's survey) to be strong within their community (sense-of-place, trust, spirituality).

Overall, the mental health results help to confirm the presence (or absence) of psychosocial effects as an underlying mechanism for determinants shaping physical health (Chapter 4). They also suggest determinants to target in policy action on mental health, and areas where further research would be beneficial. In particular, research on the sense-of-place/health relation is warranted, focusing on mental health and some of the unique features of the Mennonite community that may foster sense-of-place. Gender role, religion, patriarchy, isolation and other features of the Mennonite lifestyle also warrant further study, to better understand how (if) these relate to the strong mental health in Mennonite women.

Abstract

This paper presents the results of a 2010 survey exploring the determinants of rural mental health in two farming groups in Waterloo, Ontario, Canada: Old Order Mennonites (OOMs) and non-OOM farmers. Comparing these two groups reduces the likely impact of many contextual features impacting both groups, such as local economic conditions. We explore a comprehensive list of health determinants. The mental component summary (MCS) of the SF-12 survey was used to measure mental health status. We compare mental health in the two populations and use multiple regression to determine the relative importance of the determinants in explaining mental health. The results show that OOMs experience better mental health than non-OOMs, in part due to the strong mental health of OOM women. Coping, stress and social interaction shape mental health in both groups, suggesting that these determinants may be important across many populations with different life circumstances. Other determinants are important for one group but not the other. For example, different social capital measures shape mental health in the two groups, and sense-of-place is associated with mental health in only one group (OOMs). The results are discussed in terms of their implications for future health determinants research and policy action to address rural mental health in the general population.

Introduction

Considerable research has been undertaken exploring the influence of the social and physical environments on health. These characteristics, or health determinants, have been prominent in Canadian policy discourse since the 1970`s. The Public Health Agency of Canada (PHAC) currently recognizes 12 such determinants: *1) Income and Social Status, 2) Social Support Networks, 3) Education and Literacy, 4) Employment/Working Conditions, 5) Social Environments, 6) Physical Environments, 7) Personal Health Practices and Coping Skills, 8) Healthy Child Development, 9) Biology and Genetic Endowment, 10) Health Services, 11) Gender, and 12) Culture* (PHAC 2011). Little attention has been paid to rural as opposed to urban populations.

There are strong parallels with Canada's list of heath determinants across developed nations. The WHO's Commission on Social Determinants of Health

(CSDH) recognizes a similar list, contextualized within a conceptual framework indicating concomitant interactions within and across determinants (Fig. 1). As such, intermediary determinants directly influence health, but are in turn shaped by broader structural factors representing socio-economic and political contexts. Three main social theories underlie the CSDH framework – psychosocial, social production of disease and ecosocial/multilevel approaches (WHO 2007). They are not mutually exclusive, and for most determinants offer a complementary explanation of health relations. For example, in the income-health relation psychosocial theorists emphasize how income influences individuals' perceptions of social status leading to stress and poor health, social production of disease theorists see poor health as primarily resulting from the lack of material resources of individuals/communities, and ecosocial/multilevel theorists attribute poor health to the biological expression of social conditions accumulating over the life-course (Krieger 2001).

Although the theories are complementary, they differ in related policy recommendations (WHO 2007), which is important given the action lens present in health determinants discussions. Their complementary nature means it is difficult to prioritize any one theory, and thus course of action. Prioritizing the determinants is also difficult, since most studies examine only specific determinants or subsets, thus their relative importance is not known (Peterson et al. 2009; Wilson et al. 2009). We address this gap by examining how all of Canada's determinants (hereinafter SDOH) shape mental health, so that policy actions can tackle the SDOH shown to have the greatest impact. While the SDOH are often applied to physical health, they pertain equally to mental health with research citing linkages to socio-economic factors, social environments, work conditions and physical functioning.

Our study population is the Old Order Mennonites (OOMs) of Waterloo, Ontario, Canada. The OOM lifestyle, which has remained relatively stable and culturally isolated for generations, features little/no alcohol consumption, no smoking, a high level of religiosity (Christian), strong family and community support, a patriarchal structure, a traditional farming culture, and minimal reliance on technology (Loewen Reimer 2008). Studies of isolated populations like OOMs are attractive because they often possess distinct lifestyle practices (or environmental or genetic features), exposing health risks (determinants) less easily identified in large general populations (Maziak 2009; Rudan 2006). We study the same SDOH

relevant to many populations across the globe, using well-established measures, but focus on the OOMs because their homogeneous, distinct and isolated lifestyle may more clearly expose the influential determinants.

We compare OOMs to non-OOM farmers living in Waterloo, hypothesizing better mental health in OOMs. Comparison of these two groups eliminates from the explanation of mental health differences many structural (contextual) determinants common to both, thus allowing us to focus on social/cultural differences We also compare two rural populations, whereas most rural health studies compare urban and rural populations. Our approach may yield unique insights into the mental health determinants of rural communities, which are currently poorly understood (Kelly et al., 2011).

Background: Linking SDOH with Mental Health, OOMs and Rural Populations

Poor mental health has been associated with a number of individual-level characteristics, including low socio-economic status (Fryers, Melzer and Jenkins 2003; Hong, Knapp and McGuire 2011; Zhang et al 2011;), low levels of job control (Marmot, Siegrist and Theorelle 2008); being female (Madden 2010; Oksuzyan et al. 2010, Ussher 2010), being overweight (Kivimaki et al. 2011), inferior coping skills and weaker social support (Turner and Lloyd 1999), and higher stress levels (Thoits 2010). There is no consistent evidence that contextual (area/population-level) characteristics significantly influence mental health once individual-level factors are accounted for. For example, area-level socio-economic deprivation independent of individual factors has been linked to anxiety, depression and psychiatric hospital admissions (Fone et al. 2007; Galea, Ahern and Nandi 2007; Sundquist and Ahlen 2006). But, other studies find that individual-level attributes represent the chief mental health determinants (e.g., Butterworth, Rogers and Jorm 2006; Gale et al. 2011; Kelly et al. 2011; Peterson et al., 2009; Propper et al. 2005). Recent evidence also links mental health to individuals' *perceptions* about where they live, including sense of community belonging/cohesion and neighbourhood likes/dislikes (Gale et al. 2011; Kelly et al. 2011; Wilson et al. 2009; Young, Russell and Powers 2004).

Many studies have examined the religion-health linkage, which is particularly relevant to our study population. Regarding the SDOH, religiosity is closely

aligned with the cultural determinant, although it overlaps with many others (e.g., social support, coping). Most studies focus on Jewish and Christian faiths (Kier and Davenport 2004), with mixed results regarding the mental health influence (Koenig, McCullough and Larson 2001; Salsman et al. 2005;). Literature reviews cite various limitations including difficulties in measuring religiosity, small "convenience" samples, treating correlation as causation and inappropriate control groups (Hwang, Hammer and Cragun 2011). Spirituality, as opposed to religiosity, is also increasingly recognized as important in health research (King and Koenig 2009). Evidence suggests that spirituality is more difficult to measure because it is comparatively abstract, internal and less associated with non-sacred elements such as social support (Schlehofer, Omoto and Adelman 2008). This means research examining spirituality should employ measures other than church attendance and explore whether highly spiritual people (who may infrequently attend church) experience health benefits. A recent study examining the spirituality-health link found a positive association between psychological distress and feeling that spiritual values play an important role in life (Caron and Liu 2011).

The OOMs are a closed community with little to no in-migration, increasing the likelihood of population bottlenecks combined with genetic drift, inbreeding, and thus genetic diseases (Puffenberger 2003). Genetic studies of the OOM Waterloo lineage have identified a number of physical health disorders. These are relatively rare due to surprisingly high genetic diversity (Puffenberger 2003). Furthermore, Fretz (1989) found a broad-based discouragement of close marriages and no evidence of higher rates of mental illness in Waterloo OOMs compared to the general population. Fretz's (1989) work, while dated and lacking statistical validity, is nonetheless consistent with broader genetic research on OOM mental health.

Studies examining the health-lifestyle linkage have found that Waterloo OOM and OOA (Old Order Amish) children demonstrate higher physical fitness levels compared to non-OOM/OOA urban and rural children (Bassett et al. 2007; Esliger et al. 2010; Tremblay et al. 2005). Most other (non-genetic) health information comes from U.S. studies of the OOA and indicate differences largely in favour of Old Orders for: death rate and life span (Hewner, 1998), women's mental and reproductive health (Miller et al. 2007), risk of cardiovascular disease (Glick et al.

1998), certain cancers (Hamman, Barancik and Lilienfeld 1981; Troyer 1988; Westman et al. 2010;) and Type 2 diabetes (Hsueu et al. 2001).

Finally, we review rural health studies within developed countries for insights on rural mental health. Most compare urban and rural populations, and reviews generally conclude that there is little evidence linking mental health differences with "rurality", instead seeing it as a proxy for geographically dispersed determinants including job hazards, personal behaviour and socio-economic factors (CIHI 2006; Smith, Humphreys and Wilson 2008). Peterson et al. (2009) found no difference in urban-rural mental health using the SF-12 instrument employed in our study. Wang (2004) and Romans, Cohen and Forte (2011) found lower rates of depression among rural residents, with the former attributing this to restricted service access and the latter to a stronger sense of community. Kelly et al. (2011), in a recent study focused solely on rural populations, found sense of community to be important in shaping mental health. Other studies have found more favourable health in rural populations, but most address physical health (van Hoojidonk et al. 2007). Yet there has been little investigation of differences within a rural area.

Caution is required in extending rural research results to our two populations. OOMs and non-OOMs live in the same region but occupy different social environments. OOMs deliberately separate themselves from the larger society, yet within their community they are highly supportive, cohesive, trusting and spiritual (Fretz, 1989). These are features thought to contribute to better mental health, and we examine if this is in fact the case in OOMs.

Methods

Research Setting, Design

We compare adult OOMs and non-OOM farmers living in the Wellesley, Woolwich and Wilmot Townships of Waterloo Region, located in south-central Ontario (Fig. 2). Waterloo Region ranks second in Ontario in agricultural production (Foodlink Waterloo Region 2011). The two populations share the same locale and employment type, so these factors are unlikely to generate significant mental health differences.

A cross-sectional survey captured data for our study on health status and the SDOH. Early in the study design the challenges of accessing the closed OOM community had to be addressed. Consequently, the paper's first author spent 1½ years regularly visiting the area, conducting participant observation, and meeting with OOMs or people knowledgeable about them. This started to build trust within the community and acceptance of the project's utility.

Distribution of OOM surveys using the church system and the small number of non-OOM farmers resulted in sending surveys to *all* members of both groups. The senior OOM Bishop prepared an accompanying support letter and arranged for survey distribution following church services. Anonymity was assured by providing OOMs with a self-addressed, postage-paid envelope for use in mailing back the completed survey. We received 1,200 OOM surveys (60% response rate), of which 1,171 were usable. The OOMs sample was reduced to 850 in the following analyses, by restricting participants to those at least equal to the minimum age of the non-OOMs (age 28). This was done in an effort to age standardize the two groups.

Municipal tax rolls were used to identify non-OOM farmers. Directories of the various Mennonite and Amish groups were used to eliminate members of these groups from the tax roll farmers to avoid control group contamination. We received 344 completed surveys from non-OOM farmers. We estimate that about 800 households received the mailed survey and were not Mennonite or Amish, resulting in a response rate of 43%.

The survey distributed to both groups consisted of identical questions. It was piloted with a small number of OOM church leaders and community members, with feedback being incorporated into the final version. Study approval was received from the authors` Ethics Review Board in February, 2010.

Mental Health Measure

We selected the mental component summary (MCS) score of the SF-12 health survey to measure mental health status because of its brevity, well-established psychometric properties (Ware, Kosinski and Keller 1996) and demonstrated validity (Gill et al. 2007). Generic measures like MCS are preferred to disease-specific measures, especially in exploring mental health in general populations

(Peterson et al. 2009). The SF-12 consists of 12 questions measuring five mental health functional domains: general health perceptions (GH), energy and vitality (VT), social functioning (SF), role limitations due to emotional problems (RE) and mental health (MH) (Ware et al. 1996). An algorithm scores the functional domains, standardizing them to a mean of 50 and standard deviation of 10. Higher MCS scores indicate better mental health status.

The SF-12 has been shown to be reliable in measuring health in the U.S., Australian, Israeli, Greek and Iranian populations, and many clinical groups (Fleishman, Selim and Kazis 2010; Gandek et al. 1998a). Reliability and validity tests have been designed for the SF-36 (Gandek et al. 1998b) and adapted to the SF-12 (e.g., Kontodimopoulos et al. 2007; Okonkwo et al. 2010). We conducted the SF-12 tests on both groups, with principal components analysis confirming the two-factor conceptual structure, Cronbach α coefficients of 0.74 (OOMs) and 0.80 (non-OOMs) exceeding the minimum of 0.70 recommended for internal consistency, and known group tests confirming expected relationships between demographic and health-related variables (Author 2011).

SDOH Measures

There are practical restrictions on how we can portray each determinant. Multiple measures were included in the survey for many SDOH because of their multidimensional nature and to provide alternative measures if significant non-responses were encountered. All SDOH were defined at the individual level. A variety of sources were consulted to guide the selection of measures, choice of wording, and response options (Table 1).

Many survey questions directly correspond to SDOH measures (e.g., income adequacy, gender, age). A score was created for some measures by combining responses from one or more survey questions, with responses re-coded (as required) so higher scores represent higher levels of the underlying construct. We illustrate this method using the trust question, which asked about trust in 5 types of people (family, neighbours/community, people you know, people you meet for first time, strangers). Respondents classified their trust level for each type of person as: 1= trust completely, 2=trust somewhat, 3=do not trust very much, or 4=do not trust at all. Responses were re-coded so higher scores represent higher trust levels (4=trust completely, 3=trust somewhat, 2=do not trust very much and

1=do not trust at all). A trust score for each respondent was created by adding up the re-coded responses for the 5 types of people. This method generates a maximum score of 20 (highest trust level selected for all 5 people), and minimum of 5 (lowest for all 5 people). A similar methodology was used to score participation, reciprocity, perceived social support, the social network index (SNI), and the sense-of-place measures. The DSES6 scoring method was similar but no re-coding was employed, to ensure comparability with the broader literature where higher DSES6 scores represent *lower* spirituality levels (Underwood 2011).

Statistical Analyses

SAS Version 9.2 was used for all statistical analyses. SF-12 MCS scores were calculated using the original (orthogonal) scoring algorithm developed by Ware et al. (1995), employing norms derived from U.S. population survey data (Gandek et al. 1998a; Ware et al. 1995). Hopman et al. (2002, 2000) confirm the validity of U.S-based norms in scoring Canadian applications of the SF-36 (hence SF-12). We compared the two groups with respect to the MCS and SDOH measures. Multivariate analyses (OLS) were conducted for both groups, with MCS as the dependent variable and the SDOH measures as independents. We restricted all regressions to working with the same set of SDOH measures to ensure comparability between the two groups (rather than maximizing explanatory power using a stepwise procedure to select the variables forming the optimal model). In this way, we could determine the degree to which SDOH measures were significant in shaping mental health, given the presence of the same co-measures. All respondents in both groups answered at least 10 of the 12 SF-12 questions, and the proportion of missing data for the remaining survey questions was typically low (below 2%). Median values were substituted for missing values.

Results

Distribution of SDOH Measures

Compared to non-OOMs (non-Mennonite, non-Amish), the OOM sample (n=1,171) is *younger* (mean age 43.4 versus 57.7) and has more *females* (58% versus 51%) and *singles* (33% versus 5%). These differences arise because church distribution of the surveys captured many single OOMs, and their population is

younger with more females compared to non-OOMs and Ontario (Statistics Canada 2011b).

Table 2 provides the distribution of the SDOH measures used in the regression analyses. Three SDOH were excluded from the regressions: *Education and Literacy* because educational attainment did not vary in OOMs, *Physical Environment* because of high colinearity with other measures or absence of a significant health relationship, and *Health Service Use* since virtually all respondents (both groups) reported having family doctor access.

Information in Table 2 shows that the two groups differ significantly on most SDOH. For *Income and Social Status*, the groups did not differ on income adequacy, with most participants reporting no trouble meeting basic needs, despite lower incomes and no medical insurance for OOMs. However, while OOMs pay out-of-pocket for health care services, the church provides financial assistance where necessary (Fretz 1989).

For *Social Networks and Social Environments*, the majority in both groups were married and the OOMs had more singles. Responses to the sense-of-place questions suggest that the OOMs assign more importance to the socially-oriented measures – rootedness and community – and less to the physical environment. For social capital, the OOMs report lower levels of participation and higher levels of trust and reciprocity (given and received). OOMs rarely join the formal organizations listed in the participation survey question (e.g., professional associations, unions), yet regularly participate within the OOM community, suggesting that social interaction may better capture OOM participation levels. Higher levels of social interaction in OOMs are apparent in the higher social network index (SNI) and perceived social support scores.

Employment and Working Conditions, measured by the degree of job control, was similar with both groups reporting relatively high levels of control (averaging 8 out of 10). Traditional measures of employment, such as employment type were not used because both groups are (or were, if retired) selected because of their status as farmers. Employment status is another measure often used, but we found very little difference between the two groups, with the majority self-employed and very few unemployed/retired.

For *Personal Health Practices and Coping Skills*, OOMs report more difficulty coping but less stress. This seems counterintuitive, although the stress question may not have captured the full response range or may not have asked about stressors most relevant to OOMs (e.g., strict adherence to religious doctrine, cultural isolation). OOMs report fewer dietary concerns, perhaps reflecting the importance of family mealtime and/or fewer health conditions constraining food choices. Traditional health practice measures, such as smoking and alcohol consumption, were not used because no OOMs reported smoking or consuming alcohol.

For *Healthy Childhood Development*, the OOMs report fewer childhood diseases. BMI (calculated from self-reported height and weight) is also included here because Krieger and Davey Smith (2004) recommend including bodily stature measures in population health studies to capture the potential biological embodiment of social conditions. Our results show that OOMs are shorter ($p<0.001$ overall, each gender), with weight in OOM women being similar to non-OOM women and in men being less than non-OOM men. Therefore, OOM women have higher BMI ($p<0.001$), since they are shorter but weigh the same as non-OOM women. BMI in OOM men is similar to that of non-OOM men, since they are shorter but weigh less than non-OOM men.

Spirituality (DSES6 score) was the measure used for *Culture*, with OOMs reporting significantly higher spirituality levels.

Health Outcomes

Mean MCS scores are higher ($p<0.001$) in OOMs than non-OOMs, indicating better mental health (Table 3). This appears to be largely due to differences in women, with mental health in OOM women being higher and showing less variation compared to non-OOM women. There is no gender difference within OOMs, yet within non-OOMs women have lower MCS scores ($p=0.03$). These MCS score differences are statistically significant and of potential clinical significance since they exceed one – the minimum set for interpretation (Taft, Karlsson and Sullivan 2001; Ware et al. 1995). Potential clinical significance means the difference justifies further investigation as it may result from substantive differences in underlying socio-economic conditions. MCS scores in both groups are also negatively skewed, consistent with other SF-12 general

population studies (Kontodimopoulos et al. 2007). The functional domains used to calculate MCS scores show that group differences are mainly due to OOMs being more social and peaceful and having fewer blue/sad episodes.

Examining MCS scores by age and gender provides further insight into group differences and patterns. Since only 2.6% of non-OOMs (versus 18.6% of OOMs) are ≤ 34 (lowest age group), we cannot reach conclusions about mental health in this group. However, for the other five age groups, four show MCS differences exceeding one, all in favour of OOM women (marked 's' in Fig. 3a). For men, only two of the five groups over age 34 have MCS differences exceeding one, both in favour of OOM men (marked 's' in Fig. 3b). With the exception of non-OOM men, we also see that MCS scores increase with age as in most SF-12 studies (Kontodimopoulos et al. 2007), and peak in the 65-74 age group as seen in some (Hanmer et al. 2006; Ware et al. 1995).

Key SDOH Shaping Mental Health

Adjusted R-square values were 0.27 and 0.24 for the OOM and non-OOM regression models respectively, indicating that substantial variation in mental health in both groups remains unexplained (Table 4). In addition to the intercept, three SDOH measures were significant in the regression models of both groups - social interaction, coping and stress – with directionality consistent with the broader literature, pointing to apparently no significant differences between the groups in one area.

Some SDOH were associated with only one group. Reciprocity (help received) was significant in non-OOMs but not OOMs, with declining mental health linked to an increase in help received. Six SDOH were associated with mental health in OOMs but not non-OOMs, Mental health in OOMs declined with increased childhood illness, and improved with increasing levels of rootedness, trust, job control, age and spirituality.

Age in the OOM model reflects earlier findings where MCS scores increased with age in men and women (Fig. 3a, 3b). The absence of age in the non-OOM model likely reflects offsetting gender differences where women's MCS scores increased with age but men's did not (Fig. 3a, 3b). The absence of gender in the OOM model is consistent with the absence of a gender difference in MCS scores (Table

3). However, gender is not significant in the non-OOMs regression even though a gender difference in MCS scores was seen (Table 3), perhaps because gender effects are captured in other significant SDOH (e.g., stress, reciprocity, coping). Thus demographic differences point to different kinds of mental health in the two populations.

We note that our regression models do not include physical functioning as a predictor, despite the evidence linking poor physical and mental health (e.g., Nieminen et al. 2010). We exclude physical health because it, like mental health, is a dependent not a determinant in the SDOH literature. Moreover, the SF-12 scoring mechanism produces a measure of physical health (PCS) that is uncorrelated with the MCS score, thus the very low correlations seen in our study (Pearson coefficients of 0.03 and 0.02 for OOMs and non-OOMs). This means PCS would be an insignificant determinant in the MCS model, although our survey data provide alternate measures of physical functioning – e.g., number of chronic conditions. When this variable is included in the MCS model, it is significant (both groups, $p=0.01$) without materially changing the significance of the other predictors. The explanatory power of the OOM model does not significantly improve, although the non-OOMs model does (adj. R-square increases to 0.27).

Discussion

The purpose of this study was to determine whether mental health was better in OOMs than other rural populations, and identify the key SDOH shaping their mental health. OOM mental health was found to be better than non-OOMs, as hypothesized. Since both groups live in the same locale, individual and social/cultural characteristics are more likely to cause health differences.

Better mental health in OOMs may relate to gender. OOM women have higher MCS scores than non-OOM women across most age groups. OOMs women also have mental health comparable to OOM men, unlike within the non-OOMs and many other populations where women`s mental health is lower (e.g., Madden 2010; Oksusyan et al. 2010; Ussher 2010). Strong mental health in OOM women is perhaps surprising given the OOM patriarchal structure and links between women's poor mental health and their subordinate position in patriarchal families (WHO 2009). However, our results are consistent with those of a study on the

culturally-similar OOA, where OOA women reported better mental health and less unfair gender treatment, stress and partner violence compared to women in the general population (Miller et al. 2007). Other research links positive mental health with high parity and a secure parental base (Ussher 2010), which are central features in Old Order cultures. Ultimately, while patriarchal Old Order communities place men as the undeniable head of the church and family, this does not mean that men are autocratic or that women have no voice in community or family matters. As Fretz (1989) points out, respective roles are generally accepted uncritically by Waterloo OOMs because they are: biblically based; suited to an agricultural system where the family farm is central; undergirded by a church and school system teaching family members to love and respect others; strengthened by consistent mutual support and close-knit neighbourhoods; and respected and supported by the broader Waterloo community. Social separation from the secular world also helps to maintain the traditional lifestyle, since members are isolated from broader societal pressures contributing to mental illness especially in women, e.g., the mass media, gendered psychiatric assessments, and applause for women balancing families and careers (Dowbiggin 2009). Therefore, elements of the OOM culture, by reinforcing traditional gender roles and limiting exposure to alternative lifestyles, may facilitate women's acceptance of their role and identity and reduce perceptions of gender inequality (and the related stress and psychosocial effects). Such traditional populations continue to flourish in and remain differentiated from other populations in this rural area.

Social interaction, coping and stress shaped mental health in both groups. The priority that OOMs assign to social interaction is evident from their response to the related SF-12 question. However, the appearance of this determinant in both groups highlights its significance beyond OOMs, which is supported by a broader literature linking low levels of social interaction with higher mortality rates and a range of physical and mental disorders (Stansfeld 2008). The significant negative impact of social isolation on health in seven of eight former Soviet countries is a striking, recent reminder of the importance of this determinant (d'Hombres et al. 2011). Coping and stress were highly significant for both groups even though they differ on these, indicating their central role in shaping mental health across many populations. This interpretation is supported by Caron and Liu (2011), who found stress and coping to be among the strongest correlates with psychological distress. Poetz et al. (2007) also found coping and stress to be important to many health outcomes, and coping to be an important mediator between health and income.

We explored this mediation effect in OOMs, where the sample size was sufficient (≥500) for mediation testing. Using the methodology recommended by Frazier, Tix and Barron (2004), we confirmed that all mediation conditions were met, that is: significant relationships existed between the predictor and outcome, predictor and mediator, and mediator and outcome; and the relationship between the predictor and outcome was significantly reduced once the mediator entered the model. Frazier et al. (2004) also provide methods to test the significance of the mediator effect, and applying these we find that coping is a significant mediator ($p=0.05$) that mediates 39% of the total effect of income on mental health. The interaction term (income adequacy x coping) was also significant ($p=0.05$) in the OOMs regression model.

Reciprocity (help received) significantly and negatively shaped mental health in the non-OOMs only. This may reflect the material reality that people with poorer mental health require more help, but then less healthy OOMs should experience this too. More likely, the association reflects the psychosocial effects of receiving help, including stress arising from feelings of indebtedness, being a burden or losing independence (Abbott and Freeth 2008). The absence of reciprocity in the OOM model is unexpected, given their high levels of both forms of reciprocity (Table 2). Our results are similar to those in Ferlander and Makinen`s (2009) study of patriarchal Moscow families, where informal (family-based) social capital was found to be unrelated to (self-reported) health. These authors suggest that this may be because family-based social networks have eroded as Westernization takes hold in Moscow, or because the effects of such networks may be negative due to increased obligations, feelings of inequality and emotional distress. However, there is no evidence of a decline in the mutual support system of the OOMs. Nor do we see a negative association between health and the high levels of help given by OOMs, so there is little evidence that increased obligations or feelings of inequality/distress arise from the OOM social network. Perhaps we do not see a reciprocity-health relation because reciprocity is common place within OOMs (Loewen Reimer 2008), such that the (high reciprocity) norm goes unnoticed and lacks psychological impact compared to deviation from the norm, which may induce feelings of guilt that negatively impact health. The OOM mutual support system is deeply-embedded within the culture, backed by a long history of success in meeting the community's needs, and strongly preferred to all forms of outside support (Horst, 2000; Fretz, 1989). OOMs have been steadfast in

upholding their mutual aid system despite the trend towards "individualism" seen across societies (Fretz, 1989; Giordana and Lindstrom 2010; Putnam 2001).

Sense-of-place (rootedness), social capital (trust), job control, age, spirituality and number of childhood disorders shaped mental health in OOMs only. Most of the predictors of a strong sense-of-place are characteristic of OOMs and non-OOMs alike (e.g., lengthy residence, home ownership, low density housing). Lack of ethnic diversity in the closed OOM community may account for their stronger sense-of-place, since community diversity does not seem to foster place attachment (Lewicka 2011). Generational experiences within Waterloo, which date back to the early 1800`s for the OOMs, may also reinforce individual and group continuity resulting in their stronger sense-of-place (Lewicka 2011). However, a strong sense-of-place does not necessarily produce better health (Carpiano and Hystad 2011). Eyles and Williams (2008) confirm that studies have failed to consistently link sense-of-place and health, although differences in analytical methods, spatial scale and construct definitions have hampered study comparisons. Recent studies by Romans et al. (2011) and Kelly et al. (2011), both involving rural populations, show a positive association between sense of community and mental health. These studies suggest that it may be important to focus on rural populations and/or mental health, although rurality alone has been linked to a strong sense-of-place in many but not all studies (Lewicka 2011; Stain et al. 2008). Little is known about the mechanisms linking sense-of-place with health, reflecting an overall lack of theoretical development in place-based research (Lewicka 2011). However, the psychosocial pathway seems to be a plausible mechanism. Chronic exposure to stressors can lead to elevated blood cortisol levels which have been linked to major chronic conditions such as depression, cardiovascular disease, and diabetes (Marmot and Wilkinson 2008). Strong sense-of-place in OOMs could reflect their low stress levels, which could translate into positive physiological changes affecting health. Also, since sense-of-place in OOMs is more socially than physically oriented, it may reflect high levels of social interaction/support or other elements of social capital, which in turn may be linked to positive health outcomes. Reduced stress and increased social interaction were viewed as the most probable pathways linking trust with health in the recent study by Jen et al. (2010). Finally, rootedness has been specifically recognized as a prerequisite for integrating life experiences into a coherent story, thus facilitating self and group continuity (Hay 1998). Self and

group continuity are important to OOMs, and achievement of these should be reduce anxiety and generate positive health impacts.

The positive association between trust and mental health observed in OOMs has been found in a number of studies on other populations, with recent evidence showing that trust rivals many social capital indicators and traditional health determinants (d'Hombres et al. 2011; Giordano and Lindstrom 2010; Mansyur et al. 2008). Of the two main types of social capital (bonding and bridging), OOM trust would arise from bonding relations given their closed nature and emphasis on family values (Ferlander and Makinen 2009; Lewicka 2011). However, their mutual aid program, care for the elderly/disabled, legendary "barn raisings" etc. have an international reach that provide OOMs with bridging-like benefits normally acquired by members of mainstream populations through participation in volunteer organizations (e.g., information, advice, work opportunities). Other evidence suggests that OOM trust may be more generalized and include bridging relations. For example, the research team received an extremely positive response from the OOMs, including endorsement of the research agenda and unsolicited offers of help that facilitated community engagement and enabled analyses not otherwise possible. Also, OOMs reported higher levels of trust in our survey for both 1) family/friends, and 2) strangers and first time acquaintances (who would be mainly non-OOMs). These results are consistent with studies finding that informal network trust is a prototype for generalized trust (Glanville and Paxton 2007). As for the origin of OOM trust, religious doctrine is perhaps the key. Horst (2000: 145) notes that OOMs "believe in loving others as ourselves, even our enemies. It is our conviction that by living in this manner, we are only doing what is expected of Christians". Such unconditional love would be difficult to sustain without generalized trust. Regarding the mechanisms underlying the trust-health relation, while little research has been done in this area, it has been postulated that social influence and social support are the mechanisms affecting health through behavioural and psychological pathways such as stress reduction and promotion of a strong sense-of-place (Ferlander and Makinen 2009). Giordano and Lindstrom (2010) theorize that the psychological pathway is particularly relevant to trust. The low stress levels, high trust and sense-of-place levels, and health linkages of these in OOMs do not contradict the theory of a psychological pathway linking trust with health.

The positive association between job control and mental health in OOMs is supported by a number of studies finding poorer mental health in those with lower levels of control (Marmot et al. 2008). Although both OOMs and non-OOMs report equally high levels of job control, there are reasons, grounded in materialist and psychosocial theory, regarding its importance in shaping OOM health. OOMs choose to not participate in government programs including social assistance, public health insurance, unemployment insurance, pension and old age security programs. In addition, self-reliance remains a basic virtue taught to all OOMs from childhood, despite the existence of a strong mutual aid system (Fretz 1989). Reluctance among OOMs to utilize broader safety nets may elevate the importance of job control to ensure adequate material resources and economic stability in meeting ongoing family needs. Also, farming is the sacred vocation valued above all others by OOMs (Fretz 1989), thus job control may be seen as the way to preserve their culture and identity. Therefore, the psychosocial pathway represents another potential mechanism through which job control impacts mental health. With more control comes the ability to vary the pace and focus of the work or to support others, all of which have been linked to better mental health in the workplace (Marmot et al. 2008). Moreover, control allows OOMs to focus on farming, which they view as "physically exhausting, yet mentally and spiritually exhilarating" (Fretz 1989: 219).

Improved mental health with age is a common finding in studies employing the SF-12 and GHQ12 (12-item General Household Questionnarie), and the relation often peaks before the oldest age cohorts as seen in our study and others (e.g., Kontodimopoulos et al. 2007; Nieminen et al. 2010). Broader evidence of mental health improving with age also exists in other studies (New York Times 2012). The psychosocial pathway is the likely mechanism linking age with mental health. In OOMs, comfort and reduced stress likely accompany aging, due to their strong family and community support system and the resulting high levels of social interaction maintained throughout life. Moreover, OOMs rarely fully retire, with many retired farmers continuing to work in shops building cabinets and other furniture, repairing machinery and manufacturing stabling (Horst 2000). Horst (2000: 234), a scholar and OOM, refers to the positive work-health relation: "the psychological effect of gainful employment among seniors is positive. Life continues to be meaningful. Greater longevity seems to result."

Linkages of spirituality with better mental health find support in the broader literature (Koenig et al. 2001). Given the central role of religion in OOM life, it is perhaps not surprising that this determinant shapes their mental health. There is some evidence that religion has more significant effects for those more closely tied to it (e.g., clergy, elders and ministers), however, the effects can be positive or negative depending on the individual (Pargament et al. 2001). As for why spirituality improves mental health, the following specific mechanisms, grounded in psychosocial (and psychological and psychobehavioural) theories, have been suggested, though none are validated by a large body of empirical work at this point: 1) behavioural/motivational, such as attitudes towards smoking, drinking and exercise; 2) interpersonal, such as tangible and emotional support; 3) cognitive, in terms of establishing a mental framework for interpreting life experiences; 4) affective, such as soothing emotions that buffer stress and anxiety; and 5) psychophysiological, such as employing hope and optimism to tackle burdens and restore functionality (Levin, 2009). These mechanisms are all plausible within OOMs, since religion is the tie binding all cultural elements together. There is little evidence within OOM society of the potential negative influences of religion on mental health cited by Koenig et al. (2001) – i.e., family neglect due to excessive church time, alienation of outsiders, delay seeking medical attention due to belief in religious ritual.

Finally, our observation of a negative association between childhood illness and mental health in OOMs is consistent with the broader life-course literature (Blane 2008). Childhood illness may continue into adulthood or lead to the early onset of disease, which can negatively impact the ability to work, marry, have children, take care of a family and contribute to society. Given the aforementioned absence of a safety net and emphasis on self-reliance among OOMs, it is perhaps not surprising that this determinant significantly shapes their mental health. Many pathways may be involved in linking this determinant with health, including increased illness throughout the life-course, reduced material resources due to employment restrictions, and the psychosocial effects of stress arising from limited participation in social and economic activities

In discussing the relative importance of the determinants for mental health, we acknowledge several study limitations. First, responses rely on self-report and interpretation, and are cross-sectional only, although these same limitations are consistently found in most large population studies. Second, results may be

limited by the ways in which various determinants were measured. Since we were trying to measure all of the determinants, we were restricted in the number of measures that could be feasibly included in the survey. Third, the non-OOM sample size (344) is below the 500 recommended by the SF-12 developers (for consistency with SF-36 results), with the small sample size also potentially contributing to the lack of significance amongst variables in the non-OOM regression. However, tests conducted for the non-OOMs indicate that the instrument shows acceptable internal consistency, distinguishes between socio-demographic classes of respondents in the expected manner, and exceeds the small convenience samples often used in SF-12 validity studies (Okonkwo et al. 2010). Finally, OLS multiple regressions assume normality, yet a few variables show evidence of non-normality. However, since these variables are negatively skewed, commonly employed data transformations will be ineffective in normalizing them (Sheskin 2007).

Conclusions

Despite the above limitations, this research with its focus on the rural, deeply-rooted, community-oriented, patriarchal OOMs highlights a number of important avenues for future research and policy action on the social determinants

Regarding future research, the sense-of-place relation with health warrants further study. Is sense-of-place more critical to mental health? How does it relate to other determinants, particularly social indicators such as trust, social interaction and social support? Future research requires clear specification and testing of the pathway linking specific measures of sense-of-place and other social measures to one another and to distinct health outcomes. Another important research focus is how mental health is influenced by cultural norms and expectations regarding gender roles and family values, and how societal pressures contribute to women`s mental illness. There are surprisingly few critiques of the underlying tenets of patriarchy and how they may create the conditions leading to poorer health in married women (Ussher 2010). Our results also show the importance of breaking down determinant constructs and distinguishing between them theoretically and empirically. For example, distinguishing between different types of social capital is important, given that our study and others show: 1) a weaker than expected correlation between social capital measures, and 2) the highly influential role of specific measures such as trust. Our distinction between reciprocity received and

given further highlights the importance of breaking down constructs, as doing so may expose directional differences in functional elements.

There are implications of social capital measures such as trust and reciprocity. Studying OOMs highlights the importance of trust, which for them results from deeply embedded cultural values and social support systems that have been in place for generations. However, this does not mean we have to be an OOM to be trusting, even though they are more likely to reciprocate. Top-down and bottom-up programs can be developed to inspire trust, with the work of Giordano and Lindstrom (2010) offering encouragement as it shows that social capital (trust, participation) and health can change in as little as six years. This may increase the appeal of social capital interventions for term-oriented policy makers, overcoming increasing levels of societal mistrust (Dowbiggin 2009) and building on a re-emergence of giving. The positive health benefits of giving and the resulting increase in trust apply to many populations, as emphasized in the conclusion of a recent study on social capital in the U.K. (Giordano and Lindstrom 2010).

Our results also support policy action on determinants such as coping, stress and social interaction, which were found to be significant for both our groups. Support can be found in the broader literature as well, suggesting that these determinants transcend the boundaries of OOMs, farmers, rural residents and Canadians. They likely warrant multiple approaches for policy action - enhancing services to help individuals cope, manage stress and increase interaction; adding community programs that alleviate the broader economic/social conditions that challenge peoples' ability to cope, manage stress or interact; and ensuring that these programs include children and are integrated and sustainable over the life-course

Studying OOMs has highlighted the important role that many social determinants play in shaping mental health. Some determinants, such as trust, spirituality and sense-of-place, reflect the strong communal bond resulting from their common ancestry, generational experience (dating back 250 years), and religious beliefs. Others, such as job control and number of childhood disorders, likely reflect their roots as farmers along with unique lifestyle choices (e.g., refusal of government support). Ultimately, their "sense of community is matched by none" (Fretz 1989:186), and has remained strong despite the independence seen in many rural farming communities and the trend towards "individualism" that few societies have escaped.

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Table 1: SDOH Measures and Sources

SDOH	Measures	Sources
Income and Social Status	Income Adequacy	Miller et al. (2007)
	Gross Household Income	Wilson et al. (2009)
	Medical Insurance	Fretz (1989)
Social Networks and Environ.	Marital Status	Marmot and Wilkinson (2008)
	Number Adults in Home	Wilson et al. (2009)
	Number Years in Waterloo	"
	Sense-of-Place SoP)-Rootedness	Eyles and Williams (2008)
	SoP–Community	"
	SoP–Nat. Environ.	"
	Social Capital SC) -Participation	Bhandari and Yasunobuk (2009)
	SC-Reciprocity	"
	SC-Trust	"
	Perceived Social Support	Miller et al. (2007), Cohen and Wills (1985)
	Social Network Index SNI)	Berkman (1977) , Adapted
Education and Literacy	Education Attained	Marmot and Wilkinson (2008)
Employment and Work Cond.	Job Control Level	"
Physical Environ.	Apply Pesticides/Chemicals	Miller et al. (2007)
	Drinking Water Source	"
Pers. Health and Coping Skills	Coping	Wilson et al. (2009)
	Stress	Miller et al. (2007)
	Hours of Sleep	CCHS Stats Canada (2011a)
	Self Image Weight)	Miller et al. (2007)
	Smoking	CCHS Stats Canada (2011a)
	Alcohol	"
	Diet	", Adapted
Healthy Childhood, Biomarkers	Number Childhood Diseases	Smith (2009)
	Height inches)	Krieger (2000)
	Weight pounds)	"
	BMI	"
Biology and Genetic Endowment	Age	Wilson et al. (2009)
Health Service Use	Traditional Services	"
	Family Doctor Access	CCHS Stats Canada (2011a)
	Alternative Services	"
Gender	Type	Marmot and Wilkinson (2008)
Culture	Spirituality – DSES6	Underwood (2011)
	Religiosity – Church Attendance	Koenig, McCullough and Larson (2001)
	Discrimination	Krieger (1999)

Table 2: Distribution of SDOH Measures
(p-values for χ^2 or t test, all t-tests are 2-tailed)

SDOH Measure	**Classification (# of Categories)[a]**	**OOMs n=850)**	**non-OOMs n=344)**	**p-value**
Income Adequacy	No Trouble Meeting Basic Needs (2)	80.8%	82.3%	=0.56
Marital Status	Married (Single) (3)	77.7 (18.0)%	87.8 (4.9)%	<0.001
SoP-Rootedness	Very Rooted in Community (3)	62.6%	35.5%	<0.001
SoP –Community	Strongly Agree-Community Important (3)	55.9%	22.1%	<0.001
SoP-Nat. Env.	Strongly Agree-Nat. Env. Important (3)	56.7%	64.5%	=0.01
SC-Participation	High Level Participation, Score 17+ (3)	8.2%	25.6%	<0.001
SC-Reciprocity- Help Rec'd	High Level Help Rec'd., Score 6-8 (3)	17.9%	2.3%	<0.001
SC-Reciprocity- Help Given	High Level Help Given, Score 6-8 (3)	16.7%	8.4%	<0.001
SC-Trust	High Level Trust, Score 17+ (3)	70.9%	31.7%	<0.001
Perceived Social Support	High Level Perceived. SS, Score 6-8 (3)	83.4%	71.2%	<0.001
Social Network Index (SNI)	High Level Social Integration, Score 22-32 (3)	73.8%	33.7%	<0.001
Degree of Job Control	Med-High Level Job Ctrl, Score 5+ (2)	94.7%%	92.1%	=0.09
Coping	Excellent or Very Good Coping Skills (4)	26.8%	67.7%	<0.001
Stress	Low Level Stress, Score <=10 (2)	96.7%	89.2%	<0.001
Diet	Low Level Dietary Concern, <=3 (3)	73.1%	32.6%	<0.001
# Childhood Diseases	Low # of Child. Diseases, 0 or 1 (7)	65.5%	55.2%	=0.02
Adult BMI	Mean (SD) – Overall	27.54 (4.45)	26.63 (4.45)	<0.001
	Mean (SD) – Females	27.96 (4.83)	26.16 (4.90)	<0.001
	Mean (SD) – Males	26.95 (3.76)	27.11 (3.90)	=0.66
Age	Mean (SD) Age	50.50 (15.78)	57.73 (12.93)	<0.001
Gender (Type)	Females Males (2)	58.3 (41.7)%	50.9 (49.1)%	=0.02
Spirituality (DSES6)	High Level Spirituality, Score <=17 (4)	86.0%	43.3%	<0.001

[a] Categories reduced as needed to meet minimum cell count for χ^2 test or avoid exaggerating group differences

Table 3: SF-12 MCS Statistics[a]

Item	OOMs	Non-OOMs	p value (between group)
Mean (SD) - Overall	54.47 (6.53)	52.95 (7.69)	p <0.001
Mean (SD) – Females	54.61 (6.34)	52.19 (8.31)	p <0.001
Mean (SD) – Males	54.28 (6.79)	53.74 (6.94)	p=0.40
p-value (within group)	p=0.463	p=0.031	
Min.-Max.	21.53-69.11	27.02-65.65	
Skewness	-1.42	-1.41	

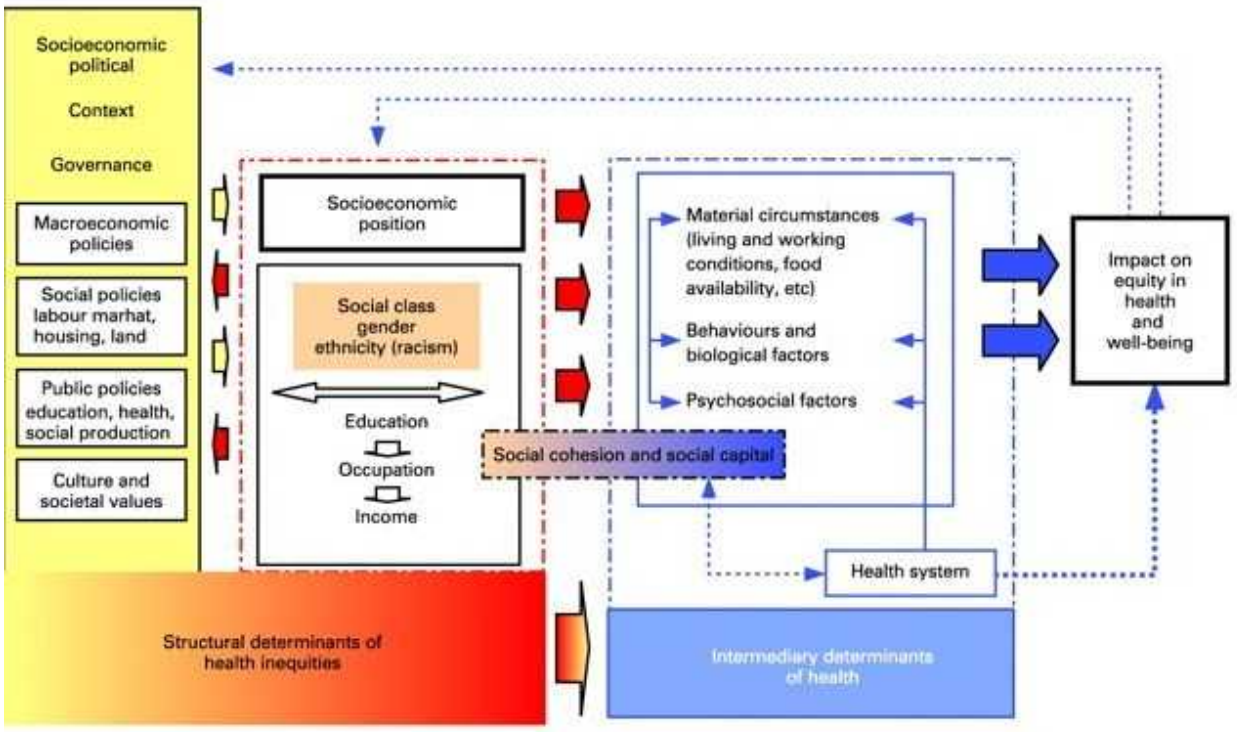
[a] all t-tests are two-tailed

Table 4: Regression Model Coefficients, Dependent Variable MCS
(***p <=0.001, **0.001<p<=0.01, *0.01<p<=0.05, $^{+}$**0**.05<p<=0.10)

SDOH Measure	OOMs >=28 (n=850)	Non-OOMs (n=344)
Intercept	31.30***	31.24**
Income Adequacy	*0.51*	*1.48*
Marital Status	0.03	-0.01
SoP-Rootedness[a]	0.76*	-0.13
SoP-Natural Environ.	-0.23	-0.28
SC-Participation	-0.05	0.18
SC-Reciprocity -Help Rec'd	-0.11	-1.00***
SC-Reciprocity -Help Given	0.09	0.16
SC-Trust	1.01***	0.55
Perceived Social Support	0.06	0.10
Social Interaction SNI)	0.12***	0.11**
Degree of Job Control	0.21*	0.01
Coping	1.99***	3.18***
Stress	-1.42***	-0.94**
Diet	0.01	0.07
Number of Childhood Diseases	-1.07***	-0.50
Adult BMI	0.01	-0.07
Age	0.04**	0.04
Gender	-0.29	1.14
Spirituality DSES6)	-0.09^{+}	-0.07
ADJUSTED R SQUARE	**0.27**	**0.24**

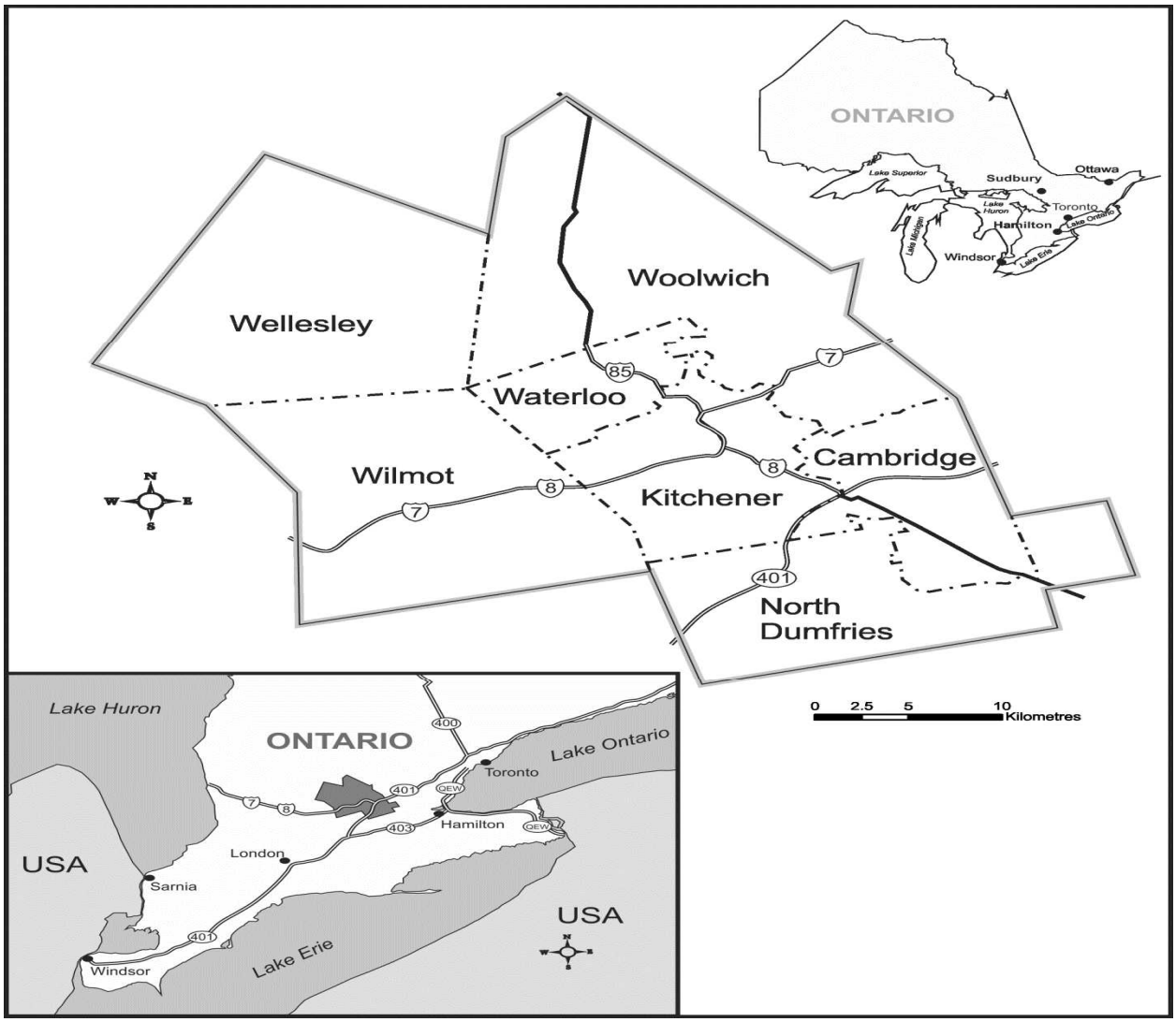
[a] Community dropped due to high colinearity with Rootedness

Fig. 1: WHO Social Determinants of Health Conceptual Framework



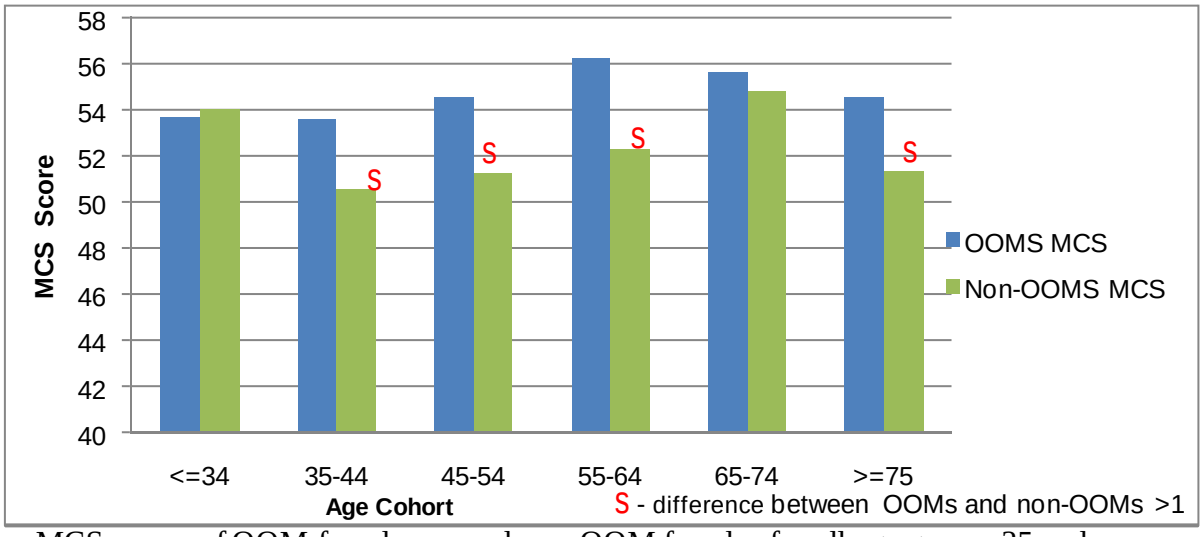
WHO Draft Conceptual Framework on the Social Determinants of Health, Commission on Social Determinants of Health (WHO, 2007).

Fig 2: Study Location



Study area includes the Townships of Woolwich, Wellesley and Wilmot (Waterloo, Ontario,Canada).

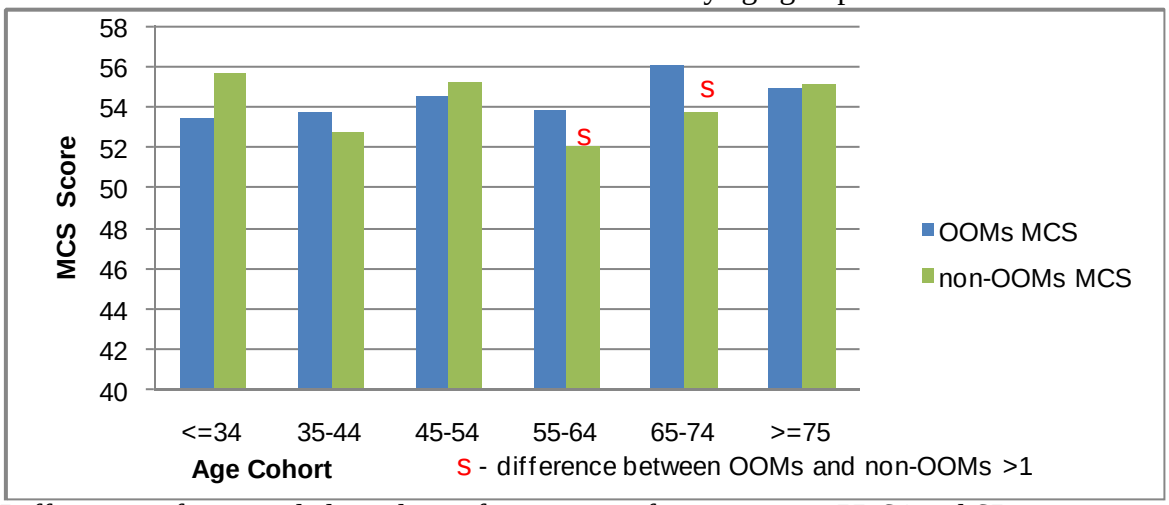
Fig. 3a: Female MCS Scores



MCS scores of OOM females exceed non-OOM females for all age groups 35 and over, and all differences are of potential clinical significance except for the 65-74 and under 35 age groups.

Fig. 3b: Male MCS Scores

Difference in male MCS scores varies by age group.



Differences of potential clinical significance exist for age groups 55-64 and 65-74, in favour of OOM men. Other differences may not be of clinical significance.

CHAPTER 3

PHYSICAL HEALTH IN A CANADIAN OLD ORDER MENNONITE COMMUNITY

Status

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Introduction

This second paper explores the physical health status and the determinants of physical health in the Waterloo Old Order Mennonites (the study group). The control group is the Waterloo non-Anabaptist (not Mennonite, not Amish) farming population. Comparing these two Waterloo groups reduces the likely impact of the many contextual factors common to both groups, such as air/water quality and local economic conditions. Physical health status is the second measure used in this study to evaluate general health status (mental health is the first, Chapter 2). The physical component summary (PCS) score of the short form health survey (SF-12) is used to measure physical health status. The SF-12 is the first 12 questions of the larger health survey distributed to the study and control groups (Appendix 1). Supplemental analyses confirm the reliability and the validity of the SF-12 instrument in the study and control groups. These analyses include factor analyses confirming the two-factor conceptual structure, strong correlations of physical health items with the PCS score, and known-group tests showing expected patterns between PCS scores and other socio-demographic and health-related variables. The results of these supplemental analyses suggest that the PCS score is a valid indicator of physical health in both populations.

The results of the physical health component of the study show that physical health is worse in the Old Order Mennonites. This is true for both genders, but Mennonite women appear to be particularly disadvantaged. Physical health in both groups is shaped by age, coping, body mass index and childhood disease history, suggesting that these determinants may be important across many populations with varying life circumstances. Physical health in the Old Order Mennonites is also shaped by income adequacy. Social capital and other social factors do not appear to shape physical health in either group.

Overall, the physical health results suggest determinants to target in policy action (those common to the study and control groups), and suggest areas where further research would be beneficial. In particular, it would be helpful to understand if the absence of the social factors in both study groups is more generally true, due to unique characteristics of rural or farming populations, or due to differences between the health outcome measure used in this study (PCS) and self-rated health (or other measures used in other studies). Reconciling determinants studies is hampered by differences in health outcomes, measures and models employed.

ABSTRACT

Introduction: This paper explores physical health and its determinants in two rural populations in Waterloo, Canada: Old Order Mennonites (OOMs) and non-OOM farmers. OOMs were selected because their distinct lifestyle might offer health benefits, and cultural homogeneity and isolation might more clearly expose the determinants shaping their health. Comparing the two Waterloo groups reduces the effect of contextual features impacting both, such as local economic conditions. The study considers a comprehensive list of determinants in order to evaluate their relative importance in shaping physical health. This information enables policy action to focus on the determinants having the greatest impact.

Methods: A survey was used to obtain information from both groups on health status and health determinants. The survey was distributed in spring/summer 2010. All members of both groups were invited to anonymously complete the survey. The physical component summary (PCS) score of the SF-12 survey was used to measure physical health. Age-gender breakdowns of PCS scores for both groups were compared, and differences evaluated using statistical significance and the interpretation cut-off recommended by SF-12 developers. Multiple (ordinary least squares) regression was used to identify key determinants shaping health. In the regressions, PCS scores represented the (continuous) dependent variable and SDOH measures were the independent variables.

Results: Non-OOMs were found to experience better physical health than OOMs, with mean PCS scores of 49.24 for non-OOMs versus 47.39 for OOMs. The difference in PCS scores (1.85) was statistically significant (p=.002) and above the interpretation cut-off. While PCS score differences were significant for both genders, differences among the women were larger. OOM men and women may face health risks due to low incomes, offspring out-migrations and health service usage. OOMs women may face additional risks related to reproductive health and gender role. Physical health in both groups is significantly shaped by coping, body mass index, childhood disease history and age. These determinants were more influential than factors like social capital, sense-of-place and spirituality, which is particularly unexpected in OOMs given the strength of the social factors.

Discussion and Conclusions: The determinants shaping physical health in both groups (coping, body mass index, childhood disease history, age) are consistent

with other studies on urban populations and people whose life circumstances vary widely. Therefore, these determinants represent targets for policy action because of their potential for widespread population health impacts. Ultimately, the fundamental health risk factors faced by small, isolated populations like OOMs appear to be common to other rural and general populations. The absence of social factors in shaping physical health in *both* groups differs from a number of social capital studies, and suggests there may be unique characteristics of rural or farming populations (e.g., high levels of self-reliance and independence). However, this could also reflect fundamental differences between physical and mental health, since other analyses show that social factors influence mental health. Understanding the absence of social factors in shaping physical health would benefit from better reconciliation of this study with others, but this is hampered by differences in health outcomes, models and measures employed across studies.

Keywords: social epidemiology, social determinants of health, health in rural populations, health in farming populations, Old Order Mennonites, Short-Form Health Survey (SF-12), Physical Component Summary (PCS)

INTRODUCTION

Considerable research has been undertaken exploring the health impact of social and physical environments. These characteristics, or health determinants, have been prominent in Canadian policy discourse since the 1970s. The Public Health Agency of Canada (PHAC) currently recognizes 12 such determinants: *1) Income and Social Status, 2) Social Support Networks, 3) Education and Literacy, 4) Employment/Working Conditions, 5) Social Environments, 6) Physical Environments, 7) Personal Health Practices and Coping Skills, 8) Healthy Child Development, 9) Biology and Genetic Endowment, 10) Health Services, 11) Gender, and 12) Culture*[1].

There are strong parallels with Canada's heath determinants across developed nations. The WHO's Commission on Social Determinants of Health (CSDH) recognizes a similar list, contextualized within a conceptual framework indicating concomitant interactions within and across determinants (Figure 1). As such, intermediary determinants directly influence health, but are in turn shaped by broader factors representing socio-economic and political contexts. Three main

social theories underlie the CSDH framework - psychosocial, social production of disease and ecosocial/multilevel approaches[2]. They are not mutually exclusive, and for most determinants offer a complementary explanation of health relations. For example, in the income-health relation, psychosocial theorists emphasize how income influences individuals' perceptions of social status leading to stress and poor health, social production of disease theorists see poor health as primarily resulting from the lack of material resources of individuals/communities, and ecosocial/multilevel theorists attribute poor health to the biological expression of social conditions accumulating over the life-course[3].

Although the theories are complementary, they differ in related policy recommendations[2], which is important given the action lens present in health determinants discussions. Their complementary nature means it is difficult to prioritize any one theory and course of action. Prioritizing determinants is also difficult, since most studies examine a subset of determinants thus their relative importance is not known[4]. This study addresses this gap by examining all Canada's determinants (hereinafter SDOH) and how they shape physical health, so that policy actions can tackle those shown to have the greatest impact.

The study population is the Old Order Mennonites (OOMs) of Waterloo, Ontario, Canada. Their lifestyle, which has remained relatively stable and culturally isolated for generations, features little/no alcohol consumption, no smoking, high religiosity (Christian), strong family and community support, a patriarchal structure, an agrarian culture, and minimal technological reliance[5]. Their lifestyle may offer health benefits, and studying isolated populations like OOMs is attractive because distinct lifestyle practices (or environmental or genetic features) may expose health risks (determinants) less easily identified in large general populations[6,7]. This study considers the same SDOH relevant to many populations, using well-established measures, but focuses on OOMs because their homogeneous, distinct and isolated lifestyle may more clearly expose the influential determinants.

OOMs are compared to non-OOM farmers living in Waterloo, hypothesizing better physical health in OOMs. Comparing these two groups eliminates from the explanation of health differences many contextual determinants common to both, thus focusing on the social/cultural differences. Most rural health studies compare urban and rural populations. This study compares two rural groups, an approach

that may yield unique insights into the physical health determinants of rural communities, which are poorly understood[8].

OOM and Rural Health, SDOH Links

The OOM community is closed with negligible in-migration, increasing the likelihood of population bottlenecks combined with genetic drift, inbreeding, and thus genetic diseases[9]. Genetic studies of the OOM Waterloo lineage have identified a number of physical health disorders, which are relatively rare due to surprisingly high genetic diversity[9]. Furthermore, Fretz[10] found a broad-based discouragement of close marriages and no evidence of higher rates of mental illness in Waterloo OOMs compared to the general population. Fretz's[10] work, while dated and lacking statistical validity, is nonetheless consistent with broader genetic research on OOM mental health.

Studies examining the health-lifestyle linkage have found that Waterloo OOM and Old Order Amish (OOA) children demonstrate higher physical fitness levels compared to non-OOM/OOA urban and rural children[11,12,13]. Most other (non-genetic) health information comes from U.S. OOA studies and indicates differences largely in favour of Old Orders for: death rate and life span[14], women's mental and reproductive health[15], risk of cardiovascular disease[16], certain cancers[17,18,19] and Type 2 diabetes[20].

The two populations in this study live in the same region but occupy different social environments. OOMs deliberately separate themselves from the larger society, yet within their community they are highly supportive, cohesive, trusting and spiritual[10]. These are features thought to contribute to better health. Beyond age, one of the most consistent findings is between poor health and low socio-economic status (SES), one that holds across many populations, diseases, and SES indicators[21,22]. While OOMs have comparatively low incomes, they cannot be considered low SES in the typical sense, since wealth is embedded in property and other agricultural assets. Nor does their non-participation in provincial health insurance limit access to health care services, since the OOM mutual aid program assists households unable to pay their medical bills.

Health behaviours such as smoking and physical inactivity are linked to poor health or intermediate outcomes (e.g., obesity), coping significantly impacts

health, and life-course studies highlight the importance of healthy childhood development in fostering a life-long advantage[23,4,24,25]. Little is known about coping in OOMs, and health behaviours appear mixed with no/low smoking and alcohol consumption offset by a potential lack of concern about diet and physical fitness (especially among OOM women). OOM families are known for being strong and stable[10], providing a solid foundation for healthy childhood development.

Social support – a strong factor in OOM communities – is considered an important determinant of physical health, with studies finding higher mortality or morbidity rates among people with the fewest social connections[26,27,28,29]. Regarding societal-level social support, the evidence is inconsistent with some studies finding poorer health in areas of high social-disadvantage[30,31], and others finding better health and/or resource access [32,33]. Social capital studies also explore the impact of social environments, with the main elements including social networks, participation, reciprocity and trust[34]. Kim et al.'s[35] systematic review found consistent evidence linking social capital with physical health, especially self-rated health. Some studies suggest that societal-level social capital effects may be weak once individual-level factors are accounted for[36,37,38].

Religiosity is among the most prominent OOM cultural features. Most studies focus on Jewish and Christian faiths[39], with considerable evidence linking religion with physical health benefits[40,41,42]. However, reviews cite limitations including difficulties in measuring religiosity, small "convenience" samples, treating correlation as causation, separating religious effects from non-sacred ones like social support, and inappropriate control groups[43,44,45]. Spirituality is also increasingly recognized as important in health research[46]. Evidence suggests that spirituality is more difficult to measure than religiosity because it is comparatively abstract and internal[47]. This means research examining spirituality should employ measures other than church attendance and explore whether highly spiritual people (who may infrequently attend church) experience health benefits.

Rurality is a feature of both study groups. There have been a number of recent rural health studies within developed countries. Smith et al.'s[8] comprehensive review concluded that much variation exists in both urban-rural and intra-rural

health differentials within and between countries. In Canada, life expectancy decreases as rurality increases, but significant only in men[48]. This suggests higher mortality rates among rural Canadians, although studies on US, UK and Dutch populations report lower rates in rural residents[33]. Asthma and certain respiratory diseases are lower in rural Canada, yet certain cancers, cardiovascular disease and obesity are higher[48]. This variability is common to most developed countries[8]. Farming locations and areas with high pesticide exposure may be at increased risk for cancer[49]. However, CIHI[48] and Smith et al.[8] conclude that rurality *per se* does not translate into health disadvantage, but instead is a proxy for geographically-dispersed determinants including personal behaviour and socio-economic factors.

METHODS

Research Setting, Design

Adult OOMs are compared to non-OOMs living in the Wellesley, Woolwich and Wilmot Townships of Waterloo, Ontario (Figure 2). Waterloo Region ranks second in Ontario in agricultural production[50]. Both groups are farmers and share the same locale, so these factors are unlikely to generate significant health differences.

A cross-sectional survey captured data on health status and the SDOH. Early in the study design the challenges of accessing the closed OOM community had to be addressed. Consequently, the paper's first author spent 1½ years meeting with OOMs or people knowledgeable about them, and regularly observing OOMs in everyday interactions such as shopping, working in local shops and farming. This built trust within the community and acceptance of the project's utility.

Distribution of OOM surveys in church and the small number of non-OOM farmers resulted in sending surveys to *all* members of both groups. The senior OOM Bishop prepared a support letter to accompany the survey information package, and arranged for survey distribution following church services. Anonymity was assured by providing OOMs with a self-addressed, postage-paid envelope for mailing back the completed survey. 1,200 OOM surveys (60% response rate) were received, and 1,171 were usable. The OOM sample was reduced to 850 in the following analyses, by eliminating those under the minimum

age (28) of the non-OOMs. This was done in an effort to age-standardize the two groups.

Municipal tax rolls were used to identify non-OOM farmers. Directories of Mennonite and Amish groups were used to eliminate members of these groups from tax roll farmers, to avoid control group contamination. Approximately 800 non-Mennonite (or non-Amish) households received the mailed survey, and 344 completed surveys were received (43% response rate).

The survey for both groups consisted of identical questions. It was piloted with a small number of OOM church leaders and community members, with feedback being incorporated into the final version.

Health Measure

The physical component summary (PCS) score of the SF-12 health survey was used to measure physical health status because of its brevity and well-established psychometric properties[51]. The SF-12 measures six physical health functional domains: general health perceptions (GH), energy and vitality (VT), physical health impacts to social functioning (SF), physical functioning (PF), physical role limitations (RP), and bodily pain (BP). An algorithm scores the functional domains, standardizing them to a mean of 50 and standard deviation of 10. Higher PCS scores indicate better physical health.

The SF-12 has been shown to be reliable in measuring health in many populations and clinical groups[52,53]. Reliability/validity tests designed for the SF-12[54,55,56] were conducted. For both groups, the instrument met the validity criteria, principal components analysis confirmed the two-factor structure, and known group tests confirmed expected relationships between demographic and health-related variables (unpublished work, Author, 2011).

SDOH Measures

There were practical restrictions on how determinants could be portrayed. Multiple measures were included in the survey for many SDOH because of their multidimensional nature and to provide alternate measures if significant non-

responses were encountered. Various sources were consulted to guide selection of measures, question wording, and response options (Table 1).

Many survey questions directly correspond to SDOH measures. A score was created for some measures by combining responses from survey questions, with responses re-coded (as required) so higher scores represent higher levels of underlying constructs. This method is illustrated using the trust question, where respondents classified their trust level for 5 types of people (Table 1). Responses were re-coded so higher scores represent higher trust (4=trust completely, 3=trust somewhat, 2=do not trust very much and 1=do not trust at all). Re-coded responses for the 5 types of people were added to create a trust score ranging from a maximum of 20 (highest trust, all 5 people) to a minimum of 5 (lowest trust, all 5 people). A similar methodology was used to score participation, reciprocity, perceived social support, the social network index (SNI), and the sense-of-place measures. The scoring method for the 6-Item Daily Spirituality Experience Scale (DSES6) was similar but no re-coding was employed, to ensure comparability with the broader literature where higher DSES6 scores represent *lower* spirituality levels (Underwood, 2011).

Statistical Analyses

SAS was used for all statistical analyses[66]. PCS scores were calculated using the original (orthogonal) scoring algorithm and employing U.S. population norms[51,53,67]. Hopman et al.[68,69] confirm the validity of U.S-based norms in scoring Canadian applications of the SF-36 (the larger survey upon which the SF-12 is based). The PCS and SDOH measure distributions were compared for the two groups. Multivariate analyses (OLS) were conducted for both groups, with PCS as the (continuous) dependent variable and the SDOH measures as independents. All regressions were restricted to working with the same SDOH measures to ensure comparability between the two groups (rather than maximizing explanatory power using a stepwise procedure to select the variables forming the optimal model). In this way, the degree to which SDOH measures were significant in shaping physical health could be determined, given the presence of the same co-measures.

Ethics Approval

McMaster University Research Ethics Board, #2009-187.

RESULTS

SDOH Measure Distribution

Compared to non-OOMs, the full OOM sample (n=1,171) is *younger* (mean age 43.4 versus 57.7) and has more *females* (58% versus 51%) and *singles* (33% versus 5%). These differences arise because church distribution of the surveys captured many single OOMs, and their population is younger with more females compared to the Ontario population[70].

Table 2 provides the distribution of the SDOH measures used in the regression analyses, and shows that the two groups differ significantly on most SDOH. Three SDOH were excluded from the regressions: *Education and Literacy* because educational attainment did not vary in OOMs, *Physical Environment* because of high colinearity with other measures or absence of a significant health relationship, and *Health Service Use* since virtually all respondents (both groups) reported having family doctor access. Also excluded from the regressions were traditional health behaviours such as smoking and alcohol consumption, because no OOMs reported either. Traditional employment measures, such as employment type and status, were excluded because both groups are (or were, if retired) selected because they were farmers, with the majority being self-employed with few unemployed/retired members.

The groups did *not* differ on income adequacy or degree of job control, with most participants reporting no trouble meeting basic needs and high job control levels. Most members of both groups were married, with the OOMs having more singles. The OOMs assign more importance to the socially-oriented sense-of-place measures – rootedness and community – and less to the physical environment. For social capital, the OOMs report lower levels of participation and higher levels of trust and reciprocity. OOMs rarely join formal organizations, yet regularly participate within their community, suggesting that social interaction may better capture participation levels. More social interaction in OOMs is evident in the higher social network index (SNI) and perceived social support scores. OOMs report more difficulty coping but less stress, which seems counterintuitive

although the stress question may not have captured the full response range or asked about stressors most common in OOMs. OOMs report fewer dietary concerns and childhood diseases. OOMs are shorter ($p<0.001$ overall, each gender), with women`s weight being similar to non-OOM women and men`s being less than non-OOM men. Compared to non-OOMs, BMI is higher in OOM women ($p<0.001$) and similar in OOM men. OOMs also report significantly higher spirituality levels.

Health Status

Mean PCS scores are higher ($p<0.01$) in non-OOMs than OOMs, indicating better physical health (Table 3). This is particularly influenced by differences in women, since physical health in non-OOM women is better than in OOM women ($p<0.01$) and the men's health is similar ($p=0.16$). There is no gender difference within non-OOMs ($p=0.47$), yet within OOMs women have lower PCS scores ($p<0.01$). All statistically-significant ($p=0.05$) PCS score differences are also of potential clinical significance since they exceed one – the minimum (cut-off) for interpretation[72,67]. Potential clinical significance means the difference justifies further investigation as it may reflect substantive differences in underlying causal mechanism(s). The difference in men's PCS scores, though not statistically significant, may be clinically significant given that it (slightly) exceeds one. PCS scores in both groups are negatively skewed, as in other SF-12 general population studies[56]. The kurtosis coefficient indicates that the OOMs PCS distribution is flatter (more spread) compared to the non-OOMs.

Examining PCS scores by age and gender provides further insight into group differences and patterns. As expected, physical health declines with increasing age (Figures 3 and 4). Since only 2.6% of non-OOMs (versus 18.6% of OOMs) are $\leq$ age 34, conclusions about physical health in the youngest age group cannot be made. However, in the other five groups, women show PCS differences exceeding one (clinical significance cut-off) for all but the 35-44 age group, all in favour of the non-OOMs (marked 's', Figure 3). Men's PCS score differences exceed one for all five age groups (all in favour of the non-OOMs, Figure 4), although differences in the middle-aged groups (the largest portion of the sample) are only slightly above the cut-off. Within both groups, men have better physical health than women for all but one age group (65-74 in OOMs, 55-64 in non-

OOMs). Age and gender differences in this study are consistent with prior SF-12 research[52].

Key SDOH Shaping Health

Table 4 presents the regression analysis results, with adjusted R-square values of 0.39 and 0.29 for the OOM and non-OOM models respectively. Four SDOH measures were highly significant ($p \leq 0.01$) in both regression models – coping, BMI, age and number of childhood disorders. Stronger coping skills were associated with better physical health, and higher BMI, increasing age and number of childhood diseases were associated with poorer physical health. The significance of age in both models reflects earlier findings where PCS scores decreased with increasing age in both groups (Figures 3 and 4).

Some SDOH were associated with only one group. Stress was significantly and negatively associated with health in non-OOMs. Within OOMs, increased physical health was associated with decreased spirituality, increased income adequacy and increased reciprocity (given). Decreased physical health in OOMs was associated with reciprocity (received) and being female.

Gender in the OOM model, and its absence in the non-OOM model, is consistent with earlier results showing a gender difference for OOMs only (Table 3).

DISCUSSION AND CONCLUSIONS

The purpose of this study was to determine whether physical health was better in OOMs, and to identify the key determinants shaping it. Physical health in OOMs was found to be lower than in non-OOMs. Since both groups live in the same location, the individual and cultural characteristics discussed below are among the main factors responsible for this difference.

Individual and Cultural Determinants of Physical Health

Physical health in both groups is shaped by age, coping, number of childhood disorders and BMI. Age is linked to declining physical health in all populations and other studies have found that coping significantly influences physical and mental health[73,74,4,24]. OOMs report more difficulty coping, despite low stress

levels and the high self-efficacy often seen in Old Orders[75]. Since the survey may have failed to identify common OOM stressors, chronic exposure to stressors may still underlie their coping difficulties, potentially resulting in increased blood cortisol levels and ultimately cardiovascular disease and other illness[76,77]. Many life-course studies support the association between number of childhood disorders and physical health[78,71]. Childhood illness can represent a lifelong threat, predisposing adults to related conditions or weakening their immune system increasing general illness susceptibility. Psychosocial effects may also be present, since childhood illness shapes OOM mental health[73]. BMI is associated with poorer physical health, with studies linking BMI to diabetes, cardiovascular disease and premature mortality[79,80,81,82]. Exercise and weight management are critical for controlling BMI and reducing chronic illness risk[79]. BMI does not shape mental health in either group[73], suggesting minimal psychosocial effects.

Some determinants shape physical health in only one group. Higher stress is linked to poorer health in non-OOMs, and they report higher stress (Table 2). Studies suggest that stress can negatively impact physical health, particularly when it is chronic and co-exists with lack of control or low social interaction levels[57]. While non-OOM job control levels are high, they may feel a lack control over broader conditions impacting farmers (e.g., economic or climate conditions) and they report less social interaction. As discussed above, psychosocial stressors can lead to elevated blood cortisol levels, potentially causing other health conditions.

Within OOMs, income adequacy, reciprocity (given and received), gender and spirituality are associated with physical health. Health improves with income adequacy, with strong support in the literature for this association[22]. Income may significantly shape OOM physical health because of lower incomes, high parity, refusal of government support or high self-reliance. Survey results indicate lower OOM household incomes and larger families. Also, OOMs refuse government assistance such as old age security. Despite a strong mutual aid system providing economic support for families, OOMs are taught self-reliance as a basic virtue[10]. Reluctance to utilize broader safety nets means some OOMs may lack the resources to meet family needs. Absence of a direct income-health effect in non-OOMs may reflect higher incomes, access to government support, or the existence of indirect effects[83]. Poetz et al.[24] and the OOM mental health

results[73] show an indirect income-health effect mediated by coping, but this could not be tested in non-OOMs because the sample is below 500[84]. Regarding the mechanism underlying the income-physical health relation in OOMs, material conditions are suspected and are in part socially produced. However, psychosocial mechanisms cannot be ruled out, since an indirect income-mental health link in OOMs was observed, and some researchers suggest that humans, as social animals, will always attach some psychosocial meaning to material resources[85].

Reciprocity received and given are negatively and positively associated with physical health in OOMs. The associations may reflect psychosocial effects – e.g., satisfaction from helping others and stress from receiving help due to feeling indebted, being a burden or losing independence[86]. However, neither form of reciprocity significantly impacts OOM mental health[73], suggesting psychosocial effects are minimal. Reciprocity-physical health relations more likely reflect health status, where more help is given and received by people with better and worse health. Reciprocity in the OOM model is consistent with the high levels of help they give and receive (Table 2), and originates from "a sense of community matched by none"[10:186].

Gender appears in the OOM model, with men's physical health exceeding women's. While many SF-12 studies find lower PCS scores among women, OOM women's scores are also below non-OOM women's, suggesting they face unique risks. There is little evidence of psychosocial effects, since OOM women's mental health is significantly better than non-OOM women's[73]. The gender-health effect remains after BMI is included in the model, suggesting risk factors beyond diet and weight management. Perhaps large families are an underlying risk to women: frequent pregnancies are physically-demanding, leave less time for recovery, and tie women to the home with cooking, cleaning and caring for children. While Old Order women report lower reproductive-related stress[15], frequent pregnancies may nevertheless carry a physical toll. Moreover, OOMs may limit/delay necessary reproductive-related health services. Therefore, the mechanism underlying the gender-physical health relation may be linked to reproduction, and rooted in broader societal norms encouraging large families and women to be "keepers at home"[87:109].

Spirituality appears in the OOM model, with *less* spiritual people having better physical health. While studies often report positive associations with physical health, most also pertain to religiosity (not spirituality) and have methodological limitations[43]. This study`s cross-sectional nature does not allow determination of directionality, thus health status may drive the spirituality-physical health relation. This interpretation is supported by studies showing that people turn to religion/spirituality to cope with poor health[88]. Interestingly, spirituality is positively associated with OOM mental health[73]. This dual role – protective for mental health and a resource for those with poor health – has been observed in clinical groups such as those with chronic pain[88]. While OOMs are not a clinical group, their lower physical health status might generate results similar to those of a clinical (or sub-clinical) group. This is speculation, however, with more research needed to clarify the costs and benefits of religion/spirituality in various populations.

Summarizing Physical Health and its Determinants

In considering the study`s overall results, one might ask: why do social factors not shape physical health? Health in both groups is influenced more by traditional determinants such as age and income, which is particularly unexpected in OOMs given the strength of many social factors (Table 2). What might explain this? First, results are sensitive to the health measure used, as evidenced by Kim et al.'s[35] finding that self-rated health shows the most consistent linkages with social capital. Manderbacka[89] found that self-rated health reflects physical health, yet Huisman and Deeg[90] suggest it may be mental or physical health depending on cognitive/filtering processes and assessment timing. Self-rated health is not equivalent to this study's measure of physical health (PCS), as it is one of the six functional domains used to derive it. Second, other studies have failed to demonstrate a relationship between physical health and either social capital[91,92] or sense-of-place[58]. Third, many studies focus on a subset of determinants, which will produce different results from those including a more comprehensive list. Fourth, perhaps the rural or farming status of this study`s populations affects the relevance of the social factors. An Australian study on rural populations found that social relations and community support had less impact on *mental* health in farmers than non-farmers, and the researchers suggest this may reflect higher self-reliance among farmers[93].

Another question arises when comparing regression model intercepts: does the low intercept in the OOM model signal other risk factors not explicitly recognized? While the OOM model has a reasonable R-square (0.39) and includes a number of determinants, the intercept is well below the non-OOM's, significantly depressing OOM PCS scores. Why? The SF-12 instrument met the validity/reliability criteria (unpublished work, Author, 2011), and underlying psychosocial effects appear minimal since virtually all members report no discrimination and OOM mental health compared to non-OOM's is equal for men and higher for women[73]. Lower OOM PCS scores may reflect genetic disorders (not measured in this study) or aspects of the OOM lifestyle which are difficult to measure. For example, families are large with OOM fertility rates more than double those of non-OOMs. Beyond the physical and economic burden of a large family, the need for offspring to acquire affordable farmland has resulted in one third of the population leaving Waterloo over the past two decades. This has disrupted the family farm and reduced contact with family and friends, which may impact health directly or do so through coping – e.g., coping is similar in OOM men and women but better in non-OOMs (both genders). The overall impact of a large family is difficult to determine, however, since some results suggest a positive health impact – e.g., when number of children is included in the regression, it significantly ($p=0.03$) and positively shapes health (OOMs only).

OOMs also differ in health service usage, although the health impacts are unclear. Virtually all OOMs report access to a family physician, so this often-used measure was not employed in this study. The challenge is in incorporating other health service information into a meaningful measure - e.g., OOMs report fewer visits to hospitals and doctors but more visits to community clinics, and significantly higher usage of alternative services. Local service providers indicate that OOMs often present with more advanced symptoms, attributing this to delays in seeking health services (pers. comm.., Waterloo Public Health, 2011). This is also seen in the Amish[75], and unsurprising since both groups lack public health insurance.

Study Limitations

Several study limitations should be acknowledged. First, responses rely on self-report and interpretation, and are cross-sectional only, although these same limitations are consistently found in most large population studies. Second, results

may be limited by the ways in which various determinants were measured. Since all the determinants were being measured, there were restrictions on the number of measures that could be included in the survey. Third, the non-OOM sample size (344) is below the 500 recommended by the SF-12 developers (for consistency with SF-36 results), with the small sample size potentially contributing to the lack of significance amongst variables in the non-OOM regression. However, tests conducted for the non-OOMs indicate that the instrument shows acceptable internal consistency, distinguishes between socio-demographic classes of respondents in the expected manner, and exceeds the small convenience samples often used in SF-12 validity studies[55]. Finally, OLS multiple regressions assume normality, yet a few variables show evidence of non-normality. However, since these variables are negatively skewed, commonly employed data transformations will be ineffective in normalizing them[94].

Conclusions

Despite the limitations, this study highlights important avenues for research and policy action. It indicates the complexity of determinants research, showing that the key determinants depend on populations, health outcomes, and factors included in the analysis. For example, the health outcome can influence directionality, with spirituality and age being negatively associated with physical health and positively associated with mental health. This study also found that social capital and other social factors do not shape physical health, yet they appear to shape mental health[73]. Is this generally true, due to the unique characteristics of rural populations or farmers, or because of differences in health outcomes? Few would deny that there are fundamental differences between physical and mental health. However, this suggests limitations in comparing this study`s results with those using different health outcomes, particularly the frequently-used self-rated health which could reflect physical health, mental health, or both. The measures used for determinants and the range of determinants included in the analysis also impact the results. For example, this study found that reciprocity as a single measure (help received and help given combined), was not significant in shaping health. However, when it was broken down into two functional measures, both were significant and their direction of association with health differed.

This study also supports policy action on the determinants. Coping, number of childhood disorders, BMI and age significantly shaped health in both groups,

consistent with studies of many urban populations and people whose life circumstances vary widely. This suggests these determinants transcend the boundaries of OOMs, farmers and rural populations, and thus warranting multiple approaches reflecting the policy directives of all three ways of looking at social determinants. Psychosocially, services could help individuals cope and reduce stress, monitor/control their weight, and maintain their family's health. Social production of disease suggests investment in community resources that promote healthy lifestyles and alleviate broader economic/social conditions challenging peoples' ability to cope or maintain health. Ecosocial/multilevel approaches ensure that programs are integrated and sustainable over the life-course, emphasizing the entire age spectrum from children's health (e.g., immunization programs, reducing childhood obesity) to healthy aging and age-friendly built environment programs.

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Figure 1: World Health Organization Commission on Social Determinants of Health Framework[2]

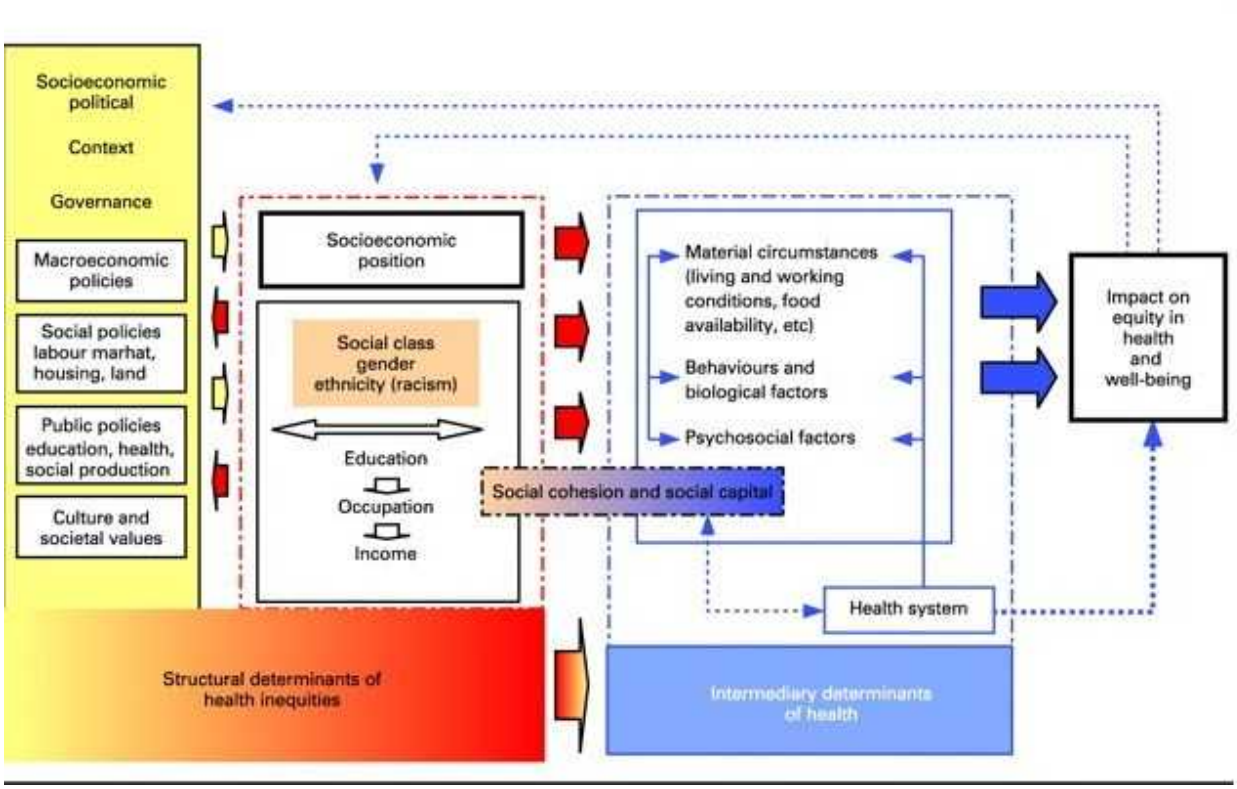

Figure 2: Study Location – Wellesley, Woolwich and Wilmot Townships of Waterloo, Ontario, Canada

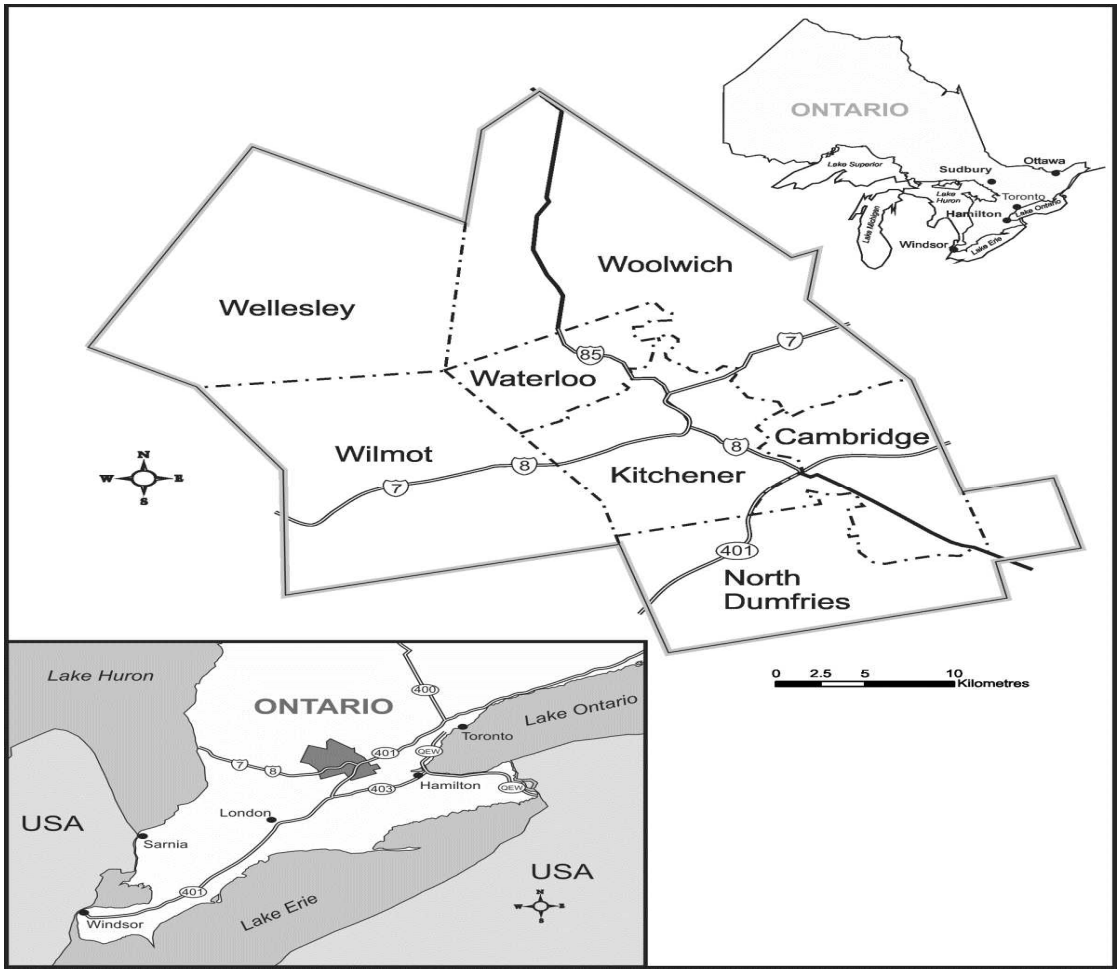

Figure 3: Female Physical Component Summary (PCS) Scores
OOMs and non-OOMs by Age Cohort

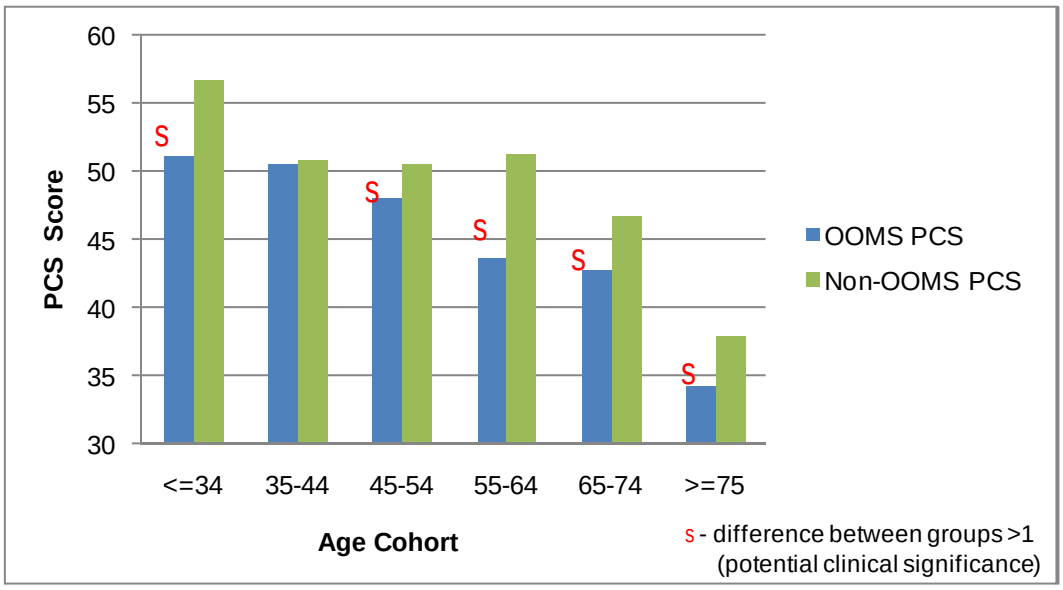

Figure 4: Male Physical Component Summary (PCS) Scores
OOMs and non-OOMs by Age Cohort

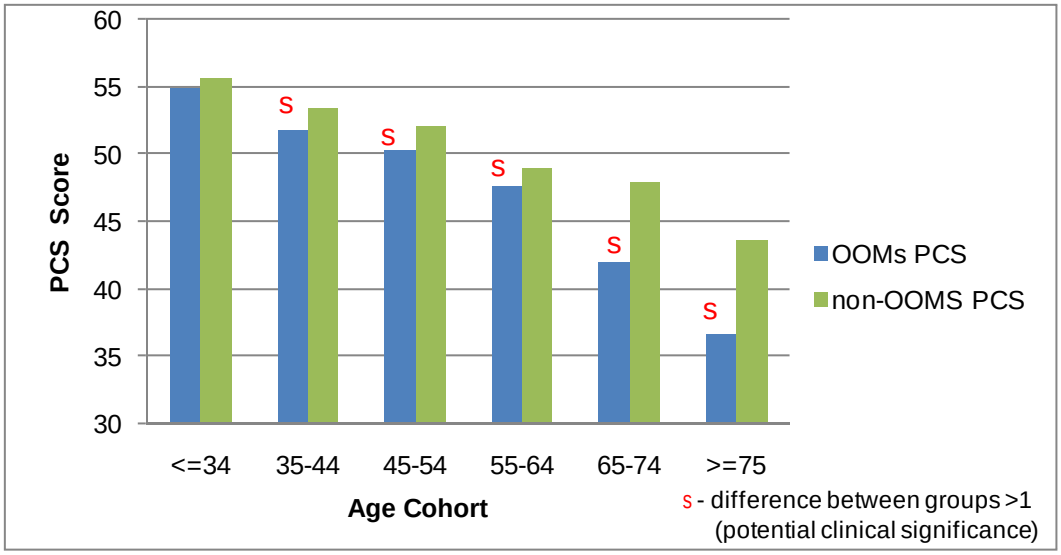

Table 1: Determinant Measures, Sources and Survey Questions

Determinants	Measures [Sources]	Question, Response Categories
Income, Social Status	Income Adequacy[15]	Trouble Paying for Basic Needs? (1) A lot (2) Some (3) None
	Gross Household Income[4]	Gross Yearly Household Income? (1) <$30,000 (2) $30,000-$50,000 (3) $50,000-$70,000 (4) $80,000+
	Medical Insurance[10]	Insurance (other than church)? (1) Yes (2) No
Social Networks, Social Environment	Marital Status[57]	Marital Status? (1) Married (2) Living Together (3) Divorced (4) Widowed (5) Single
	Number Adults in Home[4]	Number adults (18+) at home? (1) 1 (2) 2 (3) 3 (4) 4 (5) 5 (6) 6 (7) 7 (8) 8+
	Number Years in Waterloo[4]	How long in Waterloo?(1) < 1 year (2) 1-3 years (3) 4-9 years (4) 10-15 years, (5) 16+ years
	Sense-of-Place (SoP)-Rootedness[58]	How rooted in your community? (1) Very (2) Fairly (3) Neutral (4) Not very (5) Not at all
	SoP–Community[58]	Community means a lot to me?(1) Strongly agree (2) Agree (3) Neutral (4) Disagree (5) Strongly Disagree
	SoP–Natural Environment[58]	Physical environment influences my health?(1) Strongly agree (2) Somewhat agree (3) Neutral (4) Disagree (5) Strongly disagree
	Social Capital (SC) – Participation[34]	Are you an active member? (1) church (2) sport, recreation (3) art, music (4) farming, profession (5) environment (6) charity (7) political (8) other
	SC-Reciprocity[34]	Give help, receive help?(1) listen to problems (2) odd jobs (3) equipment (4) house sit (5) shop (6) family care (7) money (8) other
	SC-Trust[34]	Trust level for 5 types of people (family, community, know well, met for first time, strangers)? (1) completely (2) somewhat (3) not very much (4) not at all
	Perceived Social Supportp[15,59]	Someone available all/most of the time or not often/at all? (1) doctor (2) daily chores (3) problems (4) worries fears (5) relax (6) enjoyment (7) love (8) feel wanted
	Social Network Index (SNI)[60-Adapted}	How many close friends or relatives? (1) None (2) 1-2 (3) 3-4 (4) 5-6 (5) 7-8 (6) 9-10 (7) 11+ How often talk, visit each week? (1) Rarely (2) Once (3) Daily (4) Many times
Education, Literacy	Education Attained[57]	Highest education (non-OOMs)? (1) □ Grade 8 (2) Completed Grade 8 (3) Some High School (4) Completed High School (5) Some College/University (6) Completed College/University
Employment, Work Conditions	Job Control Level[57]	What level of control at work (1=no control, 10=total control)? (1) (2) ... (10)
Physical Environment	Apply Pesticides/Chemicals[15]	Do you work with (apply) any of the agricultural chemicals? (1) weed killers (2) crop insecticides (3) grain bin fumigants (4) fertilizers (5) livestock insecticides (6) Other
	Drinking Water Source[15]	Regular source of drinking water? (1) private well (2) bottled water (3) city water (4) other

		Running water in home? (1) Yes (2) No
Personal Health, Coping Skills	Coping[4]	Ability to handle day-to-day demands? (1) poor (2) fair (3) good (4) very good (5) excellent
	Stress[15]	Are these sources of stress (no/some, severe)? (1) time (2) own physical/mental health (3) money (4) work (5) employment status (6) childcare (7) eldercare (8) family
	Hours of Sleep (Canadian Community Health Survey[61])	How many hours sleep each night?
	Self Image – Weight[15]	Do you consider yourself? (1) overweight (2) underweight (3) just right
	Smoking (Canadian Community Health Survey[61])	Do you smoke? (1) not at all (2) occasionally (3) daily
	Alcohol(Canadian Community Health Survey[61])	Alcoholic beverage in past year? (1) none (2) < once monthly (3) monthly (4) 2-3 times monthly (5) 2-3 times weekly (6) 4-6 times weekly (7) daily
	Diet(Canadian Community Health Survey[61])	Do you choose/avoid food due to various concerns? (1) preservatives (2) weight (3) heart (4) cancer (5) osteoporosis (6) fat (7) fibre (8) calcium (9) salt (10) cholesterol (11) calories
Healthy Childhood, Biomarkers	Number Childhood Diseases[62]	Recall having diseases as child (measles/mumps/chicken pox, asthma, allergy, speech, heart, ear, headache, stomach, depression, diabetes, hypertension, epilepsy, other)? (1) Yes (2) No
	Height[63]	How tall without shoes (inches)?
	Weight[63]	How much do you weigh (pounds)?
	BMI[63]	Calculated (from height & weight)
Biology, Genetics	Age[4]	What year born?
Health Service Use	Traditional Services[4]	Used in past year? (1) hospital (2) home care (3) community center (4) family doctor (5) specialist
	Family Doctor Access (Canadian Community Health Survey[61])	Do you have a regular family doctor? (1) Yes (2) No
	Alternative Services (Canadian Community Health Survey[61])	Used in past year? (1) chiropractor (2) nurse practitioner (3) midwife (4) massage therapist (5) acupuncturist (6) naturopath (7) reflexologist (8) spiritual healer (9) other
Gender	Type[57]	Are you? (1) Female (2) Male
Culture	Spirituality – DSES6 (Daily Spiritual Experience Scale, 6 Items[64])	Feel (God's presence, strength in religion, harmony, God's love, beauty of creation, desire union)? (1) many times/day (2) daily (3) most days (4) < once/year (5) never
	Religiosity – Church Attendance[42]	How often attend church? (1) > once weekly (2) weekly (3) once monthly (4) once yearly (5) < once yearly (6) never
	Discrimination[65]	Unfair treatment in past year? (1)Yes (2) No Location of unfair treatment?(1) School (2) Public (3) Work (4) Job Application (5) Health Care (6) Elsewhere

Table 2: Distribution of Determinant Measures
(p-values for χ^2 or t test)

Determinant Measure	**Classification (# of Categories)[a]**	**OOMs (age 28+, n=850)**	**non-OOMs (n=344)**	**p-value**
Income Adequacy	No Trouble Meeting Basic Needs (2)	80.8%	82.3%	=0.56
Marital Status	Married (Single) (3)	77.7 (18.0)%	87.8(4.9)%	<0.001
Sense-of-Place (SoP) – Rootedness	Very Rooted in Community (3)	62.6%	35.5%	<0.001
SoP – Community	Strongly Agree-Community Important (3)	55.9%	22.1%	<0.001
SoP - Natural Environment	Strongly Agree-Nat. Env. Important (3)	56.7%	64.5%	=0.01
Social Capital (SC) – Participation	High Level Participation, Score 17+, (3)	8.2%	25.6%	<0.001
SC - Reciprocity- Help Received	High Level Help Rec'd., Score 6-8, (3)	17.9%	2.3%	<0.001
SC-Reciprocity- Help Given	High Level Help Given, Score 6-8, (3)	16.7%	8.4%	<0.001
SC-Trust	High Level Trust, Score 17+, (3)	70.9%	31.7%	<0.001
Perceived Social Support	High Level Perceived. SS, Score 6-8, (3)	83.4%	71.2%	<0.001
Social Network Index (SNI)	High Level Social Integration, Score 22-32, (3)	73.8%	33.7%	<0.001
Degree of Job Control	Medium-High Level Job Control, Score 5+, (2)	94.7%%	92.1%	=0.09
Coping	Excellent or Very Good Coping Skills (4)	26.8%	67.7%	<0.001
Stress	Low Level Stress, Score <=10, (2)	96.7%	89.2%	<0.001
Diet	Low Level Dietary Concern, <=3, (3)	73.1%	32.6%	<0.001
# Childhood Diseases	Low # of Child. Diseases, 0 or 1, (7)	65.5%	55.2%	=0.02
Adult Body Mass Index (BMI)	Mean (SD) – Overall	27.54 (4.45)	26.63 (4.45)	<0.001
	Mean (SD) – Females	27.96 (4.83)	26.16 (4.90)	<0.001
	Mean (SD) – Males	26.95 (3.76)	27.11 (3.90)	=0.66
Age	Mean (SD) Age	50.50(15.78)	57.73(12.93)	<0.001
Gender (Type)	Females (Males) (2)	58.3 (41.7)%	50.9 (49.1)%	=0.02
Spirituality (6-Item Daily Spirituality Experience Scale – DSES6)	High Level Spirituality, Score <=17, (4)	86.0%	43.3%	<0.001

[a] Categories reduced as needed to meet minimum cell count for χ^2 test or avoid exaggerating group differences

Table 3: SF-12 PCS Statistics

Item	OOMs (age 28+, n=850)	Non-OOMs (n=344)	p value (between group)
Mean (Standard Deviation) - Overall	47.39 (9.52)	49.24 (9.21)	p =0.002
Mean (Standard Deviation) – Females	46.64 (9.81)	48.88 (9.76)	p =0.009
Mean (Standard Deviation) – Males	48.44 (8.97)	49.60 (8.61)	p=0.16
p-value (within group)	p=0.006	p=0.47	
Minimum.-Maximum	11.63-61.70	17.13-63.58	
Skewness	-1.09	-1.35	
Kurtosis	0.33	1.28	

Table 4: Regression Model Coefficients
(****p <=0.001, ***0.001<p<=0.01, **0.01<p<=0.05, ***0**.05<p<=0.10)

Determinant & Measure	OOMs (age 28+, n=850)	non-OOMs (n=344)
Intercept	43.23****	77.56****
Income Adequacy	1.87***	-0.05
Marital Status	-0.20	-0.20
Sense-of-Place (Rootedness)[a]	-0.19	-0.83
Sense-of-Place (Natural Environ.)	0.10	0.76
Social Capital (Participation)	0.03	0.04
Social Capital (Reciprocity-Help Received)	-0.49***	0.06
Social Capital (Reciprocity-Help Given)	0.52***	0.45
Social Capital (Trust)	0.52	-0.02
Perceived Social Support	0.10	0.13
Social Interaction (SNI)	-0.03	-0.01
Degree of Job Control	0.08	0.18
Coping	2.14****	1.97****
Stress	-0.15	-1.12***
Diet	-0.07	-0.05
Number of Childhood Diseases	-1.06****	-1.27****
Adult BMI	-0.16***	-0.55****
Age	-0.32****	-0.25****
Gender	1.34**	0.49
Spirituality	0.16**	0.07
ADJUSTED R SQUARE	**0.39**	**0.29**

[a] Community dropped due to high colinearity with Rootedness

CHAPTER 4

FIELDWORK EXPERIENCE WITH A CANADIAN OLD ORDER MENNONITE COMMUNITY

Status

Prepared for publication to *The Geographical Review*; not yet submitted.

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Introduction

This third paper discusses the field experiences in working with the two rural Waterloo populations involved in the research study. It is intended to address the current gap in the literature regarding the practical aspects of carrying out geographic fieldwork. The paper particularly focuses on the Old Order Mennonites, who deliberately separate themselves from the general population, but nonetheless supported this research study with a 60% survey response rate. This success is mainly due to the use of traditional qualitative methods that collectively functioned to establish trust and a close working relationship between the primary researcher and religious leaders within the Mennonite community.

The fieldwork experience in this study was similar in a number of respects to the (few) reports in the cross-cultural literature. For example, this study and others report the value of institutional affiliation, ethics approval (modified for the local context), involving members of the community in all aspects of the study, women in providing access to people and community resources, socio-cultural similarities between the researcher and researched, maintaining regular and personal contact, and sharing information. Unique aspects of the population involved in this study include Mennonite diversity and the hierarchical nature of the Mennonite community. These represented risks because a poor understanding of them would compromise the quality of the study or fail to secure sufficient participation from members of the community.

A major implication of the fieldwork experience in this study is that time is required to do it well. There are a number of reasons why fieldwork is necessary and worthwhile, however. Fieldwork is professionally rewarding, necessary for high-quality qualitative research, useful in providing information for designing surveys, often the only way to obtain information on small or minority populations, and fundamental in addressing the increased emphasis on downsizing, local context and engaging with the humanities seen in health geography and social epidemiology. The challenge is conducting fieldwork in an era where funding agencies and universities are emphasizing evidence, action and impact. This emphasis encourages expedient data collection and a focus on reporting empirical results. It would appear that in today's academic environment there are few incentives to conduct fieldwork, and even fewer to write about it.

"If we do not write about our fieldwork, how will anybody know what we have done and how and why we have done it? And if we understand geography to be, at least in part, a field-based discipline, then how will we write it so?"
[DeLyser and Karolczyk, 2010: 466]

Introduction

Fieldwork has been a strong tradition in geography, representing a defining feature of the discipline for many researchers (e.g., Wesche et al., 2010; DeLyser and Karolczyk, 2010; DeLyser and Starrs 2001; Driver 2000; Rundstrom and Kenzer 1989). It is considered a key research tool for collecting primary data, and valued by students and instructors as a form of direct, experiential learning (Stokes et al., 2011; Hope, 2009; Fuller et al., 2006). Despite this, surprisingly little has been written about carrying out fieldwork. Fieldwork has not been treated as a subject worthy of geographical reflection or historical inquiry (Driver 2000), few university Geography Departments offer courses on it (Price, 2001), and not many academic articles or books are written about it (DeLyser and Karolczyk 2010; DeLyser and Starrs 2001). This leaves researchers with little guidance on designing and implementing field-based studies.

Geographers often prepare for the field by taking foreign-language courses or reviewing regional/cultural information and manuals that discuss safety issues, tools or methods (DeLyser and Starrs, 2001). By comparison, they spend much less time learning about doing fieldwork and what is needed to succeed, such as how the community dynamics of study groups facilitate working with them, how to gain acceptance of your study, how to develop and maintain relationships, and the nature of communications with study participants and others.

This paper is intended to discuss these and other practical issues that arise in doing fieldwork, based on our experience in studying two rural populations in Waterloo, Ontario, Canada. It is intended to contribute to the literature on the general subject of geographic fieldwork, adding to the growing body of work that includes the special issue in *Geographical Review* (2001, Vol. 91, No. 1-2), the recent review by DeLyser and Karolczyk (2010), and the limited recent field research articles (e.g., Heller et al. , 2011; Wesche et al., 2010).

We begin with a discussion of what contemporary fieldwork means in geography and the relevant themes identified in the literature and discourse, followed by a brief introduction to our research study. We then present detailed reflections on our fieldwork experiences, focusing on the important things we learned, what we did, and why. We emphasize key understandings about the populations being studied and strategies that were effective in working with them. Where possible we link to experiences reported in the broader literature to highlight generally-applicable, cross-cultural experiences, struggles and lessons learned.

Contemporary Understanding of Fieldwork

DeLyser and Starrs (2001: iv) cite J. I. Monkhouse's (1955) rather dated definition:

> "Fieldwork is essentially personal observation and recording; it brings reality to geographical study; it helps the geographer to acquire his all-important understanding 'eye for country'; and thus it enriches his descriptive and explanatory powers. I would say that an essential part of the training of a young geographer is for him to choose some small accessible unit area that attracts him; acquire a pair of stout boots, perhaps the geographer's first item of equipment; study in the area itself the association of physical and human conditions which there prevail, and in fact give the area its individuality; and record the information which he collects in a series of original maps."

DeLyser and Starrs (2001: iv) note that fieldwork "has roamed well beyond Monkhouse's avowedly stout-booted past" to include "more nuanced strains of field behaviour" such as interviews, computers, interpreters, key informants, women, and reflexivity. This in part reflects the broadening of the discipline beyond its physical and cartographic roots, perhaps motivated by a decline in the number of new areas on earth to explore or by geography's quantitative revolution where large databases became readily available. Especially after the late 1970's, the few articles discussing fieldwork emphasized human geography, cultural ecology and traditional qualitative methods (DeLyser and Karolczyk 2010). From the year 2000, fieldwork articles have continued their focus on human geography with a particular emphasis on mixed methods, including content and statistical analysis, sampling and surveys in conjunction with participant observation and

informal interviews (DeLyser and Karolczyk 2010). The study reported on in this paper is quantitative, although the methods used in the field to ensure its success are qualitative. Therefore, the overall study design is best classified as mixed methods, and fits well within the contemporary understanding of geographic fieldwork.

Themes in Fieldwork Literature and Discourse

Discussions about fieldwork in geography have largely been restricted to specific areas or issues, with little practical, broadly-applicable advice on "functioning within the research context" (Wesche et al., 2010: 61). Fieldwork has been addressed in manuals and textbooks describing the purpose, structure and effectiveness of tools or techniques such as interviews, participant observation and case studies (e.g., Iain Hay, 2005; Crabtree and Miller, 1999). There is also literature on field safety (Higgitt and Bullard, 1999), the merits of experiential learning as a pedagogical tool (e.g., Fuller et al., 2006), and specific topics such as gender issues in fieldwork (e.g., Kosygina, 2005; Chacko, 2004; Driver, 2000). Within cross-cultural research such as ours, there are writings about its complexity and the need for "respectful listening, difficult and challenging engagements, careful attention to nuances in the lives of 'others'..." (Howitt and Stevens, 2005: 30). The message in cross-cultural writings also appears in recent health geography discourse – e.g., the keynote address by Robin Kearn's at the 2011 International Medical Geography Symposium emphasized the need to slow down, reflect and engage with the populations studied (IMGS 2011).

Various authors have considered why so little has been written about field experience. Price (2001) suggests this may be due to geography's origins in describing and classifying the physical environment, where less emphasis was placed on field methods themselves. Moss (2001: 7) notes that reflections on personal experience in the field are often avoided in qualitative research because the perception is that "there is no theory in personal experience". Butz and Besio (2009: 1660) note that field reflections are challenging to write because "it is often difficult to avoid the communicative dead-end solipsism." Field reflections are especially rare in quantitative research, because it is thought to compromise generalizability (Polit and Beck, 2010). Ryan and Golden (2006: 1193) note: "Quantitative text books continue to emphasize the importance of controlling the

research environment and minimizing any factors that may intrude on the research process."

Reflexivity (and autobiography) is well accepted in disciplines such as education, nursing, action research and ethnography (Tenni et al., 2003). Moss (2001) confirms these disciplinary links within geography, noting that autobiography has been closely linked to ethnography, social theory, and feminist writings about reflexivity and positionality. Butz and Besio (2009: 1662) agree, noting that "demystifying fieldwork" and showing "how techniques are practiced in the field" are among the accepted autoethnographic styles relevant and used in geography. There are also an increasing number of mixed methods studies within geography and elsewhere that combine fieldwork with traditional qualitative and quantitative designs to address pragmatic issues that arise in conducting research (Cresswell and Tashakkori, 2007).

Therefore, discussions within geography and other disciplines acknowledge fieldwork reflections as being accepted and valued for their practical significance and analytical insights. We now turn to our study and reflections on our field experiences.

Research Study

Our study employed a survey to measure physical and mental health and their determinants in the Old Order Mennonite (OOM) community of Waterloo, Ontario, Canada. It represented the first systematic attempt to explore health in this population. We compared OOMs to non-OOM farmers also living in Waterloo, to eliminate the impact of the contextual determinants common to both, allowing us to focus on social/cultural differences. Detailed information on the OOM lifestyle, study rationale and survey administration are provided in Author (2011). The OOMs and non-OOM farmers received surveys containing an identical set of questions. Prior to distribution, the survey was piloted with six members of the OOM community and three members of the general population and revised based on their feedback. Our response rate was 60% from the OOMs and 40% from the non-OOMs. The OOM response rate is good for a mailed survey (IAR, 2011), and is 20% higher than that observed for postal health surveys of similar length (Torgerson, 2011). Given the closed nature of the OOM community and other cultural features (e.g., primary school education, little

interest in the academy and research), we consider the 60% response rate as evidence of success in working with this population.

We now discuss the methods used to achieve this success. Traditional study designs would classify our study as quantitative. However, following the mixed methods design typology developed by Collins, Onwuegbuzie and Jiao (2007) the study would be defined as placing the highest priority on the quantitative (survey) component with qualitative work done concurrently to inform and ground truth the survey instrument. Ultimately, the qualitative work ensured the success of this quantitative study.

Fieldwork Methods

The main methods we used in the field were participant observation and key informant interviews. Participant observation for the first 1 ½ years of the project consisted of regular (weekly) visits to the Waterloo Region, to observe and interact with OOMs in a range of cultural settings. Although they are a closed community, many OOMs work in local stores, travel and shop throughout the community, farm their fields, and sell directly to the public. Observation was mainly uncontrolled and usually involved strategically placing ourselves in situations where cultural understandings might arise. This is consistent with how most contemporary social geographers practice observation (Kearns, 2005). The aim was to obtain evidence complementing the information obtained from the restricted subset of survey questions by witnessing the spontaneity of everyday OOM life. Observation continues today, although community visits have become less frequent (bi-monthly).

Key informant interviews were conducted with a wide variety of people, including the operator of a local Mennonite education center, people from the general population who do business with the OOMs, people who hire OOMs to work on their farms, people hired by OOMs as drivers, municipal and community health clinic employees who provide services to OOMs, and OOMs who own and operate local stores. We found that participant observation itself offers many unplanned opportunities to meet and engage in conversation with OOMs. The majority of interviews were informal, and resulted from casual encounters, introductions by colleagues that worked with OOMs, or direct contacts made by our research team.

Document reviews were helpful in preparing us for participant observation and interviews, and included a broad range of literature. Academic literature included health research on the US Amish and research on Waterloo OOMs (e.g., children`s physical fitness, environmental risk perception, social work). There are also a number of socio-cultural books on the Waterloo OOMs, most written by local Mennonite scholars. We also acquired (from a public auction) past copies of magazines that most OOMs subscribe to (*Young Companion, Family Life*), which helped in understanding OOM values and perspectives on many social issues.

The methods we used are not new, and while there were many times in the field where technology such as computers, cameras, and audio recorders would have been useful, these were avoided because OOMs shun them. Document reviews, participant observation and interviews helped us to acquire critical insights on sensitivities (e.g., view on technology), community dynamics, organizational structure, leaders and key people within the community, perspectives on health and related issues, and strategies for securing survey participation. Below we focus on what we learned using standard qualitative methods, emphasizing how these understandings helped us to succeed in working with OOMs.

Fieldwork Reflections

Figure 1 highlights the approaches we used in the field to secure study participation, which we classify into three categories: understanding, representation, and communication. In an ideal world the approaches would be sequential, with full understanding of the study group preceding study representation, with this preceding communication of results. However, the field is dynamic, and as such the approaches are concurrent and interrelated rather than sequential and mutually exclusive. Feedback and response are continuous in fieldwork – e.g., understandings change as ongoing communications reveal new insights, representation of the study changes as support and momentum for your study build in the field. We discuss each of these below as they apply to the study and control group. We emphasize the study group (OOMs) in the discussion that follows, with control group issues presented mainly for context and comparison.

I UNDERSTANDING

Study Group

Sub-Groups

Sub-groups within a larger culture are relatively common, and time is needed to understand their attributes and determine whether they should be included in your study. Early in our study we learned that the highly visible "horse and buggy" Mennonites were one of over twenty Mennonite groups in Waterloo Region, and that the Mennonite diversity would take time to comprehend. As Loewen Reimer notes (2008:9), since the seventeenth century outsiders have found it challenging to comprehend the many names and varieties of Mennonites comprising the "complex Mennonite world(s)". Taking time to understand this diversity was essential, however, because we had to determine which groups had the attributes best suited to our study.

Mennonite groups range from progressive ones similar to mainstream Protestant religions (regarding theological outlook, religious organization, social and economic status), to conservative ones such as the OOMs (Fretz, 1989). The cultural differences between Mennonite groups range from minor to significant, with visual differences often being subtle and noticeable only to a trained eye (Draper, 2010). For example, the "Dave Martins" and OOMs differ significantly (culturally) yet appear identical to most outsiders (e.g., both use horse and buggy, dress similarly, have the same names). However, "Dave Martins", unlike OOMs, allow smoking (e.g., many men use cigars), use cellular telephones, use highly-specialized (often computerized) machinery in their businesses, are rigid and absolute with respect to shunning (i.e., rejection by the community), rarely converse with outsiders, and accept government support such as public health insurance, child care benefits and old age security (Draper, 2010). Some of these cultural differences have potentially negative health impacts, and many are not representative of the traditional lifestyle we were trying to capture. This was apparent to my OOM contacts, who advised us about "Dave Martins" to ensure that we excluded them from the OOM group.

Most cultures do not display such large diversity. However, sub-groups or splinter groups are not uncommon, and as you discover them you may have to re-consider

who you should be studying and how you will identify them. Once we understood the characteristics of the Waterloo Mennonite groups, we confirmed that OOMs were appropriate for our study as they were the most traditional of the conservative Mennonites. They were also identifiable, as they publish and sell (publicly) a directory listing the names and contact information for all members. However, we also found that it was important to reconcile different information sources, since the literature suggested group memberships that do not exist. For example, Fretz (1989: 289) refers to the "Dave Martin Old Order Mennonites", suggesting that "Dave Martins" belong to the OOMs. Fretz (1989) also includes various Amish groups within the Waterloo Mennonites. During our interviews with the OOMs, however, we learned that their directory excludes the "Dave Martins" and all Amish groups. In fairness to Fretz (1989), his meticulously-gathered data set pertains to the two decades before publication of his book, and his book is now over twenty years old. Undoubtedly, the groups have undergone considerable cultural change during this time. However, these differences highlight the general importance of "ground truthing" your information sources to confirm their accuracy and currency.

Conservative Farming Pioneers, not Renegades or Evangelists

Once you know who you would like to study, it is then important to assess whether you *can* study them. In addition to financial support and technical competency, consideration should be given to socio-cultural issues, such as how the study group will view your study and whether they are likely to participate. Wesche et al. (2010) call these "pre-field" considerations that help you decide whether you have the mental, physical, economic and technical resources to address the fieldwork challenges.

Isaac Horst (2001, pg. 11), an accomplished scholar on OOMs and an OOM himself, notes:

> "Most of the 'outsider' people do not really understand Old Order Mennonite lives and customs. They often perceive OOMs as being a type of renegade Amish."

Horst's quote reflects how we viewed the OOMs for the first few months. During this time we made weekly visits to the community, observing OOMs

in various social settings and speaking with people who worked with them, employed them or lived beside them. By the end of the first year we were concerned that the OOM (and Amish) cultural practices were contradictory and illogical. Why do they forbid driving cars themselves but hire someone to drive them to the doctor`s office? Why, if they have decided to use a tractor, would they not put rubber tires on it? Why do they refuse public health insurance when they pay taxes (and thus qualify for it), and use and respect traditional health care services? Why are diesel-powered cooling systems and lighting acceptable and not electric ones? There seemed to be many inconsistencies, and we wondered if OOMs might be a "cult", and if so, whether they would reject the study for reasons we may never comprehend or realistically counter. But, shortly after the first year of the study we began to realize that we were comparing OOMs to our mainstream frame of reference. This also coincided with our deeper understanding of qualitative methods, as we were delving more into this literature and learning about reflexivity, positionality and bias in the research process. Ultimately, we realized that we needed to view the OOMs using their frame of reference, not ours. This required understanding their culture and how they view change, and looking at lifestyle features from their perspective.

Using their frame of reference, we began to see our study as a snapshot of OOM life, with the bigger picture being a culture that has been changing in order to survive within a rapidly-changing world. As Fretz (1989: 285) notes, all cultures including the Mennonites change, with the conservatives having developed more defences against change because of the "fear that new ideas and new ways will threaten the desired unity and harmony within their fellowship". When deciding to adopt change, OOMs reflect long on how the change impacts their religious mandate of separation: – "to be *in* the world but not *of* the world", a phrase that derives from a verse in the New Testament of the Bible (Gingrich and Lightman 2006: 186). Practical economic grounds have driven many of the changes they have made (e.g., telephone, electricity, tractors), with OOMs modifying their practices to conform to the changing legal requirements and business norms of the broader community. But, because the changes also encompass *social* change, the boundaries regarding acceptability are unclear and thus contentious, with some community members approving and others

disapproving them. Different viewpoints on specific changes have led to the diversity of Mennonite groups we see today.

Why was this enlightened viewpoint important? It effectively transformed our original view of OOMs from an unpredictable, whimsical group of renegades to a group that behaved in a disciplined, conservative and logical manner with religious doctrine undergirding their traditional lifestyle. It also became clear to us that OOMs resent strong proselytizing and were not evangelical, unlike some recent Mennonite groups (Loewen Reimer, 2008) and despite dabbling in revivalist doctrine during the 1930's (Draper, 2010). Moreover, OOMs certainly were not a "cult". With this understanding we became optimistic about our study as we could see no reason why they would outright reject it. While it would be new to them and give them reason to pause and question it, we could not see how it would threaten their religious mandate, and in fact we could see it helping them better understand health in their community, to the benefit of all members. We also began to see options for working with them, and to anticipate (and either avoid or address) their major concerns. Ultimately, our new perspective increased our control over the study's outcome and reduced the likelihood that we would have to rely solely on luck.

Other evidence suggested optimism in working with OOMs. The majority are self-employed farmers and their customer base would be very small if it consisted of only OOMs, especially since most produce the same goods. Thus they had to be used to working with the general population. They are also bilingual, speaking German at home but learning English in their schools (Horst, 2001), which was evidence they recognize the need to live and work with the "English" (their term for the general population). Waterloo OOMs are known to regularly support their neighbouring "English" farmers (Gingrich and Lightman, 2006), and there is support for OOMs within the broader Waterloo population. Relations among the many Mennonite groups are generally respectful, and the secular community highly regards OOMs as the area`s original farming pioneers (Gingrich and Lightman 2006). Ultimately, we learned that the historical context and local factors created a supportive, cooperative social context for studying Waterloo OOMs - a context not experienced by all Mennonite groups in Ontario (Janzen, 1998).

Organizational Structure

In closed communities it is important to understand the organizational structure and community dynamics, because interaction with outsiders is often restricted or limited to certain individuals. Involving these individuals in your study may be a prerequisite to proceeding, or may help you to gain access to more members of the community.

The community concept applicable to OOMs is *Gemeinschaft* – a cohesive society characteristic of preindustrial rural communities and organized on the basis of shared, communal values rather than individual rights. People often are born into the community, resist leaving due to strong emotional ties, share a common ancestry and prefer face-to-face contact (Fretz 1989). This contrasts *Gesellschaft*, which is more characteristic of modern industrial society with its emphasis on impersonal relations, continued change, individual gain, and little consensus on norms, values or group commitment (Fretz 1989).

The governing elite in OOM communities are the religious leaders. Church leaders are not dictators; their role is to guide, model and reinforce the norms selected by the group (Draper, 2010; Horst, 2001). Waterloo OOMs confirm this, noting that biannual "laity" council meetings allow everyone to express their views (Draper, 2010; Gingrich and Lightman, 2004). Gingrich and Lightman (2006: 187) confirms the democratic nature of the Waterloo OOM community, finding that both group members and church leaders report individual choice, free will and a high tolerance/respect for non-members "uncharacteristic of the commune/collective community subtype [to which they belong]". These features suggested to us that some OOMs might choose to participate in our study, regardless of what others did. However, other cultural elements suggested that seeking the support of church leaders was prudent. First, our study was new to the community, and it seemed likely that some OOMs would seek guidance from the religious leaders. Second, shunning or criticism of those choosing to participate in the study might result from those who disapprove of it, thus there seemed to be a need to protect participants. Third, although church leaders are not autocratic they have a great deal of authority (Draper, 2010), thus they could influence people to participate in the study or discourage them from doing

so if they did not approve of it. Finally, out of respect for the culture and its leadership, it seemed appropriate to inform church leaders about the study, and seek their approval.

At the time we were designing our survey, there were 2 OOM bishops. We met with both, and it took several meetings over the course of three months before we obtained approval for our study. This may seem like a long time, but change within OOM culture is slow, and as noted by one of the service providers in Snyder and Bowman's (2004: 109) study, "it takes time to build the relationship with Mennonites, and you need to earn their respect." Building trust and respect is likely to take time in any culture. However, OOMs also value face-to-face relations (Fretz, 1989), suggesting that the work itself is unlikely to be respected without first establishing trust and respect for the person doing it.

Ultimately, the Senior Bishop formally approved the study, and offered critical assistance: a support letter to accompany each survey and use of the church system to distribute them. This assistance actually resulted from the Bishop and his wife working together to devise a method of distributing the surveys that was culturally acceptable, expeditious and likely to generate interest. The Bishop delivered the surveys to the 13 deacons at the Spring Church Leader's Conference (April, 2010), and each deacon distributed the survey package after church service to the adults at the 13 meeting houses. Church distribution came with a price, however - as part of the "deal", all adults in the community would receive a copy of the survey and be invited to (anonymously) participate in the study. This significantly increased the study costs, since now 2,000 surveys had to be printed and administered (only 330 were needed for statistical validity). However, in return the survey would gain credibility by being distributed in church, likely resulting in more than the minimum number of surveys (1,200 were actually received).

This level of support was critical to the study's success, so much so that we reflect on how we were able to obtain it. While luck and the project's utility may have played a role, we believe it was beyond these factors. Persistence was likely important, along with clear demonstration of the willingness to invest time in developing relationships, explaining the study and working at

a culturally-acceptable pace. It was also likely important to work with people at the appropriate level in the community – e.g., those who are in a capacity to make decisions and speak on behalf of the community. For example, we were not successful in "winning over" the Junior Bishop; while he did not reject the study, he was instead noncommittal, reluctant to speak on behalf of the community, and hesitant to "stick his neck out" in support of the study. Perhaps this was because the Junior Bishop defers to the Senior Bishop on matters where norms are unclear. Gingrich and Lightman (2006: 187) refer to the hierarchy in their Waterloo OOM study:

> "Contact with the outside world is afforded according to the hierarchical order in the community. Specifically, the permission, ability, opportunity, and expectation to engage with outsiders increase as one ascends the hierarchy of power and authority in the community. The norms and guidelines may be specific to one's status in the community."

The nature of the hierarchy in our study group is unique to OOM culture. However, hierarchies in general are common within closed communities, and can be seen in others such as ultra-Orthodox Jewish groups (Lightman and Shor, 2002). The hierarchy helps to maintain separation, often by assigning senior members with the responsibility of representing the group in interactions with outsiders. The hierarchy also helps to maintain consistency in the behaviours and practices within the group. The governing elite have the power to influence members' behaviour if not directly control it, and as such the hierarchy presents both opportunity and risk for researchers. If you are able to convince the leaders to support your study, their endorsement may go a long way to secure member participation. They may also provide crucial support for your study, as they did with ours. However, the risk is that you do not succeed in convincing leaders that your study is worthwhile, with the resulting lack of support being taken as a signal by group members to refuse participation.

Control Group

The control group presented a number of challenges in terms of member identification and securing participation. Some of the challenges arose

because of the unique nature of the study group and its role in shaping Waterloo's farming history (e.g., the need to remove Mennonites from the control group). The absence of an organizational structure to work with for the control group represented another challenge, making it much more difficult to build the study's momentum and credibility. For the control group, we were effectively working with individuals, not a collective.

Non-Mennonite farmers were the most appropriate control group, and this resulted in the need for a second survey, since secondary health information on this specifically-defined population was not available. In addition to the costs of administering a second survey, identification of the members of the control group was complicated. Non-Mennonite farmers are not an official group and as such do not publish a directory (as the OOMs do). While many are members of various farming associations such as the Ontario Federation of Agriculture, member lists are confidential. Municipal tax rolls were the only available public source, and we used these to identify people living on farming property (as indicated by a farm tax assessment), and then eliminating people that belonged to any of the Amish or Mennonite groups (to avoid contamination). This effort was hampered by two things: some people living on farming property were not farmers and some Mennonite groups did not have publicly-available directories (allowing us to identify and remove them from the sample). Both problems were encountered in our first mailing to the control group, resulting in over 200 completed surveys from non-farmers and/or Mennonites, which could not be used. Without these surveys, we also did not have the 330 needed to meet the sample size requirement, thus necessitating a second mailing.

II STUDY REPRESENTATION

Study Group

Institutional Affiliation

Wesche et al. (2010) found that the official backing of an institution was crucial to success in the field. Price (2001: 144) advises: "don't underestimate the value of a business card that shows an institutional affiliation." Our connection with a large and well-known university turned

out to be similarly important in working with the OOMs, even though we initially thought it might represent a barrier.

Our initial concerns arose from our knowledge that all conservative Mennonite groups reject higher education and credentials that signify knowledge or expertise (Kraybill 2001). They place higher value on personal integrity, hard work, and proving your worth. Waterloo OOM children terminate their formal education at grade eight, sometimes earlier (Draper, 2010; Horst, 2000). Other research on the Waterloo OOMs confirms that church leaders and other informal helpers are self-educated and have no formal training beyond primary school, and the community "rejects acquired knowledge or credentials as wisdom or power for themselves and outside professionals alike" (Gingrich and Lightman, 2004: 519). We thought this would mean OOMs would be reluctant to participate in our study, because it was university-based and represented PhD dissertation research.

However, in meeting with OOMs it became clear that our affiliation with the university was a benefit. Members of their community have used the university's hospital services, and the university's health care staff are appreciated and highly respected. It didn't matter that we were from a different department at the university or that we were not nurses or doctors, since the institution itself was held in such high regard. We have received telephone calls and correspondence from OOMs at the university for the past three years, demonstrating that they will contact us when it is convenient for them. Many participants also wrote in the margins of the survey, thanking our institution for the excellent medical services received by members of their community.

Ethics Approval

Ethics approval is an important aspect of institutional affiliation. Canadian universities are required by law to have all studies involving human subjects approved by their research ethics committee prior to commencement. The study population may also require ethics approval, or be more willing to participate if the study has passed an ethics screen. However, we found that having ethics approval or adopting the recommendations of the ethics

committee is not a guarantee that ethical issues have been appropriately addressed. To ensure this, we found it necessary to consider the societal context of our study, check the appropriateness of our methods with study group members, and defend our methodology to the ethics committee. For example, our study provided the control group with an opportunity to win money for participating in the study, but this was not offered to the OOMs. Our institution's ethics committee initially rejected this aspect of our study, recommending instead that both groups be treated equally. We had already discussed this matter with the OOMs, and they had indicated that participation motivated by money was offensive to them. Adopting the ethics committee recommendation would have had a significant, negative impact on the institution's image and study participation rates. When this was explained, the committee approved our methodology as originally proposed.

Informed consent - the need for participants to receive and understand full information about the study and to participate voluntarily – is also a typical prerequisite for ethics approval. However, its meaning is dependent on the societal context, and changes to standard procedures may be required (Wesche et al. 2010). For example, written consent is a standard approach and was recommended by our ethics committee. However, after discussing this with OOM leaders, it was decided that anonymity was an essential aspect of securing participation, and written consent would threaten this. When this was explained to the ethics committee, they waived the requirement for written consent.

Mutual Respect

Respect for both parties – the researcher and the researched – is essential for success in the field. We found that time and face-to-face contact was important in gaining respect from the OOMs. As Hall and Kulig note in their study on Mexican Mennonites (2004: 364):

> "It quickly became evident for the research assistants that to be accepted by respondents, a great deal of time was needed in socializing. It was not unusual for them to be at a household for 5

> hours when only approximately 90 minutes were spent on the interview."

OOMs also value diligence and hard work. We returned to them many times to clarify understandings, ask how to accomplish something, work on a problem, or explain our results. This conveyed to them that we were meticulous, serious and hard working. These features are highly valued within the community (Horst 2001; Fretz 1989; Gingrich and Lightman 2004), and helped to gain respect. Frequent visits also increase familiarity with the researcher, fostering acceptance (Price, 2001).

Respecting the OOMs was equally important, and came from developing a better understanding of their culture, taking their lifestyle into account when arranging meetings, and knowing and respecting their main preferences. Examples of how we took these things into account include avoiding the use of technology (e.g., audio-recorders, cameras, computers), meeting OOMs in their home (because horse and buggy travel is time consuming), reciprocating by bringing lunch to some meetings, and preserving the customary social context by ensuring that a male colleague accompanied the female researcher to all meetings to provide male participants with an opportunity to direct their response to a male, if preferred.

Acceptance by Women

Price (2001: 145) notes: "in most settings a woman researcher doing an extended field study needs to be accepted, or at least tolerated, by the women in the community...This is true even if the subjects of the study are not women." Price (2001) started helping Latin American women with cooking, tutoring children and other activities, and found that they secured access for her to the male-dominated fishing enterprise (e.g., arranged for her to go fishing with their husbands or brothers, introduced her to the community leaders).

When we reflect on our experience in working with the OOMs, we see that a number of times women took the initiative to provide us with critical support. For example, the Senior Bishop's wife suggested the church system be used to distribute the surveys. She also helped prepare the Senior

Bishop's support letter that accompanied the surveys, and offered us her past OOM directories and death records to enable us to do additional analyses. Other women in the community offered their private records to allow us to do more detailed analyses, and arranged for us to meet other community members. Considerable support was initiated by women, and this was not pre-arranged with their husbands as it arose spontaneously during meetings.

The amount of help we received from OOM women came as a surprise to us. We had assumed that the patriarchal OOM community would afford women little independence or authority, especially when dealing with outsiders. However, as Horst (2000) notes, the general population misunderstands the role of women in OOM society, assuming them to be discriminated against, undervalued, or uninvolved in decision-making. Horst (2000) cites the divine order - God, Christ, man and woman – as being similarly degrading to both men and women because the ultimate authority is neither (but rather God). He also cites many biblical passages that instruct men to give themselves to their wives, and evidence that OOM women are generally satisfied (e.g., fewer women than men leave the church, women themselves have chosen their restrictive dress). Fretz (1989) further notes that, while the father is the undeniable head of the family, this does not mean he is autocratic or that the wife has no voice in family decision-making. In considering patriarchal societies more generally, Ussher (2010) indicates that there are surprisingly few critiques of the underlying tenets of patriarchy and what it means for the lives and health of married women (Ussher, 2010).

Obtaining women's support in the field may more generally depend on the nature of interactions with the researcher. Price (2001) suggests that temporarily living with families or participating in customary women`s activities can succeed because they may be more consistent with the social expectations. The customary context within OOMs is for men and women to engage with one another, often within their homes (Gingrich and Lightman, 2006). Most of our meetings with OOM women were at their homes, often over lunch and with their husbands present. We also had a male and female researcher present at all OOM meetings. We were conscious of time and tone, making sure to avoid appearing rushed and ensuring that there was

plenty of time for discussing matters unrelated to our research study, because of the importance of face-to-face contact in building trust within the OOM culture. These interactions opened many doors and also provided many cultural insights.

Common Interests and Values

Socio-cultural features that researchers have in common with their study group can be helpful in connecting with them. For example, motherhood can help to break down barriers, as there seem to be many common, cross-cultural concerns. Motherhood can be particularly helpful in gaining acceptance from women, since this is often their primary role. One of our researchers recalls apologizing for the mess their children had left in the car when we picked up an Old Order family for lunch, and the wife quickly reassured her to stop worrying, noting that "I've had 12 children and I know what a mess they can make!". One of our researchers brought her children on interviews or visits, often because they were invited, and we had many conversations with OOMs about parenting. Price (2001) notes that motherhood has helped her become accepted in Latino communities, because it is a feature that makes her less different and more understandable.

Age, appearance and image can also matter in research. Young female researchers can attract unwanted attention from men, making it more difficult to obtain information and creating barriers in working with women (Price 2001). As a mature student, our main researcher was likely seen as someone serious about her work, and less likely to make rash judgements or naive interpretations. Dressing conservatively also helps, although this does not mean researchers should dress like the group they are studying. For example, the OOMs value simplicity and genuine behaviour, so dressing like other OOM women runs the risk of being seen as disingenuous or attempting to be one of them (not studying them).

Reading is an evening pastime in most OOM households, as it is in ours. There are fairly rigid criteria on suitable material, thus OOMs focus on the daily newspaper and books/magazines about family life, farming, religion and their Anabaptist heritage (Horst 2000). There are also two monthly

Mennonite/Amish magazines - *Young Companion* and *Family Life* – that most OOM households subscribe to, with the former being for the youth (pers. communication with OOMs, 2010). We purchased three years worth of these two magazines at a local auction. Reviewing them enabled us to converse with OOMs about them, and provided us with many insights on their priorities, values and world views.

Community Involvement in Study

Involving members of the community in all aspects of the study is one of the most important ways to gain acceptance for it (Price, 2001). We piloted our survey with church leaders and members of the OOM community, revising it for the feedback we received. Not all of the OOMs that we asked agreed to pilot the survey, but this can happen in working with mainstream populations too. It is important to not get discouraged, but rather to continue meeting a broad spectrum of people, because familiarity within the community fosters acceptance. Wesche et al. (2010: 72) noted this too, suggesting researchers should "never give up" in the field, even if you think you are failing to secure interest or support.

In highly organized groups like the OOMs, it is also important to involve community leaders. We were fortunate to have OOM church leaders distribute our survey, and provide a letter of support to communicate acceptance and encourage participation from the broader community. We also involved OOMs in the analytical component of our work, by meeting with them to review and confirm our interpretation of the survey results.

The Control Group

Because the control group did not represent a formal organization, it was more difficult to reach them and inform them about the study. Collaboration was at the individual and not community level, thus limiting the ability to rely on "word of mouth" or build momentum from within the group. Conventional forms of communication, such as use of the postal system and local media, seemed more suitable for this group.

The survey package mailed to members of the control group included a cover letter printed on university letterhead and indicated ethics approval,

thus institutional affiliation and approval of the study was established. In addition, we requested that both local newspapers publish an article about the study to increase awareness, and they agreed to do this. The newspaper articles cited the support of the Senior Bishop and OOM community, which boosted the study's credibility. The newspaper articles were also discovered by a radio broadcasting network (CBC Morning Radio), who interviewed our research team and broadcast the interview on a morning news program. These publicity efforts collectively raised the profile of the study, increasing the local interest and willingness to participate.

III COMMUNICATION

The Study Group

Personal Contact

We were diligent and timely in responding to all telephone calls and correspondence from our study participants. We viewed these efforts as courteous, but also another opportunity to make contact and build relationships. Since we had a directory with the contact information for all OOMs, we contacted them by telephone even if they contacted us in writing. We viewed this as a more personal method of communication, and one that might help us to appear more accessible. We also found that word travels very quickly within the OOM community, thus it was best to develop the reputation of being prompt and helpful in addressing concerns.

We received many telephone calls and letters from OOMs, particularly in the spring of 2010 just after the survey was distributed. Respondents typically called for clarification of certain survey questions or to request a copy of the study results. These contacts were also helpful because as we talked with some of the women they mentioned having difficulty getting their husbands or brothers to complete the survey, because they were busy in the fields or thought that the purpose of the study was to obtain information on sick rather than healthy people. These insights were helpful later on in interpreting the survey results, such as why more females than males responded and why physical health in the OOMs sample might underestimate the population's health.

Sharing Study Progress and Results

We found that providing study participants with regular updates on the progress of our research was appreciated by them and a good way to maintain interest and secure ongoing support. We could not keep everyone informed, but we communicated regularly with our main contacts to allow them to share information with others. We found that updates were important because the analytical and institutional process transforming our survey data into academic papers was poorly understood by study participants.

We promised to share our research findings with the study group, and the high survey response rate and many telephone calls/letters we received were evidence that OOMs wanted to hear them. This was challenging for us, however, because no one in the population has more than a grade eight education. Academic papers containing the empirical results emphasize factor analyses, chi-square and t-tests, p-values and regression coefficients, which are topics that do not appear in the primary school curricula. However, numerical results can be displayed visually along with discussion of them in plain English. For example, regression results can be presented as pie charts, and statistical significance can be discussed in terms of the amount of influence on health. We found that our presentations were successful, and demanded that we have a thorough understanding of the underlying statistical procedures and what could confidently be said about the results. We also found it useful (and prudent) to work with the community leaders on developing our presentations. This gave them another opportunity to be involved in the study, and offer insights on how the material should be presented. Their questions also revealed aspects of our material that were unclear and required revision before presentation to a broader audience. It was also important for us to respect technological sensitivities; since OOMs minimize use of modern technology, we avoided using computers for presentations, opting instead for hand-written or printed documents.

We collected information in our survey that was also useful to public health officials that provide services to the OOMs, and we shared this information with them. This can be an important way of giving back to the community (Wesche et al. 2010; Price 2001). However, we found that this effort

required more than sharing hardcore, peer-reviewed articles. Some of the information we shared was not presented or disclosed in any rigorous, academic venue. For example, we extracted many service usage statistics from our survey data that were not used in our research (e.g., traditional and alternative health care service usage, smoking rates, uptake of various cancer screening services) and presented these to public health officials because of their role as health service providers.

Ultimately, we found that there was an ongoing need for communication throughout our fieldwork. We found that presentation materials take time and care to prepare and deliver, particularly when face-to-face contact is preferred as with our study group. However, personal contact also helps to reinforce/maintain relationships in the field, and other cross-cultural researchers report a preference for personal contact in their communications (e.g., Wesche et al., 2010). We also found the need to share information that extends beyond our academic research; as Price (2001: 149) notes: "it is difficult to match the particular needs of a community with the theoretical concerns of the academy".

The Control Group

While personal contact should be equally important with control groups, the opportunity for personal contact with ours was limited because of the independent nature of the group, confidentiality concerns and preferences for less personal forms of communication. For example, 11 members of the control group contacted us to ask questions about the study or to request a copy of the results, with 10 using email and one using the telephone.

We will be preparing a short, written summary of our findings to mail out to those that have requested the study results. We also plan to contact the two local newspapers, to print a follow-up article summarizing the results of the study, which will help us to communicate with the broader control group community.

CONCLUSIONS

Geographic fieldwork is mentally and physically challenging, and demanding in terms of time and resources. Little practical literature exists on how to prepare for these challenges and demands. This article was

intended to help fill this gap, by sharing our field experiences and linking these with the broader (limited) fieldwork literature in an effort to identify more generally applicable experiences, struggles, lessons learned and methods of bridging cultural divides.

This paper discusses our experience in working with two rural Waterloo communities, with emphasis on the culturally-unique OOMs. Despite the uniqueness of the OOM culture, our fieldwork experience was similar in a number of respects to that reported in the cross-cultural literature. For example, we and others report the value of institutional affiliation, ethics approval (modified for the local context), involving members of the community in all aspects of the study, women in providing access to people and community resources, socio-cultural similarities between the researcher and researched, maintaining regular and personal contact, and sharing information. The unique aspects of our study relate to characteristics of our study group, particularly Mennonite diversity and the OOM organizational structure, which created both challenges and opportunities. Mennonite diversity was challenging to comprehend and required considerable time in terms of defining and identifying the study and control groups. One of the most significant opportunities came from the OOM organizational structure, however, which is hierarchical with church leaders having significant influence. We found that going to the top of the organization was essential because obtaining support at this level helped secure participation from "rank and file" community members. While the OOM hierarchy was instrumental for us, we recommend that hierarchical communities be approached cautiously, and only once you are well informed, since failing to obtain community leader support will likely mean your study will not succeed.

There were also surprises and lessons learned in our fieldwork. We were surprised at our success in bridging the cultural divide with the OOMs. This success was due in part to the uniquely-supportive local context, which paved the way for our researchers to work directly with community members instead of having to employ cultural brokers. Face-to-face contact helped to bridge the cultural gap by allowing community members to see and judge us for themselves, with a positive evaluation opening many doors. An important lesson we learned was to pay sufficient attention to the control group. We spent a disproportionate amount of time and effort understanding

and working with the culturally-unique OOMs. We unexpectedly discovered that the control group was equally time consuming, but for different reasons – e.g., confidentiality issues, its independent nature and the lack of an organizational structure. These features made it difficult to build study awareness, momentum and support. We learned that, while cultural differences are not insurmountable, cultural similarities are not a guarantee of expediency.

It is also clear from our fieldwork experience and others, that time is required to do it well. Without committing the time, researchers are likely to be unwelcome in the communities they are studying, and thus unsuccessful in the field. Perhaps we should ask whether fieldwork is worth the time and effort? The answer to this question appears to be "yes, for many reasons. First, those that have undertaken fieldwork generally extol its virtues. For example, Price (2001:143) describes fieldwork as "a prime privilege of this profession" and Wesche et al. (2010: 73) conclude that it is usually "highly rewarding on both personal and academic levels". Second, immersion in the field is a fundamental prerequisite of high-quality qualitative research (Hay, 2005; Crabtree and Miller 1999). Third, qualitative methods (fieldwork) are often used to develop quantitative (survey) instruments (Onwuegbuzie, Bustamante and Nelson, 2010), and the mixed methods practice perspective recognizes that "traditional" research designs routinely use both qualitative and quantitative methods to address pragmatic issues that arise in conducting research (Creswell and Tashakkori, 2007). Finally, in our research area (health geography, social epidemiology), there is an increasing emphasis on local context and engaging with the humanities. Pearce (1999: 682) notes that "to understand the causation of disease in a population, it is essential to understand the historical and social context and to emphasize the importance of diversity and local knowledge rather than only searching for universal relationships". Maziak (2009: 397-398) calls for downsizing away from "larger, longer and wider reach epidemiology" towards studies of smaller, well-defined populations strategically selected for their contrast regarding priority risk factors. Robin Kearn's keynote address at the 2011 International Medical Geography Symposium emphasized the need for future health geography research to slow down, reflect and engage with the populations studied (IMGS 2011). Therefore, the message in the broader geographic literature

and discourse is: take the time to reflect and engage with populations being studied, as this is the basis for an informed, sensitive, and relevant analysis.

Against this backdrop of support for fieldwork and taking time to reflect, we face many challenges from both academic institutions and funding agencies. Pressure to publish and limited research funds emphasize expediency and avoiding methods engaging with real-world people because this is "too messy and problematic" (Price 2001: 143) and requires "long immersion in the field" (Soderstrom, 2010: 117). The disincentives mount higher for studies involving different cultures, remote populations, or closed communities (Wesche et al. 2010). Perhaps even more challenging is obtaining financial support for *writing* about fieldwork, because the immediate beneficiaries are researchers, not the communities they study. Funding agencies, particularly in the area of health research, increasingly emphasize evidence, action and impact. This requires a focus on empirical results and direct links to policy, with articles addressing fieldwork or research methods generally being seen as a means to this end. This is undoubtedly one of the reasons why so few articles are written about doing fieldwork. In the absence of explicit funding, the abridged version of what happens in the field is included in the (relatively short) methods section of empirical papers, leaving the impression that fieldwork is innate and requires little elaboration. However, as DeLyser and Starrs (2001: vi) note "fieldwork is not innate, but learned – and those lessons can and should be shared".

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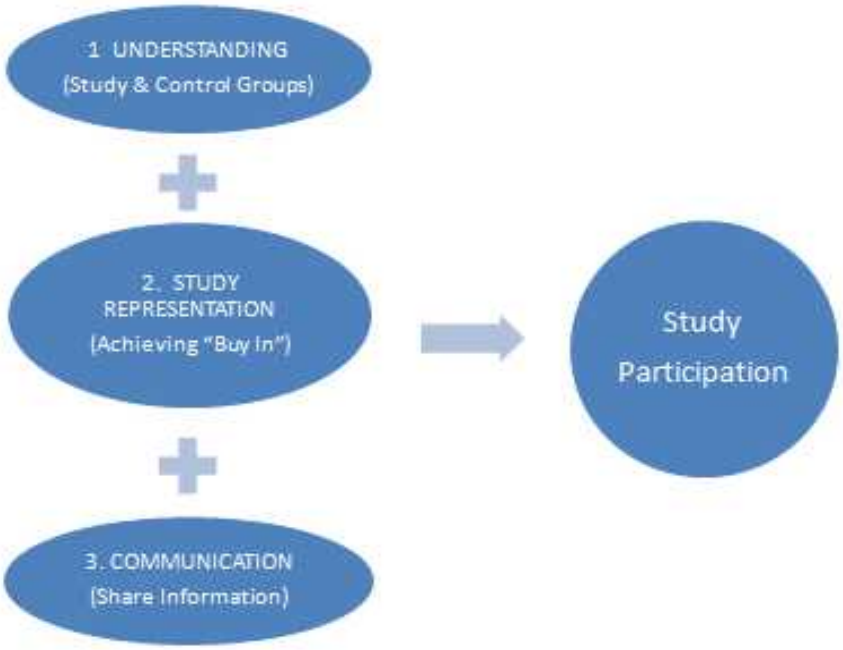
Fig. 1: Strategies for Securing Study Participation



CHAPTER 5

CONCLUSIONS

5.0 Introduction

The aim of the study was to determine if general health status was better in Waterloo OOMs, and whether the non-genetic risk factors provided an explanation of health similarities and differences. This study, while situated within the field of Health Geography, fits within the broader field of "determinants of health" research by exploring physical and mental health status and how these were shaped by Canada's 12 heath determinants (excluding genetics) in two rural populations: the Old Order Mennonites (OOMs) and non-OOM farmers living in Waterloo, Ontario, Canada. OOMs were selected as the study population because of their unique lifestyle, which contrasts the general population regarding a number of factors (determinants) thought to influence health. The OOM lifestyle is characteristic of traditional rural populations living over 100 years ago, and features horse and buggy transportation, little/no alcohol consumption, no smoking, a high level of religiosity, strong family and community support, a patriarchal structure, a traditional farming culture, and minimal reliance on technology (Loewen Reimer, 2008). While factors such as no smoking and higher levels of physical activity have obvious health benefits, there is also substantial literature supporting the health benefits of religiosity (as presented in the edited collection by Koenig et al., 2001). There may also be health benefits resulting from social factors such as reciprocity and trust that arise from the community-clan-family structure of OOM society (Maziak, 2009b).

Maziak (2009b) also suggests that studying populations that differ from mainstream ones on the factors that have undergone rapid change during the past century – e.g., the patterns of socialization, recreation, communication, indoor existence and mobility - may be particularly helpful in understanding contemporary disease patterns. While these factors have changed in OOM societies too, the lifestyle has generally been much more stable with change being slower and less frequent (Fretz, 1989). For example, the current OOM lifestyle has managed to retain a traditional emphasis on face-to-face contact, farming as the primary vocation, time spent outside, and minimal use of technology in activities relating to recreation, transportation and farming. In addition to differing from the general population on a number of these social risk factors, OOMs are a cultural isolate that can be likened to a natural experiment, with their distinct lifestyle characteristics being the risk factors experienced by all members of the community in contrast to the general population.

The control group used in this study was the non-OOMs living in Waterloo. Comparing OOMs to another Waterloo population significantly reduced the possible explanations of health differences by eliminating many of the contextual factors shared by both, such as economic conditions, the political climate, and physical environmental conditions such as air and water quality. While the potential differences between the two populations are reduced by selecting a control group that shares the same location and vocation, the study preserves many of the essential (social or cultural) differences thought to influence health. Waterloo OOMs and farmers are similar in that both occupy the same physical space, live in a rural environment, and are farmers. The two groups differ in what might be loosely referred to as "Mennoniteness" – i.e., the cultural and lifestyle characteristics unique to OOMs.

I now discuss the study's findings in terms of what they suggest about health in the OOMs and the determinants of health more broadly.

5.1 Health in OOMs

The first research question concerned the general health status of OOMs, and whether it was better than that of non-OOMs. The study found that mental health is better in OOMs, and appears to be mainly due to better mental health amongst OOM women, since no statistically-significant difference was found in the men. On the other hand, physical health is worse in OOMs, and while this is true for both genders, OOM women appear to be particularly disadvantaged. Therefore, there is a mixed message regarding the general health status of OOMs in comparison to non-OOMs. OOMs may experience fewer mental health conditions (e.g., depression, anxiety) but more physical health conditions, with gender effects present as well.

The second research question concerned the extent to which the determinants help to explain differences in health between the two groups. For mental health, some but not all of the determinants are significant in the MCS regression model. OOMs rank higher on six of the nine determinants in the OOM MCS model, having higher social interaction rates, lower stress, fewer childhood disorders, higher sense-of-place (rootedness), higher trust levels and higher spirituality – all of which positively shape their mental health. The non-OOM model includes four determinants, and non-OOMs rank lower on three of the four, having lower social

interaction rates, higher stress levels, and experiencing negative mental health impacts from reciprocity received (even though their reciprocity received levels are lower than OOMs, neither form of reciprocity is significant in the OOMs model). The negative relationship seen in the non-OOMs between reciprocity received and mental health is interesting, as it suggests there are psychosocial impacts associated with receiving help. These impacts are not seen in OOMs, perhaps because reciprocity (both given and received) is commonplace in their culture. Mental health in both groups is also shaped by physical health conditions[1] as often observed in other populations, although the explanatory power of the MCS model improves significantly only for the non-OOMs (bringing the R-square in line with the OOM's model). Therefore, mental health is strong among OOMs, especially amongst women, and can be traced to a number of determinants many of which are social factors (e.g., trust, social interaction, sense-of-place).

The determinants shaping physical health in both groups are mainly fundamental factors such as age, coping/stress, number of childhood disorders, BMI, income and gender. Social factors, such as sense-of-place, social support, or the social capital measures do not significantly shape physical health in either group. Lower physical health among OOMs can be traced to higher BMI, poorer coping skills, and there being a higher proportion of women (with OOM women having poorer physical health than non-OOM women), although these effects are offset by being younger and having fewer childhood disorders. Spirituality and reciprocity (both given and received) appear to be a function of physical health in OOMs, rather than a determinant of it. Higher PCS scores overall among non-OOMs can be traced to better coping skills and lower BMI, although these too are offset by being older, having more childhood disorders, and having higher stress levels. Ultimately, examining the factors helps to explain the PCS scores for each group, but the effects of the factors offset one another making it is difficult to reach an

[1] The measure of physical health included in the model for testing this relation was number of chronic conditions, not the PCS score. The PCS score is derived using factor loadings that assume an orthogonal relationship between PCS and MCS scores, thus there would be no point in including this measure in the MCS model as it would be insignificant given the lack of correlation between the two measures.

overall conclusion about which group should have the higher PCS score (better physical health).

It is likely that some of the key determinants are missing from the OOM PCS model, despite the reasonable R-square. This may reflect the individual or combined effects of harsh conditions facing OOMs, genetic disorders, loss of offspring due to out-migrations, reluctance to access health care services in a timely manner, or bias in the survey results (e.g., perhaps sick OOMs were more likely to complete the survey). Exploring whether these factors are responsible for lower PCS scores in OOMs is challenging, as some do not lend themselves to straightforward measures and others require specialized expertise (e.g., genetics research).

5.2 Other Insights on Determinants Research

5.2.1 Sensitivity to Health Outcome Measures

The thesis research highlights the complexity of determinants of health research, particularly the sensitivity of the results to the health outcome measure selected. The factors shaping MCS and PCS scores differ, which is not surprising given that there are fundamental differences between mental and physical health. However, not only do the factors shaping physical and mental health differ, but the direction of the association for a given factor can differ by health outcome. For example, spirituality is positively associated with mental health and negatively associated with physical health.

There also appears to be sensitivity of the results to the specific *physical* health measure used. This study found that physical health in both groups was influenced by fundamental determinants such as age, coping, BMI and childhood disease history, with social factors and social capital measures being less important. This is particularly unexpected in OOMs given the strength of many social factors in their community and the importance of social factors in shaping the health of other populations. There are a number of possible reasons why social factors may be less important in this study compared to others, but the uniqueness of the study population seems to be a less likely explanation since social factors were less important in shaping physical health in both populations. Differences in models, methods, and variables are more likely to be at the root of the study differences,

such as the use of different health outcome measures. For example, self-rated health, which is often thought to capture physical health, is not identical to physical health in this study since self-rated health is one of the 12 items used to calculate PCS scores. However, self-rated health has been generally found to be a consistent predictor of mortality (Jylhä, 2009) and health-care utilization (Huisman and Deeg, 2009), and found to be moderately correlated with a range of health indicators including physician assessments, number/type of self-reported health problems, diagnoses or chronic disease, number of medications, acute symptoms, and various composite measures (Birch et al., 1996). Manderbacka (1998) found that self-rated health reflected physical and functional aspects of health more than mental health. In this study we also find that self-rated health is more strongly correlated with physical health. For example, the Pearson correlation coefficients for self-rated health and the PCS scores are .68 and .70 (OOMs and non-OOMs respectively) compared to .21 and .23 for the MCS scores.

Despite considerable conceptual overlap, no measures of physical health are identical, and this can account for differences in the significance of the determinants. This is observed in this study, as different determinants can be shown to shape PCS and self-rated health[2]. The latter health outcome measure is frequently used in determinants research, and when it is used with the OOMs data (as a dichotomous variable distinguishing between excellent/very good versus lesser health) certain social factors are significant, specifically sense-of-place (rootedness) ($p=.02$) and perceived social support ($p=.04$). These do not show up in the PCS model. Both models represent alternative physical health models, both overlap on many of the fundamental determinants (coping/stress, age, number of childhood disorders), and both differ in terms of the social factors that significantly shape the various outcomes (in the presence of largely the same set of fundamental factors). This may be due in part to underlying differences in the health outcome measures themselves, but also the statistical procedures used – e.g., logistic regression is used for dichotomous measures such as self-rated health, but OLS regression is used for the continuous PCS scores.

[2] This discussion on self-rated health does not appear in the mental health or physical health results (Chapters 2 and 3). The results referred to here come from supplemental regression analyses that use self-rated health as the health outcome.

Other studies would likely show differences in the significance of the determinants if alternative health outcome measures such as PCS and self-rated health were available for analysis and comparison. Currently, there is no direct objective measure of "true health", and thus no gold standard for judging the validity of the different measures (Huisman & Deeg, 2010; Jylhä, 2009; Birch et al., 1996). Self-rated health, PCS, chronic disease and various other health indicators all represent potential measures of "true health". These measures are not identical to one another, with each capturing potentially different constructs. Conceptual and theoretical vagueness are recognized as particularly problematic in understanding the widely-used self-rated health indicator, despite the considerable empirical evidence linking it to a range of health outcomes (Huisman and Deeg, 2010). What this means is that for the foreseeable future we are likely to continue to see a variety of health outcome measures used in determinants research and continue to be challenged in reconciling study differences. Unfortunately, variation in study results will also make it difficult to determine the most effective policy action to take in addressing the persistent health inequities observed in many populations.

5.2.2 Determinant Constructs: Composite versus Specific Measures

This study also points to the importance of breaking down determinant constructs into more basic functional forms where possible (e.g., where functional breakdowns are known or could be hypothesized, where the information is available). This may be particularly important when different elements of a construct are thought to have a different relationship with the health outcome (or where it is not certain that the relationship is the same). For example, breaking down the reciprocity determinant into *help given* and *help received* highlights important directional differences, such as the positive health association seen with help given and negative one with help received. Also, breaking down determinants can highlight their significance, which otherwise might be hidden if the component measures have offsetting effects. For example, when a single reciprocity measure is used in the OOM PCS model, it is not significant in the regression because of the offsetting nature of the two component reciprocity effects. This issue may have implications for social capital studies, where composite measures are frequently used. For example, it is not uncommon to see trust and reciprocity combined into a single measure, which may fail to detect differences between trust and reciprocity, as well as differences in the types of

trust (e.g., generalized versus specific) and differences in the types of reciprocity (e.g., giving versus receiving help).

It is also important to note that breaking down determinants can impact other aspects of the research. For example, knowing that information is required on both help received and help given impacts the structuring of the survey question to distinguish between the two forms of help (the reciprocity question used in many surveys combines both types of reciprocity in a general question which would not allow the different forms to be separately analysed).

5.2.3 The Potential Benefits and Demands of Fieldwork

When reflecting on the fieldwork component of this thesis research (Chapter 4), the issue of the time required to conduct fieldwork should be mentioned. There seems to be few incentives within universities or from funding agencies to conduct fieldwork (or write about the process), yet there are increasing calls from the research community to undertake it. This is especially the case in contemporary epidemiology, where the need to carefully select populations at clear contrast to one another regarding the factors of interest is considered critical to detecting the causal factors, as is characterization of the local context. The likelihood of there being an existing database containing information specific to such populations and their local environment is slim, leaving fieldwork as the only option to acquire the necessary information. This raises the question of how to narrow the gap between academic incentives and research needs. Perhaps the best way to accomplish this is to 1) ensure that graduate students write about their fieldwork experience, and 2) highlight unique insights arising from fieldwork-based research, and indicate those that could not have been acquired using information from secondary sources. Graduate students generally have more time to reflect on their fieldwork and write about it. By writing about it, the common experiences and strategies that succeed in the field become better known, allowing future researchers to anticipate (and avoid common) problems and establish realistic expectations, timelines and budgets. Highlighting the unique insights arising from the research underscores the value of fieldwork, thus encouraging future researchers to consider this avenue with the goal of making a significant contribution to their field.

5.2.4 Unique Insights from this Study

There are a number of unique insights arising from this research, which result from a combination of in-depth knowledge acquired during fieldwork, features of the study design, and comparisons with the broader literature. First, it was beneficial to examine the same determinants with respect to both mental and physical health, as this helped to identify the likely mechanisms (or rule them out) underlying determinant-health relations. For example, the absence of reciprocity (either form) in the OOM MCS regression model suggests that psychosocial effects are not underlying the reciprocity-physical health relation. Similarly, a realistic hypothesis regarding the poorer physical health seen in OOM women would have been the psychosocial effects of patriarchy, if it were not for the strong mental health results observed in the OOM MCS model. In general, even where physical health is the primary analytical target, including a mental health measure in the study can provide information on underlying mechanisms such as the psychosocial effects that play a central role in the social theories underlying determinants research.

Second, consistency between the findings for the general population and those of an unusual study population such as the OOMs strengthen support for the claim that the findings are more broadly applicable. For example, the study results indicate that social interaction, coping, and stress shape mental health in both OOMs and non-OOMs. Physical health in both groups is shaped by age, childhood disease, BMI and coping. Support for these determinant-health relations can also be found in the broader literature. This suggests that these particular determinants (ahead of the others) warrant the attention of policy action and intervention measures, as the effects are likely to be far-reaching and not restricted to unique sub-populations.

Third, this study compares two *rural* populations, which represents the "road less travelled" since most studies compare urban and rural populations. This methodologically-unique approach offers a different perspective on the role that rurality may play in shaping health and the diversity of risk factors present in rural populations. For example, physical health in both groups is not shaped by the social factors, which suggests that we should consider the broader characteristics of rural or farming populations to understand why the results for both groups are similar (despite large differences in the social environments). Perhaps farmers are generally more independent and less reliant on social support, or perhaps the

social factors are less influential in shaping physical health in many populations (with differences in methods and measures masking this finding in other studies, as discussed above). The factors shaping mental health differ in the two populations, with the social factors playing a significant role in shaping OOMs mental health. This suggests that the strength of the social factors in the OOM community are indeed significant in shaping the specific health outcome (mental health), with their absence in the non-OOMs representing a risk factor within this population. Ultimately, similar findings between the two groups suggest that there may be broader characteristics of the environment at work, and differences point to the diversity within rural populations and the need to avoid treating all rural populations as the same simply because they of their rural status.

Fourth, the explanation of some of the study's findings benefit from an indepth understanding of the study population. For example, sense-of-place (rootedness) was found to shape mental health in OOMs, but not in non-OOMs. This is consistent with the broader, recent literature, which suggests that mental health is more closely linked with sense-of-place, and rurality alone is insufficient in explaining differences in sense-of-place. To understand why sense-of-place is important in OOMs only, we need to look more closely at the population and what distinguishes them from the non-OOMs. Length of residence is one of the strongest indicators of sense-of-place, but the survey results indicate that both groups have been long-time residents of Waterloo ($\geq$ 15 years) so this alone cannot account for the difference. However, what may account for the difference is generational and group continuity, which distinguish the OOMs from all other farmers in Waterloo since OOMs are the original pioneers of the area. The concept of continuity may also be linked to religion and the *Gemeinschaft* nature of the community (also properties that distinguish OOMs from all other Waterloo farmers), which collectively function to strengthen the bond among OOM community members and their land. The potential explanation of positive mental health in OOM women is another example of where indepth understanding of the community is helpful. The broader literature suggests that patriarchy is an underlying cause of poor health in women globally, even though the mechanisms have yet to be fully explored. OOM women reside in a patriarchal society, but this does not mean that their patriarchal society is identical to all others. A closer look indicates that OOM religious beliefs place both men and women in a subservient position, with God reigning over both genders. Moreover, treating women poorly is contrary to various biblical passages, and the bible is literally

adhered to by OOMs. Various other cultural attributes reinforce women`s acceptance of their role in OOM society, including consistency of experiences and expectations throughout the life-course and isolation from broader media influences. While these alternate explanations of positive mental health in OOM women require further research to substantiate, they represent reasonable alternative understandings that are consistent with the study`s results and field observations.

Fifth, there is an action lens present in determinants research, but also the reality that resources are limited. As such, understanding the *relative* importance of the determinants is important in establishing priorities and focusing limited resources on those determinants most likely to influence health. This study considered all of the determinants, and it is possible that the reason for the absence of the social factors in the physical health model is that these factors are less important than the others. Studies that only look at social capital measures may find that these factors are significant in shaping health, even though other determinants are more important or have the potential to offset (or mediate) social capital effects. To conclude that certain determinants should be the focus of policy action and intervention when only a limited set has been considered runs the risk of wasting limited resources. Therefore, more comprehensive models will likely be more economically-efficient in addressing the action mandate of determinants research.

5.3 Future Research Avenues

This study was the first systematic attempt to explore health in the Waterloo OOMs, and as such focused on developing a baseline estimate and understanding of health. A survey instrument was considered the most appropriate means to acquire the necessary information to understand the population's health. The various limitations inherent in this study, including the use of a survey, are discussed in Chapters 2 and 3. Perhaps one of the most significant limitations relates to the type of information that can be collected in a survey, particularly the depth with which issues can be explored. While the survey results enable basic statements to be made about health and the factors shaping it, they invariably raise additional questions and suggest areas where further research could be particularly fruitful. Some research topics potentially offer more broadly-applicable benefits, and other topics offer more localized benefits for service providers having a specific interest in the health of Waterloo OOMs. The research

avenues that appear to offer significant potential to make a contribution to the determinants literature are discussed below.

5.3.1 Gender Effects in OOM Society

The mental health of Waterloo OOM women appears to be strong. The survey results indicate that mental health is better in OOM women than in non-OOM women, and comparable to OOM men's mental health. This is unexpected, since in most populations women's mental health status is lower than men's. For example, General Health Questionnaire (GHQ) applications across many countries consistently find that women report lower levels of mental well-being (Madden, 2010), many studies show that women experience significantly higher rates of psychosomatic illness and anxiety (Dowbiggen, 2009), and women outnumber men in lifetime prevalence of depression at a ratio that ranges from 2:1 to 4:1 (Ussher, 2010). The patriarchal nature of the OOM community makes the survey results that much more surprising, since studies have linked poor mental health in women with their subordinate positions in patriarchal families (WHO 2009).

However, the survey results from this study are consistent with research on the culturally-similar OOA (Miller et al. 2007). Other research links women's positive mental health with high parity and a secure parental base (Ussher 2010), both of which are central features of Old Order cultures. Social separation from the secular world may also limit exposure of OOM women to broader societal pressures thought to contribute to mental illness especially in women, such as the mass media, gendered psychiatric assessments, and applause for women balancing families and careers (Dowbiggin 2009). All of these represent potential explanations of the positive mental health observed in Waterloo OOM women, but at this point they are speculative and require further research to confirm. Qualitative work would be most appropriate for obtaining a better understanding of the origins of positive mental health in OOMs women.

5.3.2 Sense-of-Place and Health

This study and the results of other recent research appear to be painting a more consistent picture regarding the role of sense-of-place in shaping health – i.e., sense-of-place positively shapes *mental* health. Sense-of-place has not been

consistently linked to physical health, nor has it been consistently shown to be a property of rural populations. These results taken together suggest that sense-of-place is more likely to consistently impact mental health, and unique properties of the OOM community beyond their simple status as rural residents are likely to account for their strong sense-of-place. These properties might include their lack of ethnic diversity, and/or the generational experiences that reinforce individual and group continuity in OOMs. This generational connection is likely well worth exploring and understanding better. It may relate to the *Gemeinschaft* nature of OOM communities, with their emphasis on shared values, common ancestry, and kindred feelings for one another. As Fretz (1989:36) aptly writes – "They know who they are and from whence they came". These feelings tie OOMs to one another and to their physical location, and are reinforced by other lifestyle features such as their preference for face-to-face communication and mode of transportation (horse and buggy).

Links to other determinants are also worth exploring to better understand sense-of-place in OOMs and how it relates to mental health, which could be pursued by path analysis. Further research beyond the multiple regression employed in this thesis is needed to understand how sense-of-place interacts with the other determinants in influencing mental health, the direction of the interactions, and the overall influence of sense-of-place once more complex linkages have been identified. While multiple regression was appropriate for a baseline health study of OOMs (this thesis), it does not allow for exploring mediating variables or specifying directionality, and we may not have identified all of the important determinants due to problems caused by multicolinearity (Vasconcelos et al., 1998). Path analysis can be used to help address these uncertainties, since it allows the specification of chains of association (variables can be both dependent and independent), and provides estimates of the direct and indirect effects. Examining sense-of-place in relation to trust, social interaction and spirituality may be particularly useful, given that these determinants appear to significantly intervene in the sense-of-place mental health path per preliminary analyses using Goldsmith's (1977) partial correlation criterion. Qualitative research should also be employed to help delineate the relationships between sense-of-place and the other determinants.

5.3.3 Other Potential Avenues for Qualitative Research

Trust is emerging as one of the most influential social capital measures, and as such increased research attention on this element of social capital appears warranted. Further research on trust in OOMs may help us to understand its origins and how to foster it in other populations. Within OOMs, trust is strong and appears to shape their mental health. Qualitative research investigating trust in OOMs could help to understand if and how it relates to religious doctrine, spirituality, or the *Gemeinschaft* nature of OOM society. In addition, it would be beneficial to confirm the extent to which trust is in fact generalized within the community. There is evidence from the survey that OOM trust is generalizable, but this requires confirmation as to the extent to which it is true for the population as a whole, and why this is the case if it is.

The PCS results raise an interesting question about why social factors seem to be less significant in shaping physical health in both populations. Perhaps qualitative research could help to understand how farmers view social support and interaction, and whether self reliance is stronger in farming populations (and thus a possible reason why social factors play a less significant role in shaping their physical health). Qualitative research may also help to confirm the validity of the assumed directionality between physical health and the two main social factors that appear in the regression models for OOMs (reciprocity and spirituality). It would appear that physical health is shaping reciprocity (both types) and spirituality in OOMs, but this is based on the MCS results (which suggest no psychosocial linkage for reciprocity) and other literature on clinical populations regarding the dual role of spirituality. Further confirmation of the directionality would be helpful.

Finally, local service providers are likely interested in finding out why physical health is lower in OOMs (both genders). Qualitative research may help to identify the relevant risk factors. The traditional lifestyle of the OOMs may be the underlying cause, but this alone is not much of an explanation. What exactly is it about the lifestyle that is more risky? Is there a delay in seeking or using health care services, and could this account for poorer health? Is the mutual aid system easily accessed, does it meet the needs of the community, and does it address the needs of both genders? Is diet or lack of exercise an issue? Do lower incomes, especially for large families, contribute to poor health? How much is known about genetic disorders within the community, and how prevalent are they? How have

families been affected by out-migrations? Is OOM farming more physically demanding, and could this account for poorer health (in both genders)? Answers to these questions may help to indentify some of the additional risk factors predisposing OOMs to poorer physical health.

CHAPTER 6

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APPENDIX 1

SURVEY INSTRUMENT

OLD ORDER MENNONITE HEALTH SURVEY (MARCH, 2010)

PLEASE MARK (WITH A "✓") ONE ANSWER TO THE FOLLOWING QUESTIONS UNLESS THE QUESTION INDICATES THAT MORE THAN ONE ANSWER MAY APPLY.

1. In general, would you say your health is:

Excellent	Very Good	Good	Fair	Poor
O	O	O	O	O

2. Does your health <u>now</u> limit your ability to perform <u>moderate activities</u> such as gardening, mowing the lawn or moving a table:

Yes, limited a lot	Yes, limited a little	No, not limited at all
O	O	O

3. Does your health <u>now</u> limit your ability to climb <u>several</u> flights of stairs:

Yes, limited a lot	Yes, limited a little	No, not limited at all
O	O	O

DURING THE <u>PAST 4 WEEKS</u> (for Questions 4 – 10):

4. **Have you had any of the following problems with your work or other regular daily activities as a result of your <u>physical</u> health?**

	Yes	No
- **<u>Accomplished less</u> than you would like?**	O	O
- **Were limited in the <u>kind</u> of work or other activities?**	O	O

5. **Have you had any of the following problems with your work or other regular daily activities as a result of <u>any emotional problems</u> (such as feeling depressed or anxious)?**

	Yes	No
- **<u>Accomplished less</u> than you would like?**	O	O
- **Didn't do work or other activities as <u>carefully</u> as usual?**	O	O

6. **How much did pain interfere with your normal work (including both work outside the home and housework)?**

Not at all	A little bit	Moderately	Quite a bit	Extremely
O	O	O	O	O

7. How much of the time have you felt calm and peaceful?

All of the Time	Most of the Time	A Good Bit of the Time	Some of the Time	A Little of the Time	None of the Time
O	O	O	O	O	O

8. How much of the time did you have a lot of energy?

All of the Time	Most of the Time	A Good Bit of the Time	Some of the Time	A Little of the Time	None of the Time
O	O	O	O	O	O

9. How much of the time have you felt downhearted and blue?

All of the Time	Most of the Time	A Good Bit of the Time	Some of the Time	A Little of the Time	None of the Time
O	O	O	O	O	O

10. **How much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives etc.)?**

All of the the time	Most of the time	Some of the time	A Little of the time	None or the time
O	O	O	O	O

11. Do you <u>currently</u> have any of the following conditions that have been diagnosed by a <u>health professional</u> (such as a family doctor or nurse practitioner)?

	Yes	**No**	**Don`t Know**
- Allergies……	O	O	O
- Extrinsic Allergic Alveolitis ("Farmer's Lung")….	O	O	O
- Asthma ……	O	O	O
- Emphysema, Bronchitis, COPD……	O	O	O
- Rheumatoid Arthritis……	O	O	O
- Osteoarthritis……	O	O	O
- Back Problems (not caused by arthritis)……	O	O	O
- High Blood Pressure……	O	O	O
- Heart Disease……	O	O	O
- Effects Caused by a Stroke……	O	O	O
- Crohn`s Disease……	O	O	O
- Ulcerative Colitis……	O	O	O
- Irritable Bowel Syndrome……	O	O	O
- Bowel Incontinence……	O	O	O
- Diabetes (not due to pregnancy)……O		O	O
- Depression, Other Dementia……	O	O	O
- Cancer……	O	O	O

If you now have <u>cancer</u>, what type? _____(Please specify – for example, breast, colon)

12. Do you <u>currently</u> have <u>any other</u> long-term physical or mental health condition that has been diagnosed by a health professional (other than those conditions listed in question 11 above)?

Yes	No	Don't Know
O	O	O

If Yes, Please Specify _____

13. Have you <u>ever had</u> cancer?

No	Yes
O	O

If yes, what type? _____(Please specify – for example, breast, colon)

If yes, how many years ago did you have cancer? _____

(Please specify number of years ago)

14. What is your estimate of last year's <u>gross household income</u> (from all members and all sources):

Less than $30,000	$30,000-$49,000	$50,000-$79,000	$80,000 or more
O	O	O	O

15. What type of dwelling do you live in? Is it a:

Single Detached House	Doddy House	Apartment (Under 5 Stories	Apartment (Over 5 Stories)	Institution	Other
O	O	O	O	O	O

16. Is this dwelling owned by a member of the household?

Yes	No
O	O

17. **Excluding church insurance, do you have any other insurance to cover medical expenses such as prescription medication, dental expenses, eye glasses or hospital expenses?**

Yes	No
O	O

If Yes – Please Specify what is covered (for example – dental)

_____

18. How much trouble do you have paying for your basic needs:

A lot	Some	None
O	O	O

19. **If you are employed, is your <u>main job</u>**:

Paid Employment (More than 30 Hours per week)	Paid Employment (Less than 30 Hours per week)	Self Employment	Housewife	Not Employed
O	O	O	O	O

If you are <u>not employed</u>, are you:

Retired or Pensioned	A Student	Unemployed and Looking for Work	Other
O	O	O	O

20. **If you are employed, do you have <u>more than one job or means of earning income</u>?**

Yes	No	Not Employed
O	O	O

21. **In which occupation are you doing most of your work? If you are retired or otherwise not working now, what was your main work in the past?**

Farmer – Have Own Farm	Skilled Manual Worker	Semi-Skilled or Unskilled Manual Worker	Office Worker (Manager)	Office Worker (Non Manager)
O	O	O	O	O

Housewife	Other
O	O

22. **If you are or were a farmer, what type of farming do/did you do**?

Cash Cropping (Cereal, Grains)	Dairy	Cattle	Sheep, Goats	Hogs	Mixed	Not a Farmer
O	O	O	O	O	O	O

23. Do you use electricity?

Yes, Inside And Outside The Home	Yes, Outside the Home	No, Not at all
O	O	O

24. Do you use horses rather than tractors for field work?

Yes	No
O	O

25. Do you use any of the following self-propelled (or motor-driven) farming equipment for field work?

Silo De-loader	Baling Equipment	Crop Sprayers	Tractors	Harvesters	Combines	Other
O	O	O	O	O	O	O

If other, please specify type of equipment _____

26. **How much control do you have over what you do at work? If you do not work currently, characterize your major work in the past. Use this scale to indicate your degree of control where 1 means "no control at all" and 10 means "complete control" (you were your own boss)**:

No control at all									Complete control
1	2	3	4	5	6	7	8	9	10

27. **What is your marital status**:

Married	Living Together as Married	Divorced	Separated	Widowed	Single
O	O	O	O	O	O

28. How many adults (18 and over) currently live in your home (including the doddy house)?

1	2	3	4	5	6	7	More than 7
O	O	O	O	O	O	O	O

29. **How long have you lived in <u>Waterloo Region</u>?**

Less than 1 Year	1-3 Years	4-9 Years	10-15 Years	Over 15 Years
O	O	O	O	O

30. Please indicate whether you have assisted your neighbours or friends, or they have assisted you, with the following activities in the past year (mark all that apply)?

	My Neighbours or Friends Have Assisted Me	I Have Assisted My Neighbours or Friends
- Listened to problems……	O	O
- Helped with odd jobs……	O	O
- Lent household equipment……	O	O
- Looked after house while away……	O	O
- Assisted with shopping……	O	O
- Cared for a member of the family……	O	O

- Lent money…… O O
- Other…… O O

31. **For each of the following types of support, please indicate whether it is available to you (if you need or want it) either "most or all of the time" or "not often or not at all":**

	Most or all of the Time	Not Often or not at All
- Someone to take you to the doctor……	O	O
- Someone to help you with daily chores……	O	O
- Someone to talk to about your problems……	O	O
- Someone to share your private worries/fears with……	O	O
- Someone to get together with for relaxation……	O	O
- Someone to do something enjoyable with……	O	O
- Someone who shows you love & affection……	O	O
- Someone to love and make you feel wanted……	O	O

32. **The next two questions are about your close friends and relatives (for example: those with whom you have regular contact). About <u>how many of each</u> do you have:**

	Close Friends	Close Relatives
- None……	O	O
- 1 - 2……	O	O
- 3 - 4……	O	O
- 5 - 6……	O	O
- 7 - 8……	O	O
- 9 – 10……	O	O
- More than 10……	O	O

33. **In a typical week, about <u>how often do you talk to or visit</u> with these close friends or relatives :**

	Talk to close friends or relatives	Visit or go out with close friends or relatives
- Rarely ……	O	O
- Once a week……	O	O
- Daily ……	O	O
- Many times a day ……	O	O

34. **For each of the following voluntary organizations, indicate whether you are an active member, an inactive member or not a member of that type of organization:**

	Active	Inactive	Don't Belong
- Church, Religious Group……..	O	O	O
- Sport, Recreational Group (such as quilting)…..	O	O	O
- Art, Music, Educational Group……..	O	O	O
- Farming, Other Professional Group……..	O	O	O
- Environmental Organization……..	O	O	O
- Humanitarian, Charitable Organization……..	O	O	O
- Political Party……..	O	O	O
- Other……..	O	O	O

35. **This question is about how much you trust people from various groups. Could you tell me for each whether you trust people from this group completely, somewhat, not very much or not at all:**

	Trust Completely	Trust Somewhat	Do Not Trust Very Much	Do Not Trust Not At All
- Your Family……O		O	O	O
- Your Neighbourhood/Community ……	O	O	O	O
- People You Know Personally ……..	O	O	O	O
- People You Meet For the First Time…O		O	O	O
- Strangers……O		O	O	O

36. **What is your regular source of drinking water:**

Private well	Bottled water	City	Other
O	O	O	O

37. **Do you have running water in the home?**

Yes	No
O	O

38. **Do you work with (apply yourself) any of the following agricultural chemicals (mark all that apply):**

Weed Killers	Crop Insecticides	Grain Bin Fumigants	Livestock Fertilizers	Insecticides	Other
O	O	O	O	O	O

If Other, please specify _____

39. If you work with (apply yourself) agricultural chemicals, have you received any training on protecting the safety of yourself and others?

Yes	No
O	O

40. Do you have a telephone?

Yes	No
O	O

41. **Do you have a computer?**

Yes	No
O	O

If yes, do you have access to internet services?

Yes	No
O	O

42. Do you have a television?

Yes	No
O	O

43. What form of transportation do you most often rely on?

Horse and Buggy	Automobile or truck	Bicycle	Other
O	O	O	O

If other, please specify_____

44. **Do you smoke?**

Not at all	Occasionally	Daily
O	O	O

If occasionally or daily, please indicate how much _____ **(cigarettes per day)**

45. **During the past 12 months, have you had an alcoholic beverage (such as beer, wine, liquor)?**

None	Less than once a month	Once a month	2-3 times a month	Once a week	2-3 times a week	4-6 times a week	Every Day
O	O	O	O	O	O	O	O

46. How would you rate your ability to handle the day-to-day demands in your life, like work or school or family responsibilities?

Poor	Fair	Good	Very Good	Excellent
O	O	O	O	O

47. **People use different sources to learn about health issues. Please indicate your primary sources for obtaining health information (mark all that apply):**

Daily Newspaper	News Broadcasts on Radio or TV	Printed Magazines	Books	Internet or Email
O	O	O	O	O

Talk with Family Or Friends	Other
O	O

If other, please specify _____

48. **<u>Other than at work</u>, do you participate in regular (weekly) physical activity, such as bicycling, swimming etc?**

Yes	No
O	O

If yes, what do you do? _____

If no, why not:

Lack of time	Too tired	Don't see the need for it	Other
O	O	O	O

If other, please specify_____

49. **For each of the following please indicate whether they were sources of stress for you within the past year:**

	No or Some Stress	Severe Stress
- Time pressures/not enough time……	O	O
- Own physical or mental health problem……	O	O
- Financial situation (for example: not enough $, debt)…..	O	O
- Own work situation (for example: long hours, conditions)	O	O
- Employment status (for example: unemployed)……	O	O
- Caring for own children……	O	O
- Caring for elderly, disabled, others……	O	O
- Other personal or family responsibilities……	O	O

50. **Do you consider yourself:**

Overweight	Underweight	Just about right
O	O	O

51. **How many hours do you spend sleeping each night?** _____(hours per night)

52. **Do you take any prescription medicines?**

No	Yes
O	O

If yes, please specify_____

53. Do you regularly take any non-prescription medicines, vitamin/mineral supplements or natural remedies?

No	Yes
O	O

If yes, please specify what you take_____

54. Do you choose certain foods or avoid others because of any of the following concerns (mark all that apply):

	Yes	No
- preservatives	O	O
- body weight	O	O
- heart disease	O	O
- cancer	O	O
- osteoporosis (brittle bones)	O	O
- fat content	O	O
- fibre content	O	O
- calcium content	O	O
- salt content	O	O
- cholesterol content	O	O
- calorie content	O	O

55. **Do you recall having any of the following diseases as a child (mark all that apply):**

	Yes	No	Don't Know
- Measles, mumps, chicken pox	O	O	O
- Asthma or other respiratory disorder	O	O	O
- Allergy	O	O	O
- Speech impediment	O	O	O
- Heart trouble	O	O	O
- Chronic ear problem	O	O	O
- Severe headaches or migraines	O	O	O
- Stomach problems	O	O	O
- Depression	O	O	O
- Childhood diabetes	O	O	O
- Hypertension	O	O	O
- Epilepsy/seizures	O	O	O
- Other	O	O	O

If other, please specify _____

56. How many children do you have?

None	1	2	3	4	5	6	7	8	Over 8
O	O	O	O	O	O	O	O	O	O

If you have children, were any born below 5 ½ pounds?

None	1	2	3	4	5	Over 5
O	O	O	O	O	O	O

If you have children, do any suffer from disorders/diseases?

No	Yes
O	O

If Yes, please specify disorders/diseases_____

57. Are you aware of any diseases that you know to be genetically-caused or appear to run in your family (consider your siblings, parents, grandparents and other bloodline relatives)?

No	Yes
O	O

If yes, please indicate the disease and member of your family that has the disease.

Disease	Family Member (e.g., Grandfather, Mother, Brother)
_____	_____
_____	_____
_____	_____

58. During the past 12 months, have you used any of the following (mark all that apply):

Hospital	Home Care Services	St. Jacob's of Wellesley Health Center (or other community clinic	Medical Doctor
O	O	O	O

Medical Specialist (such as a Cardiologist, psychiatrist, oncologist)
O

59. Do you have a regular family doctor?

Yes	No
O	O

If yes, how often do you usually visit the doctor?

Only when needed	At least once a year	Once every 2 years	Once every 3 years	Less often than every 3 years
O	O	O	O	O

If no, why do you not have a family doctor (mark all that apply)?

No medical doctors available in the area	Medical doctors in the area not taking new patients	Have not tried to contact one
O	O	O

My doctor left or retired	Cost	Other
O	O	O

If other, please specify _____

60. In the past 12 months, if you have seen the following alternative health care providers about your physical or mental health, please indicate what services they provided to you (leave blank if you have not seen them)?

- Chiropractor _____ (services)
- Nurse Practitioner _____ (services)
- Midwife _____(services)
- Massage therapist _____(services)
- Acupuncturist _____(services)
- Homeopath or naturopath_____(services)
- Reflexologist _____(services)
- Spiritual or religious healer _____(services)
- Other _____(provider and services)

61. In the last 3 years, have you had any of the following (mark all that apply):

General physical Check-up	Blood pressure Check-up	Colorectal Cancer screening	Mammogram (if female)
O	O	O	O

Pap Smear (if female)	Prostate screening (if male)
O	O

If you have not had any of these in the past 3 years, what are the reasons (mark all that apply)?

Do not think necessary	Personal or family responsibilities	Waiting time too long	Transportation or Cost Problems
O	O	O	O

Fear (embarrassing, find something wrong)	Other
O	O

62. **Are you male or female?**

Female	Male
O	O

63. **Have you been an Old Order Mennonite your entire life?**

Yes	No
O	O

64. Which meeting house do you regularly attend? _____

65. Apart from weddings and funerals, about how often do you attend religious services or meetings?

More than once a week	Once a week	Once a month Year	Once a once a Year	Less Often than once a Year	Never of almost never
O	O	O	O	O	O

66. Please indicate about how often you have the following feelings:

	Many times a day	Every day	Most Days	Some Days	Once in a while	almost never
- I feel God's presence……O	O	O	O	O	O	
- I find strength and comfort in my religion……O	O	O	O	O	O	
- I feel deep inner peace or harmony……O	O	O	O	O	O	
- I feel God's love for me directly or through others..O	O	O	O	O	O	
- I am spiritually touched by the beauty of creation..O	O	O	O	O	O	
- I desire to be closer to God or in union with Him....O	O	O	O	O	O	

67. For each of the following, please indicate how important it is in your life.

	Very Important	Not Very Important	Not at all Important
- Family……	O	O	O
- Friends……	O	O	O
- Leisure Time……	O	O	O
- Politics……	O	O	O
- Work……	O	O	O
- Religion……	O	O	O

68. **Have you experienced unfair treatment within the past year due to gender, religious or cultural background?** Yes O No O

If yes, then where did this happen?

In School O | In a Public Setting O | At Work O | Getting a Job O

Getting Medical Care O | Elsewhere O

If elsewhere, please specify where _____

69. In what year were you born? _____

70. **How tall are you without your shoes on?** _____ Height (specify in feet and inches)

71. How much do you weigh? _____ Weight (specify in pounds)

72. How rooted do you feel in your community?

Very rooted O | Fairly Rooted O | Neutral O | Not very rooted O | Not at all rooted O

73. **My community means a great deal to me?**

Strongly agree O | Agree O | Neutral O | Disagree O | Strongly Disagree O

74. Physical environmental features common in the rural areas of Waterloo region, such as green space and clean/fresh air, are important influences on my health.

Strongly agree O | Agree Somewhat O | Neutral O | Disagree O | Strongly Disagree O

************YOU ARE DONE - THANK YOU VERY MUCH FOR YOUR TIME******************

APPENDIX 2

SENIOR BISHOP'S LETTER

March, 2010

Regarding: Study of Chronic Illness in the Old Order Mennonites and Non-Mennonite Farmers of Waterloo Region

To: Members of the Old Order Mennonite Community

In this envelope you will find a health survey which you are being asked to complete. This survey is part of a large study being conducted by Kathryn Fisher from McMaster University in Hamilton, Ontario. The study has been approved by the McMaster's Ethics Review Board. I have met with Kathryn, and I have reviewed her research proposal and the enclosed survey.

The study will be capturing information on both the extent of and possible causes of chronic illness in two Waterloo communities: our Old Order Mennonite community and the broader Non-Mennonite farming community. Chronic illness includes diseases familiar to all of us, such as heart disease, stroke, diabetes and cancer. At this point in time, these diseases are responsible for almost half of all deaths in our local area and in many parts of the world.

Your participation in this study is anonymous and confidential. This means that the names of those completing the survey will not be known to anyone. Even Kathryn Fisher will be unable to identify the individual completing the survey. A self-addressed, stamped envelope is included to allow you to anonymously submit your completed survey. The surveys are to be completed separately and mailed separately by each adult member of our community (those 18 years of age and older).

We are in support of this study because we see the results as providing our community with valuable and up-to-date information on:

- the health of the members of our community;
- the possible causes of chronic illness in our community; and
- our use of health services, and our health service needs.

It may make a significant contribution to health and health care in general.

May we request that you support this study by taking the time to complete and return the enclosed survey. The early completion of the survey would be much appreciated because it would allow the timely tabulation of the results.

Yours truly,

Ian Shantz

APPENDIX 3

COVER LETTER

DATE: March, 2010

LETTER OF INFORMATION

Study: "Towards an Understanding of Chronic Illness in the Old Order Mennonite and Non-Mennonite Farming Populations of Waterloo Ontario"

Principal Investigator: Kathryn Fisher, M.A.Sc., M.Sc.
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(905) 525-9140 (x 20441)
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Faculty Supervisor: Dr. Bruce Newbold
School of Geography and Earth Sciences
McMaster University, Hamilton, Ontario, Canada
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You are being invited to participate in a health study.

Purpose of the Study

The purpose of the study is to better understand the extent and cause of chronic illness in 2 rural populations in Waterloo Region, Ontario - the Old Order Mennonite and Non-Mennonite farming populations. This study will ultimately provide you with current information on the health of your local community, including information about well-known diseases such as heart disease, stroke, diabetes, cancer, asthma, arthritis and depression. It will also include information on possible risk factors that may be responsible for these diseases.

What will be your part in the study?

We are inviting you to participate in this study. Your participation involves completing the enclosed survey and returning it to us. The survey asks you whether you have common chronic conditions like heart disease and cancer, and asks you about your family history concerning genetic disorders. It also asks

about lifestyle factors that appear to be important in influencing the development of chronic conditions, including social support, social relations, employment, diet, physical activity, and religious/spiritual attitudes and practices. The survey should take you about 30 minutes to complete.

What are the benefits of doing this study?

This research will provide you with current information about chronic illness in your community, and the potential causes of it. It will also provide the broader health community with this same information. Chronic illness currently accounts for almost half of all deaths worldwide. It is a concern to all of us, but often studies are too broad or lack sufficient control to enable us to determine the factors causing chronic illness. This study is an attempt to directly address these problems, by focusing on 2 small, well-defined populations that differ significantly from one another and the broader general population on a number of characteristics that appear to have a significant influence on the development of chronic illness.

Are there any risks to doing this study?

We do not foresee that there are any risks to you in answering the questions in this survey. It is your choice to participate in this study and you do not need to answer questions that you do not want to answer or that make you feel uncomfortable. You are also free to withdraw from the study at any time by notifying Kathryn Fisher (see contact information at the top of the first page). If you withdraw, your data will be destroyed and not used in the study.

Who will know what participants have said in the study?

You are participating in this study confidentially. Protecting your privacy is a major priority for us, and we will not use your name or any information that would allow you to be identified. Your response will also remain anonymous to us, by using the enclosed self-addressed, stamped envelope to send us your completed survey. The information you provide will be kept in a locked cabinet where only Kathryn Fisher will have access to it. Information kept on a computer

will be protected by a password. The data will remain locked in the cabinet once the study has been completed.

How do participants find out what was learned in this study?

The study is expected to be completed by the winter of 2010 or spring of 2011. A public meeting will be held shortly after the completion of the study to present the results to interested members of the community. If you would also like a brief 2-3 page summary of the results, please contact Kathryn Fisher (see address at the top of page 1) as she would be pleased to provide you with this summary.

McMaster University Ethics Review Board Approval

This study has been reviewed by the McMaster University Research Ethics Board, and it has received ethics approval. If you have concerns or questions about your rights as a participant or about the way the study is conducted, please contact:

McMaster Research Ethics Secretariat, Telephone: (905) 525-9140 ext. 23142 c/o Office of Research Services, E-mail: ethicsoffice@mcmaster.ca

You are also invited to contact Kathryn Fisher directly with any questions or concerns that you may have about this study.

We sincerely appreciate the time you have taken to consider participating in this study, and hope that you are willing to complete the survey. Ultimately, we look forward to providing you and the broader health community with up-to-date results on the health status and needs within your community.

Yours sincerely,

Kathryn Fisher, PhD Candidate,
McMaster University, Hamilton, Ontario