UNDERSTANDING THE LINK BETWEEN RELIGIOUS SERVICE ATTENDANCE, CORONARY HEART DISEASE AND RELATED RISK FACTORS IN CANADA: A MIXED METHODS STUDY AND FUTURE DIRECTIONS FOR HEALTH PROMOTION.

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THESIS ABSTRACT

The relationship between religion and health has been of longstanding interest in the health, social, and behavioural sciences. Attending religious services has been linked to the reduced risk of coronary heart disease (CHD) and related risk factors (e.g., diabetes and high blood pressure).

Research examining the relationships between religious indicators and the cardiovascular health of individuals and populations has been relatively understudied in the Canadian context. It could be Canadian epidemiologists are unclear of the specific features, characteristics, and dynamics operating within religious institutions and broader community settings. As such, epidemiological studies run the risk of not evaluating the effectiveness of religious behaviours and its relevance on the health of various populations in Canada.

Mixed-methods are employed in this doctoral thesis to understand the relation between an objective measure of religion, i.e., religious service attendance (RSA), and the prevalence of CHD and related risk factors in Canada. In addition, this thesis explores the role of religious institutions, specifically churches, in implementing health promotion programs for older adults.

This thesis contains three main studies, developed from a sequential explanatory mixed method research design. The first study examined the association between the frequency of RSA and prevalence of CHD, diabetes and high blood pressure in Canada. The Saskatchewan sample of the Canadian Community Health Survey (CCHS-4.1) was used to build multivariable logistic regression models. The analysis revealed participants

who attended religious services more than once a week had lower prevalent odds of CHD (OR= 0.82, 95% CI 0.61-1.11, $p>0.05$), diabetes (OR=0.60, 95% CI 0.45-0.80, $p<0.05$) and high blood pressure (OR= 0.82, 95% CI 0.68-0.99, $p<0.05$) compared to participants who attended less than once a year after adjustment for demographic, socio-economic and health behaviour factors.

Previous research in health and religion is mainly from the United States and whether conclusions on the inverse association between RSA and health outcomes hold true is unknown in the Canadian context. Therefore, the second study was qualitative and undertaken to help interpret and explain the quantitative results from the CCHS. Twelve semi-structured interviews with ordained pastors and three focus groups with parishioners in Catholic, Anglican and United churches were conducted in Canada. The findings suggest that attending religious services: (1) promotes mental health; (2) provides social support and activities; and (3) promotes health and lifestyle behaviours to lower CHD risk.

Qualitative data from the second study was used for the third study, which identified relevant factors associated with the implementation of heart health promotion programs in churches. Among the various factors identified, pastor leadership, funding for a parish nurse, community-focused interventions, secured infrastructure and social support were important to facilitate health promotion programs in churches.

Overall, this doctoral thesis features quantitative and qualitative evidence in the connection between RSA and health outcomes in Canada. Findings are supported by

strong and consistent studies, and research and health promotion implications provide future research in understanding the relations between religion and coronary health.

PREFACE

This doctoral thesis consists of studies that were prepared in collaboration with Dr. Mark Oremus (thesis supervisor) and all members of the thesis committee: Dr. Michael Boyle, Dr. Sonia Anand and Dr. Patricia Strachan. Dr. Oremus was pivotal in the mentorship and guidance in the development, execution and write-up of this thesis. Committee members contributed a depth of both clinical and research experience to the development of the research questions/objectives for each project, reviewing and providing feedback on the proposals and related manuscripts.

The author of this doctoral thesis led all components of the research projects, including the development of objectives and aims, data collection and analysis, interpretation of results, and manuscript preparation and revisions.

PRAYER

Om Jai Sai Ram
I lay this Thesis at the Lotus Feet of Lord Sri Bhagawan Sathya Sai Baba.

"Saraswathi Namasthubhyam, Varade Kaamroopini
Vidyaarambham Karishyaami, Siddhir Bhavatu Mey Sada"
"Ma Saraswathi, you are the provider of boons and the one, who grants all our educational desires.
As I pursue my studies, I bow to the Goddess to help me in making it fruitful and make me successful in all my efforts"

For my Grandma Shanti Rani Chatterjee. Always in our hearts.

ACKNOWLEDGEMENTS

I truly do not know where to begin. I never imagined in my life that I would pursue a doctoral degree. The academic journey in the last five years in the Health Research Methodology (HRM) program at McMaster University has not been an easy path. I was a qualitative researcher entering the world of epidemiology and biostatistics with no appreciation of quantitative methods. However, I knew learning about quantitative methods was going to be part of my doctoral training and I would have to work twice as hard. Fortunately, I have come to realize the value of measurement and statistical analyses in order to discern relationships between health phenomena. As a result, I learned how to bridge qualitative and quantitative methods to better understand health issues and have established myself as a mixed methods health researcher.

The thesis supervisor enhances the doctoral experience. I would like to give my sincere gratitude to Dr. Mark Oremus. You were an amazing thesis supervisor. Without your insightful ideas and constant mentorship, writing this doctoral thesis would not have been even close to possible. You supported my thesis ideas on religion and health and were the driving force behind the research projects from the beginning, and through the entire process. I never ceased to be in awe of your expertise in mixed-methods and academic writing skills.

I would like to thank Dr. Michael Boyle, Dr. Sonia Anand and Dr. Patricia Strachan for being members of the doctoral thesis committee. You were all able to provide me with the appropriate expertise and guidance on my thesis work. I give an extended thanks to Dr. Michael Boyle for being my independent study supervisor during the HRM comprehensive exams. I feel privileged to have been taught about multi-level modeling from you in the early stages of my doctoral training. It was quite the challenge but your patience and belief in my learning competencies is what kept me focused and dedicated. I thank Dr. Sonia Anand for introducing me to the HRM program to pursue a doctoral degree. I will always be appreciative to you in making me a co-investigator on the pilot project grant to investigate the contextual factors influencing health behaviours in an Aboriginal community funded by the Heart & Stroke Foundation. I thank Dr. Pat Strachan for playing a pivotal role in the planning and development of the qualitative study in my doctoral thesis. You pushed me to think critically and always pointed out my strengths as a qualitative researcher.

I feel honored to have been part of such a unique academic environment and train with a number of mentors and faculty members over the years. In particular, I would like to thank Dr. Anne Klassen for hiring me as a research assistant for two years. You enabled me to practice my qualitative data analysis skills for an incredible project that explored special challenges faced by immigrant parents caring for children with cancer in Canada. Also, I will be grateful to you for sending me to Guwahati, India and conducting qualitative interviews with patients at the Operation Smile Hospital. It was the international health research experience of a lifetime.

I would like to give a special thank you to Dr. Steve Hanna and Lorraine Carroll who helped me with all administrative issues in the HRM program. Steve, you ensured I was focused and motivated to finish all academic requirements for the HRM program in a timely fashion.

Lorraine, I enjoyed our chats beyond the topic of HRM every time I came to see you at your office. You always brought a smile to my face especially during the stressful times.

The support I received from my family and relatives in Toronto, Canada and Kolkata, India in the last five years is a true blessing. I thank my parents Namita and Anil Banerjee from the bottom of my heart for immigrating from India 40 years ago to Canada with the desire of having your children pursue post-secondary education and become respectable professionals and citizens. Your love and pride for me is priceless and I can never return all the blessings you have given me in my education and life. I thank my older brother Arnab Ted Banerjee and sister-in-law Nibedita Banerjee for supporting me always. Lastly, I thank all my relatives in Kolkata, especially my aunt Shandhya Roy Choudhury for being my second mother.

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I thank my good friend Dr. Saswata Deb and the Bengali Heart Health Team for giving me the opportunity to put some of my thesis findings into practice. It was so rewarding to organize and implement the heart health educational seminar for our Bengali community at the Toronto Kalibari Temple.

The qualitative data collection would not have been possible without all the participating Anglican, Catholic and United churches. Though I cannot disclose the names of these religious institutions and the respective pastors, I thank every study participant for their time, enthusiasm and perspectives on the thesis research questions. God bless you all.

This doctoral thesis is dedicated to my late grandmother Shanti Rani Chatterjee, also known as my Didu. You raised me for 27 years and always encouraged me to work hard and appreciate all that life has to offer. I still remember the day how happy you were when I told you I was pursuing a doctoral degree but also sad to see me move to Hamilton from Toronto. You left this world suddenly during my first year at McMaster and I couldn't imagine continuing my doctoral work without you. I know your spirit carried me through the next four years and brought me to the finish line in fulfilling an amazing academic achievement.

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CHAPTER 1: GENERAL INTRODUCTION & THESIS OVERVIEW

1.0 General Introduction

Evidence from epidemiological and clinical studies shows that attending religious services is inversely associated with health outcomes such as coronary heart disease (CHD) and related risk factors like diabetes and high blood pressure (Hummer et al, 1999; Oman et al, 2002; Goldbourt et al, 2003; King et al, 2001; 2002). These studies suggest attending religious services could provide a small yet important protective benefit against CHD and related risk factors.

The evidence for the association between religious service attendance (RSA) and CHD and related risk factors is primarily based on American studies. It remains important to determine if this association exists in Canada since about 32% of adults in Canada attend religious services at least monthly (Statistics Canada, 2009). Further, while published studies have focused on the relationship between RSA and various health outcomes (e.g., CHD and high blood pressure), the link between RSA and diabetes has not been researched as extensively. Thus, more research into a possible link between diabetes and RSA is required.

Understanding the relationship between RSA and CHD and related risk factors will provide evidence as to whether places of worship could be potential avenues for health promotion initiatives and risk reduction activities that counter CHD in Canada. Religious groups could promote health and prevent disease through encouragement of positive health behaviours and provision of services, such as screening (Levin, 1994). Several church-based health awareness and intervention programs have been successful in

reducing high blood pressure, and diabetes (Campbell et al, 2004), which can reduce the risk for CHD.

1.1 Use of Mixed Methodologies to Understand Religion and Health

Research on religion and health is challenging due to the inherent difficulty of measuring religious constructs and new approaches are needed to broaden our understanding of religion and health. The complexity of religious dimensions (e.g., RSA) in relation to CHD health makes this area an ideal context for the use of mixed method approaches. Indeed, the use of qualitative studies has been recommended as a valuable complement to large-scale epidemiological studies examining the influence of religious indicators on the health of populations (Chatters, 2000). Sometimes quantitative relations between RSA and better health outcomes may provide a partial understanding and a need for further explanation is required. Often, quantitative results can net general explanations for the relationship between RSA and health variables, but the more detailed understanding of the specific aspects of RSA (e.g., prayer, social support, and proscribed health behaviours) influencing health outcomes are often lacking. Qualitative data can help to build a depth of understanding of the religious context in relation to health that is not always possible through the use of quantitative investigations.

The combination of quantitative and qualitative methods in health and social sciences is growing steadily as evidenced by the extensive range of published papers and books over the past decade (Creswell, 2007). The mixed method sequential explanatory research design is characterized by the collection and analysis of quantitative data

followed by the collection and analysis of qualitative data (Creswell & Clark, 2007). The purpose of this design is to use the qualitative findings to explain or give greater meaning to the quantitative data. Tashakori & Creswell (2007) suggested that using this design increases the reliability, validity and accuracy of the quantitative study.

In this doctoral thesis, the mixed method sequential explanatory research design is employed in three phases (figure 1-1, page 10). First, the quantitative relation between RSA and CHD and related risk factors were examined. The second phase entailed qualitative methods to explain the inverse relation between RSA and CHD and related risk factors found in the first phase from the perspective of pastors and parishioners. Data integration (Creswell, 2007) occurred in the third phase in which the quantitative and qualitative results were compared. This phase helped answer questions that could not be answered by quantitative or qualitative approaches alone.

1.2 Thesis Overview

1.2.1 Chapter 2: Literature Review

The doctoral thesis begins with a review of the trends in CHD, diabetes and high blood pressure prevalence in Canada. The concept of religion and its associated indicators (e.g., RSA) are introduced in the context of CHD health. Studies showing a relationship between RSA and CHD and related risk factors are highlighted. Various proposed mechanisms considered in the literature are reviewed to explain the relationships. Lastly, gaps in the literature are discussed to provide rationales for this thesis project.

1.2.2. Outline of Thesis

Quantitative and qualitative methods and data, combined in a set of three studies are presented in this thesis. Figure 1-1 (page 10) shows the mixed method sequential explanatory design of this thesis.

1.2.2.1 Chapter 3: The Relationship Between RSA and Coronary Heart Disease and Related Risk Factors in Saskatchewan, Canada

This is the first thesis study conducted in Canada to quantitatively analyze the RSA variable collected in the 2007-2008 Canadian Community Health Survey (CCHS 4.1) (Statistics Canada, 2007a). A series of multivariable logistic regression models was developed to evaluate associations between RSA and self-reported CHD, diabetes and high blood pressure. The results of this study extend the current knowledge about attending religious services and CHD health by examining understudied health outcomes like diabetes. The findings were orally presented at the Canadian Research Data Centre Network Conference (CRDCN) in October 2011 (Banerjee et al, 2011). This study was published in *The Journal of Religion and Health* (Banerjee et al, 2012) [Appendix A, page 205] and featured in the *National Post* (Blackwell, 2012) [Appendix E, page 235] and on *Global News Television* (2012).

1.2.2.2 Chapter 4: Attending Religious Services and the Relation to Prevalence of Coronary Heart Disease and Related Risk Factors: A Qualitative Study of Church Pastors' and Parishioners' Perspectives

Although quantitative research is particularly effective for examining potential relationships between RSA and CHD health variables, it often does not illuminate the

context within which the relationship between these variables occur. Also, quantitative studies do not address questions of "how" and "why" particular relationships among variables exist. Thus, the second study of this thesis uses qualitative methods (e.g., interviews and focus groups) to explain the results of the first study from the perspectives of ordained pastors and parishioners who attend religious services at least once a week. Direct content analysis (Patton, 1999) was conducted to specifically identify aspects of weekly RSA that may be related to a lower prevalence of CHD and related risk factors among parishioners. The findings were presented at the McMaster University Clinical Epidemiology & Biostatistics Research Day during March 2012 for which the doctoral student won the Michael Gent Prize for the Best Poster by an HRM student (Banerjee et al, 2012).

1.2.2.3 Chapter 5: Factors to Facilitate the Implementation of Heart Health Promotion Programs In Canadian Churches: A Qualitative Study

The third and final study is informed from the qualitative data collection in the second study. Direct content analysis was conducted to identify the facilitating factors in the implementation of heart health promotion programs in Canadian churches. The findings were placed in the context of the Precede-Proceed model (Green & Kreuter, 2005). The findings have particular relevance for health promotion and public health research to design community-based health promotion programs in religious institutions for the older adult population at risk for chronic diseases.

1.2.3 Chapter 6: Discussion

Although each chapter has a discussion section respective to the specific study, this chapter will integrate the findings of all three studies. Future research and practical implications will be also discussed.

1.2.4 Chapter 7: Conclusions

The final chapter of this dissertation will summarize the findings of the entire thesis.

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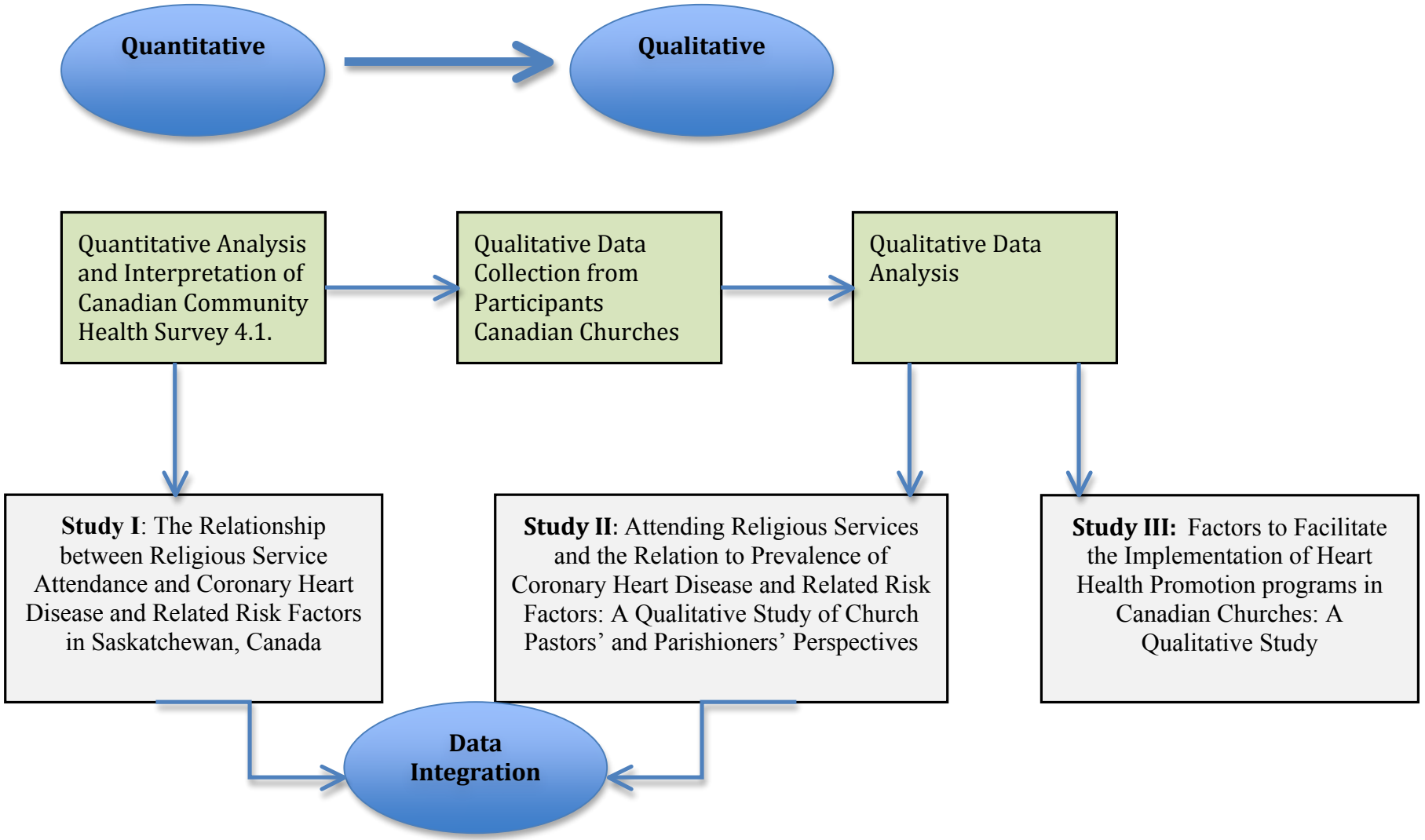
Figure 1-1: Mixed Method Sequential Explanatory Research Design of Doctoral Thesis (Adapted from Creswell & Clark, 2007)



CHAPTER 2: LITERATURE REVIEW

2.0 The Burden of Coronary Heart Disease, Diabetes and High Blood Pressure in Canada

The prevalence of CHD and its attendant risk factors is increasing in most age and income groups in Canada (Lee et al, 2009). CHD is the result of atherosclerosis and is one of the leading causes of death in Canadian adults. Atherosclerosis, the build-up of fatty substances in the arteries, decreases blood flow to the heart (PHAC, 2005). Three common classifications of CHD are ischemic heart disease, acute myocardial infarction (AMI), and congestive heart failure. Conservative estimates suggest 1.3 million Canadians (4.8% of Canadians) had CHD in 2007 (PHAC, 2009). In Canada in 2004, there were 72,743 deaths due to CHD, representing 32.1% of all deaths. Also in 2004, CHD costs in Canada amounted to $22.2 billion (PHAC, 2009). Two significant risk factors for CHD are type II diabetes mellitus and high blood pressure (PHAC, 2009).

Insulin is a hormone that lowers the level of glucose (a type of sugar) in the blood. Type II diabetes usually begins with insulin resistance, where the body's cells are unable to use insulin properly, thereby causing the glucose level in the blood to rise. The proportion of people with type II diabetes has increased in the Canadian population, whether measured by self report (4.2% in 2000 to 5.8% in 2007) or from physicians' records (5.5% in 2000/01 to 7.1% in 2004/05) (PHAC, 2009). Type II diabetes has long been known as a risk factor for CHD, as revealed from the Framingham study, and is conservatively estimated to increase the risk of CHD events by twofold (Kannel and

McGee, 1979). In a Canadian study, Tanuseputro et al estimated the absolute risk of CHD in Canadian patients with type 2 diabetes at 23% (2003).

High blood pressure or hypertension is defined as systolic blood pressure greater than or equal to 140 mmHg or diastolic blood pressure greater than or equal to 90 mmHg (PHAC, 2005). High blood pressure is increasing at rates similar to diabetes discussed above (PHAC, 2005). Epidemiologic studies have consistently shown continuous and independent relations between high blood pressure and CHD (Vasasn et al, 2001; Rywik et al, 2000). Vasan et al (2001) demonstrated a stepwise increase in cardiovascular event rates in persons with higher base line blood pressure categories in the Framingham Heart Study. Compared to persons with optimal blood pressure (120/80), persons with high-normal blood pressure (130/85 to 139/89) had higher risk of CHD (adjusted hazard ratio = 2.5, $p<0.001$).

There are a number of underlying determinants of CHD, diabetes and high blood pressure among Canadians. Most Canadian data have supported the relation between these health challenges and a range of clinical (e.g., obesity and cholesterol), socio-demographic (e.g., income and ethnicity) and behavioural (e.g., exercise and diet) determinants (Yusuf et al, 2004; Tanuseputro et al, 2003).

Indicators of religion are important social variables that have not been examined in Canadian studies of determinants of CHD and related risk factors. Given the large numbers of people who are religiously active, studying the association between religious indicators, specifically RSA, and CHD is relevant for a substantial proportion of the

Canadian population. Whether frequency of attendance plays a beneficial role in preventing and managing CHD and related risk factors is unknown in Canada.

2.1 Defining Religion in the Context of Health

The Commission on Social Determinants of Health (CSDH) developed by the World Health Organization (WHO) states religion is a social determinant of health similar to income, gender and ethnicity (Kelly et al, 2007). Koenig (2001b) describes religion in the health context as an organized system of beliefs, practices, rituals, and symbols designed (1) to facilitate closeness to the sacred or transcendent (e.g., God, higher power, or ultimate truth/reality) and (2) to foster an understanding of one's relationship and responsibility to others living together in a community. Religion in the scientific literature often refers to religious service attendance (RSA), including practices like meditation and praying at a place of worship (Musgrave, 2002).

It is important not to overstate the extent to which researchers and healthcare practitioners endorse the proposition that religious involvement is important for individual and population health (Chatters, 2000). Skeptical resistance to this perspective is still evident and primarily reflects challenges in understanding the complex, multifactorial processes through which religion affects health outcomes (Sloan, Bagiella, & Powell, 1999; Koenig et al, 1999). Moreover, longstanding scientific and professional perspectives have fostered stereotypes and misconceptions about issues of religion and/or openly antagonistic attitudes that preclude a consideration of questions related to religion and health (Sherill & Larson, 1994).

Researchers should maintain a rigorous perspective with regard to studies on religion and health and also recognize inherent limitations and suggest constructive ways in which to advance this field of study. Overall, there is little dispute that attending religious services can provide psychological comfort to adherents (Koenig, 2001). The scientific literature on religion and health is growing and overall showing that participation in religious services is linked to better CHD health outcomes. Social, moral, and dietary prescriptions that promote health and communal religious activities that increase social support are among the effects of religious involvement on better CHD health (Martin & Carlson, 1988). These are potentially important findings that have implications for disease prevention and disease etiology (Ellison & Levin, 1998).

2.2 Systematic Review on the Relation between Religious Service Attendance and Coronary Heart Disease and Related Risk Factors

2.2.1 Search Strategy and Results

A systematic review was conducted to examine the published literature on the relation between RSA and CHD, diabetes and high blood pressure. Databases included MEDLINE, Web of Science, CINAHL and PSYCINFO between 1970 and June 2012. Key words were "coronary artery disease", "diabetes", "high blood pressure", "hypertension", "religion", and "RSA". The review included longitudinal and cross-sectional studies measuring RSA that controlled for potential confounders. Out of the 124 articles retrieved from the search, only ten met these criteria. The ten studies identified

for this literature review, almost all were conducted at least 10 years ago (Hummer et al, 1999; Oman et al, 2002; Goldbourt et al, 1993; King et al, 2001; Koenig et al, 1989; Larson et al, 1989; Graham et al, 1978; Gillum, 2006; ; Obisesan et al 2006; Sorensen et al, 2011). Among the four longitudinal studies, two articles studied cardiovascular (including CHD) mortality (Hummer et al, 1999; Oman et al, 2002), one article studied CHD mortality (Goldbourt et al, 1993) and another studied cardiovascular inflammatory markers (King et al, 2001). There was one cross-sectional study examining the relation between RSA and prevalence of heart attacks (Obisesan et al, 2006). Hummer et al's study also examined the impact of RSA on diabetes mortality (1999). High blood pressure was not examined in any of the longitudinal studies, but it was examined in the five cross-sectional studies (Koenig et al, 1989; Larson et al, 1989; Graham et al, 1978; Gillum, 2006; Sorensen et al, 2011). Further, the cross-sectional studies did not examine CHD and diabetes in relation to RSA.

2.2.1.1 Coronary Heart Disease

An eight-year follow-up study conducted by Hummer et al (1999) found an association between RSA and CHD mortality. They examined data from the 1987 U.S. National Health Interview Survey (NHIS), which comprised 22,080 people (National Center for Health Statistics, 1989). Compared with persons who attended church more than once weekly, persons who never attended had a greater risk of dying from cardiovascular disease (including CHD). The adjusted hazard ratio was 1.87 ($p<0.001$), after controlling for demographic factors such as age, gender, education and ethnicity. This excess risk

dropped slightly, but remained statistically significant, after controlling for health behaviours (e.g., cigarette smoking) and social ties (e.g., having friends to count on for help).

Oman et al (2002) also found inverse associations between frequency of religious attendance and mortality from cardiovascular disease (including CHD) between 1965 and 1996 among 6,545 residents of Alameda County, California. Their results were similar to Hummer et al's longitudinal study. After adjusting for age and sex, Oman et al found that infrequent religious service attendees (i.e., never or less than weekly) had significantly higher mortality from cardiovascular disease (including CHD) [hazard ratio=1.41, $p<0.0001$] compared to frequent attendees (i.e., greater than weekly). In models controlling for demographic (e.g., ethnicity, country of birth, age, education, income and marital status), social support and health behaviour (e.g., smoking status, exercise level, and alcohol consumption) variables, infrequent attendees had higher rates of death from circulatory diseases (hazard ratio=1.21, $p<0.001$).

Oman et al and Hummer et al stated that their findings were partly due to enhanced social ties and improved health behaviours among frequent attendees. Frequent attendees had more social connections than infrequent attendees. These connections were characterized by close relatives and friends, as well as nonreligious group membership (Oman et al, 2002). In addition, frequent attendees as a group were more likely to exercise and less likely to smoke or excessively consume alcohol.

Goldbourt et al. (1993) studied the impact of degree of religious orthodoxy (i.e., religious attendance at synagogues, religious education and self-described degree of

orthodoxy) on CHD mortality in 10,059 Israeli civil servants over a 23-year follow-up. They found an unadjusted relative risk (RR) of 0.69 (p <0.05), indicating individuals classified as highly orthodox had a 31 percent lower risk of death from CHD compared to less orthodox individuals. After adjustment for socio-demographic factors (e.g., age, gender and income) and healthy behaviours (e.g., physical activity and smoking status), this association remained largely unchanged (RR= 0.72, p <0.05). Further, the relation between degree of orthodoxy and better cardiovascular health remained after results were adjusted for blood pressure, previous CHD, smoking, cholesterol and diabetes.

A study by King et al (2001) used data from the National Health and Nutrition Examination Survey III (1988-1994) to explore the relationship between RSA and inflammatory markers of cardiovascular risk. Compared to persons with higher-frequency attendance, persons with lower-frequency attendance at religious services had significantly higher white blood cell counts (4.05% vs. 2.08%, p=.001) and higher C-reactive protein (10.35% vs. 7.90%, p=0.05). These findings suggest that persons with lower frequency attendance were at greater cardiovascular risk. When the authors controlled for covariates such as age, gender, health status, and body mass index, the inverse relation between religious attendance and inflammatory markers of cardiovascular risk held.

A cross-sectional study conducted by Obisesan et al (2006) examined whether frequency of attendance at religious services was associated with the prevalence of heart attack. The authors also analyzed data from the National Health and Nutrition Examination Survey III like King et al (2001). Overall, they found frequent attenders, i.e.

those who attend religious services more than once a week over the age of 60 had the same prevalence of self-reported heart attack as infrequent attenders, i.e. those who never attended religious services (10.9% vs. 12.3%) but a lower prevalence at age 20-50 (0.9% vs. 1.5%, p=0.039). After adjusting for all demographic variables, the only significant association between RSA and heart attack status (yes, no) was observed in Mexican American men. RSA in these men was inversely associated with heart attack status (OR=0.33, p<0.001).

2.2.1.2 Diabetes and High Blood Pressure

Only one longitudinal study examined the association between RSA and diabetes. Hummer et al found individuals who never attended religious services were about 3.76 (p<0.05) times more likely to die from diabetes compared to persons who attended more than once a week, after controlling for several covariates (e.g., age, gender, physical activity and smoking).

Five cross-sectional studies examined the association between attendance at religious services and high blood pressure (Koenig et al, 1989; Larson et al, 1989; Graham et al, 1978; Gillum, 2006; Sorensen et al, 2011). Among the older cross-sectional studies, Graham et al observed a significant and consistent association between frequent church attendance and lowered mean age-adjusted systolic and diastolic blood pressure levels in white males (1978). Larson et al (1989) examined the relation between the frequency of church attendance and blood pressure status. Comparison of mean systolic (134.1 mmHg vs. 136.3 mmHg) and diastolic (83.9 mmHg vs. 86.4 mmHg) blood pressures between frequent (at least weekly) and infrequent (less thank weekly)

church attenders showed lower pressures among frequent attenders, although the differences were not statistically significant. A few years later, Koenig et al found small (1-4 mmHg) and consistent, though non-significant, differences in measured systolic and diastolic blood pressures between frequent (once per week) and infrequent (less than per week) religious service attenders (1998).

In 2006, Gillum et al examined whether frequency of attendance at religious services was related to the prevalence of hypertension (blood pressure $\geq$ 140/90 mmHg) among 14,475 Americans participating in the Third National Health and Nutrition Examination Survey (NHANES III). After controlling for socio-demographic and health status, and blood pressure treatment, weekly and more than weekly religious attendance were associated with lower prevalence compared to nonattendance: weekly attendance ($p<0.01$); more than weekly ($p<0.05$).

More recently, Sorensen et al (2011) tested the relationship between RSA and blood pressure in a Norwegian context. After adjustment, inverse associations between RSA and diastolic blood pressure/systolic blood pressure were found. The RSA-diastolic blood pressure relationship ($p < 0.001$) demonstrated a gradient in effect, with increasing RSA associated with decreasing diastolic blood pressure, with 1.50/1.67 mmHg lower in women/men respectively in those attending more than 3 times/month, 0.87/1.16 mmHg lower in those attending 1-3 times/month, and 0.49/0.10 mmHg less in those attending 1-6 times /6 months.

2.2.1.3 Summary

In conclusion, the strength of association between RSA and CHD and related risk factors like high blood pressure is similar across most studies (9/10) in the literature review. However, more research is necessary to determine whether RSA impacts CHD related outcomes such as diabetes.

2.3 Theoretical Framework to Explain the Relation Between Religious Service Attendance and Coronary Heart Disease and Related Risk Factors

Harold Koenig studied the relation between religion and all dimensions of health (including CHD) [2001a; 2001b; 2001c; 2008; 1998] and proposed a *theoretical framework* to help understand religion and chronic diseases (including CHD) (Figure 2-1. page 30). His framework (Koenig et al, 2001b) illustrates the impact of RSA on physical health outcomes (including CHD, diabetes and high blood pressure) and involves a number of possible explanations and functional mechanisms (e.g., direct effects and indirect [mediated or moderated] effects through other variables).

Prior research suggests some variables may be said to function as mediators to the extent that they partially explain the relation between RSA and CHD (Hummer et al, 1999; Oman et al, 2002). There is strong evidence that better CHD outcomes for people who frequently attend religious services are partially explained by better health behaviours (physical activity and not smoking), which suggests that religious involvement serves a general health promotion function (Oman et al, 2002). Studies (Hummer et al, 1999; Oman et al, 2002) suggest attending religious services benefit

health indirectly by providing an impetus for people to engage in positive lifestyle and health behaviours that result in reductions in risk for CHD, diabetes and high blood pressure (e.g., via healthy diets, not smoking, and exercising).

Research has also shown that people involved in religious practices enjoy increased social support, which has been recognized as an important mechanism for understanding the effects of RSA on health (Jones, 2004; Strawbridge et al, 2001, Musick et al, 2004; Ellison & George,1994). Strawbridge and colleagues (2001) investigated whether religious attendance would improve social relationships for 2,676 Alameda County Study participants, aged 17 to 65 years in 1965, who survived to 1994. Weekly attendance was significantly associated with increased social relationships (OR=1.62, 95% CI=1.13-2.31) compared to persons who never attended. In turn, a number of studies have shown that social ties are associated with better CHD health (Greenwood et al, 1996).

RSA could be protective against CHD. However, the magnitude of this effect may vary based on the impact of potential moderators that affect the direction or strength of the relation between RSA and health outcomes. For example, the significance and relationship of RSA to CHD health outcomes could vary across different levels of socio-demographic variables (e.g., age, gender and ethnicity).

Attending religious services may be more common for older people. Koenig (2001a) argued older adults who, compared to younger people, are more likely to have CHD, diabetes or high blood pressure attend places of worship to seek emotional and instrumental social support. This can imply reverse causality bias, which suggests being

diagnosed with CHD, diabetes or high blood pressure may encourage greater religious attendance among older persons who would otherwise rarely attend. Therefore, the effects of service attendance on CHD and related risk factors could appear to be stronger for older adults.

Women are consistently found to attend religious services more often than men. Therefore, the effect of service attendance on CHD health outcomes may be greater for women than men (Strawbridge et al, 1997). Lastly, religion is of special importance in the lives of ethnic groups such as Blacks and South Asians (Multicultural Canada, 2009). In the United States, African American churches have historically provided an avenue for status attainment and social integration. Studies show African Americans derive significant support from fellow church congregants (Campbell, 2007) and report higher levels of attendance than Europeans (Levin, Taylor and Chatters, 1994). In summary, we might expect the effects of RSA on CHD and related outcomes to be stronger among older adults, women and certain ethnic groups.

2.4 Gaps in the Literature

Studies are consistent in showing that persons who attend religious services frequently have a lower risk of CHD mortality, though no new findings have been reported in the recent years.

Researchers have not investigated whether the association exists in different populations. The cohorts of most studies (8/10) identified in the literature review consist primarily of individuals living in the United States. Thus, the relationship between RSA

and CHD and related risk factors remains unknown in the Canadian context.

Religion is an important aspect for many individuals living in Canada. According to the General Social Survey (GSS) conducted in 2008, the combined rate of weekly and monthly attendance at religious services in Canada was about 30% (Eagle, 2011). Despite the fact that Canadians differ considerably in terms of their religious affiliations, various communities attach a strong sense of importance to their religion and to attending religious services. Therefore, it is critical to understand whether RSA is a potential determinant of CHD health in Canada.

Most studies have not examined dose-response and only one study by Hummer et al. has shown a decreased risk of CHD mortality with increasing RSA after controlling for several covariates. Compared with people who attended church more than once weekly, persons who never attended, who attended less than once per week and who attended weekly had adjusted hazard ratios of 1.50 ($p<0.01$), 1.24 ($p<0.05$) and 1.21 ($p<0.05$) respectively. It appears most researchers are primarily concerned about individuals who attend more than once a week in comparison to individuals who do not attend at all. It could be the dose response for CHD may occur above a certain threshold, where the maximal effect occurs at attending religious services at least once a week. Overall, very few data exist to support a dose-response relationship, it is important to evaluate whether attending religious services monthly confers similar health outcomes compared to attending more than once per week.

This thesis study adds to the health and religion literature by examining understudied chronic conditions such as diabetes. Prevalence statistics for this condition

in relation to RSA are needed because the number of sufferers is relatively large and their use of health services is high, thereby contributing to an excess health care burden. For example, CHD and diabetes were among the 'top ten' most prevalent chronic diseases in Canada and the leading causes of death over the last several years (PHAC, 2005). Further, patients diagnosed with diabetes or high blood pressure are two to three more times likely to be at risk for CHD. Thus, understanding the association between chronic diseases such as diabetes and RSA will help inform researchers, health professionals and policy makers on how to prevent chronic disease and health promotion activities at a community level.

Unlike previous studies, this analysis includes individuals who attend religious services a few times a year. It is important to evaluate whether persons who attend church a few times a year confer similar health outcomes to persons who attend more than once a week.

A number of factors suggest places of worship may be a particularly effective location for innovative health programs (Campbell, 2007). Places of worship are one of the first places many people naturally turn to when health problems arise especially in the older adult population who in need of preventive health programs. (Koenig, McCullough & Larson, 2001). Religious institutions function not only as houses of worship, but also education sites and expanding activities to include a focused health program may correspond with and extend the traditional mission of places of worship (Olsen et al, 1988).

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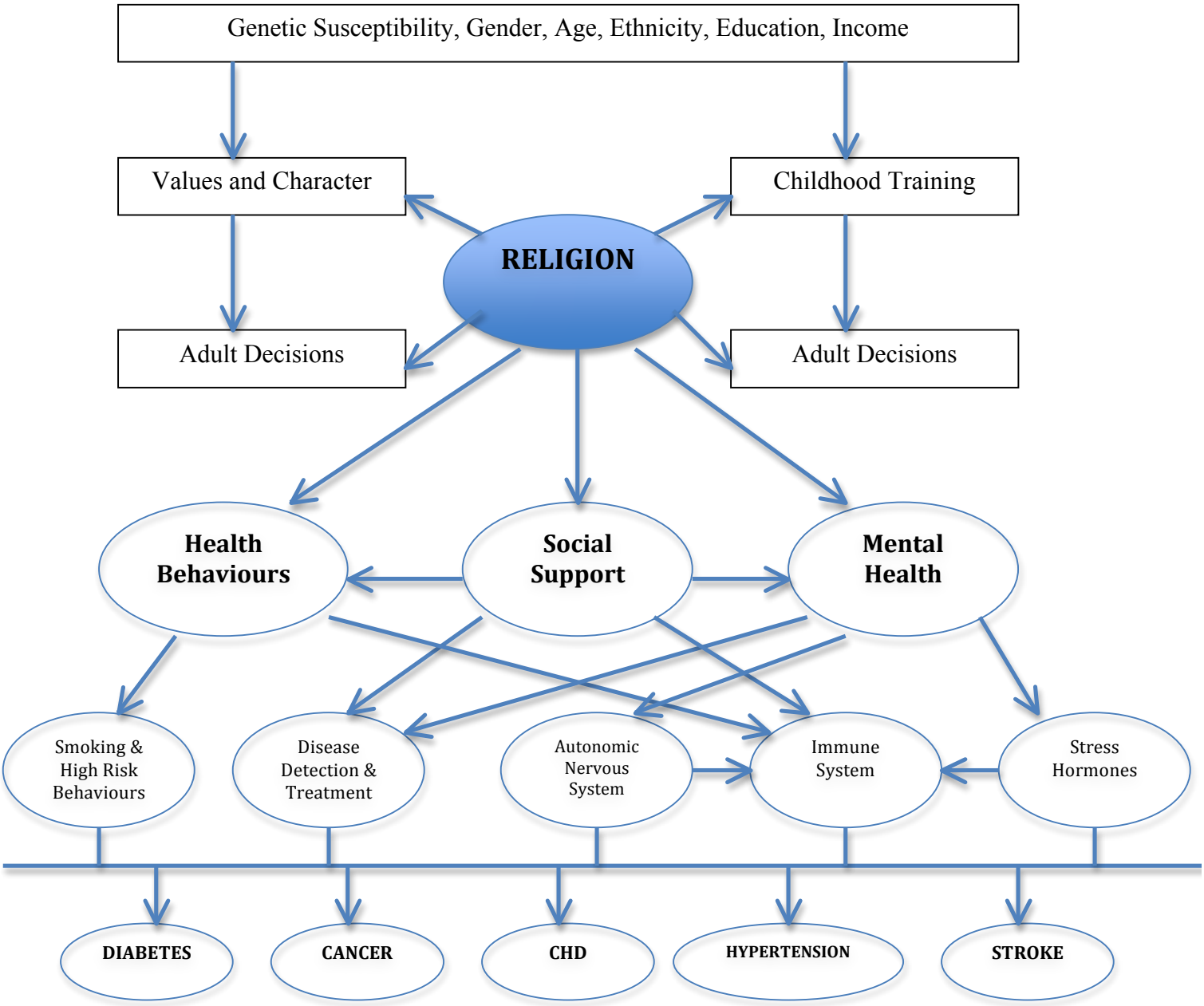
Figure 2-1: Theoretical Model Describing How Religion Affects Physical Health



From Koenig, H.G., McCullough, M.E., Larson, D.B. (2001). *Handbook of Religion and Health*. Oxford: Oxford University Press. Copyright 2011 by Oxford University Press. Reprinted with permission. (Appendix B, page 222)

CHAPTER 3: STUDY I

THE RELATIONSHIP BETWEEN RELIGIOUS SERVICE ATTENDANCE SERVICE AND CORONARY HEART DISEASE AND RELATED RISK FACTORS IN SASKATCHEWAN, CANADA

3.0 Abstract:

Research suggests that attending religious services could provide small yet important protective benefits against coronary heart disease (CHD) and CHD risk factors (e.g., diabetes, high blood pressure). The extent to which these benefits apply to Canada deserves study because approximately one-third of adult Canadians attend religious services at least monthly. Therefore, the objective of this study is to examine the association between frequency of religious service attendance (RSA) and prevalence of (1) CHD, (2) diabetes and (3) high blood pressure in Canada. We used the Saskatchewan sample (n=5442) of the Canadian Community Health Survey (CCHS-4.1) and built multivariable logistic regression models to evaluate associations between RSA and self-reported CHD, diabetes and high blood pressure. After controlling for demographic, socio-economic and health behaviour variables, the association between RSA and prevalence of CHD was not significant (OR= 0.82, 95% CI 0.61-1.11). However, persons who attended religious services more than once a week exhibited lower prevalent odds of diabetes (OR=0.60, 95% CI 0.45-0.80) and high blood pressure (OR= 0.82, 95% CI 0.68-0.99) compared to persons who attended less than once a year. The findings of this study are the first to suggest RSA may be associated with a lower prevalence of CHD risk factors in Canada.

Keywords: Coronary Heart Disease; Diabetes; high blood pressure; Religious Service Attendance; Canada

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3.1 Background

Coronary heart disease (CHD) and the related risk factors of diabetes and high blood pressure are the leading causes of morbidity and mortality in Canada (PHAC 2005; 2009). There are a number of underlying determinants of CHD, diabetes and high blood pressure. These determinants include a range of clinical (e.g., obesity and cholesterol), socio-demographic (e.g., income and ethnicity) and behavioural (e.g., exercise and diet) variables (Tanuseputro et al, 2003; Yusuf et al, 2004; Lee et al, 2009). Indicators of religion are equally important social determinants that have not been examined in Canadian studies of CHD and related risk factors.

The World Health Organization (WHO) Commission on Social Determinants of Health states that religion is a social determinant of health similar to income, gender and ethnicity (Kelly et al, 2007), and identified in recent years as a potential influence on coronary health. In studies examining the relationship between different dimensions of religious involvement and health, associations have been stronger for religious attendance than for other dimensions such as spirituality or prayer (McCullough et al., 2000). In longitudinal studies, RSA is inversely associated with CHD (Hummer et al. 1999; Oman et al. 2002; Goldbourt, Yaari & Medali 1993; King et al. 2001). For example, Hummer et al (1999) examined data collected from 22,080 people participating in the eight-year follow-up study of the 1987 U.S. National Health Interview Survey (NHIS) (National Center for Health Statistics, 1989). Compared with people who attended church more than once per week, people who did not attend church at all were 1.87 ($p<0.001$) times as likely to die from cardiovascular disease (including CHD) after controlling for

demographic variables such as age, gender, education and ethnicity. This excess risk dropped slightly, but remained statistically significant, after controlling for health behaviours (e.g., cigarette smoking) and social ties (e.g., having friends to count on for help).

Oman et al (2002) also found inverse associations between frequency of religious attendance and mortality from cardiovascular disease (including CHD) between 1965 and 1996 among 6,545 residents of Alameda County, California. Their results were similar to Hummer et al's longitudinal study. After adjusting for age and sex, Oman et al found that infrequent religious service attendees (i.e., never or less than weekly) had significantly higher mortality from cardiovascular disease (including CHD) [hazard ratio=1.41, $p<0.0001$] compared to frequent attendees (i.e., greater than weekly). In models controlling for demographic (e.g., ethnicity, country of birth, age, education, income and marital status), social support and health behaviour (e.g., smoking status, exercise level, and alcohol consumption) variables, infrequent attendees had higher rates of death from circulatory diseases (hazard ratio=1.21, $p<0.001$).

Oman et al and with Hummer et al stated that their findings were partly due to enhanced social ties and improved health behaviours among frequent attendees. Frequent attendees had more social connections than infrequent attendees. These connections were characterized by close relatives and friends, as well as nonreligious group membership (Oman et al, 2002).

The relationship between RSA and diabetes has been studied less frequently. Hummer et al. (1999) reported that individuals who never attended religious services

were about 3.76 ($p<0.05$) times more likely to die from diabetes compared to persons who attended more than once a week after controlling for age, gender, physical activity and smoking.

Studies examining an association between attendance at religious services and high blood pressure are rare and based on cross-sectional designs. Gillum et al. (2006) examined whether frequency of attendance at religious services is related to the prevalence of hypertension (blood pressure $\geq$ 140/90 mmHg) among 14,475 Americans participating in the Third National Health and Nutrition Examination Survey (NHANES III). After controlling for socio-demographic variables, respondent health status, and blood pressure treatment, weekly and more than weekly religious attendance versus non-attendance were associated with a significantly reduced prevalence of hypertension.

Overall, available research indicates that attending religious services could provide small yet protective benefits against CHD and related risk factors. There is evidence that better CHD outcomes for people who frequently attend religious services are explained partially by better health behaviours (physical activity and not smoking), which suggests that religious involvement may serve a general health promotion function (Oman et al. 2002). In this health promotion function, attending religious services could provide the impetus for people to engage in positive lifestyle and health behaviours that result in reductions in risk for CHD, diabetes and high blood pressure (e.g., via healthy diets, not smoking, and exercising) (Hummer et al. 1999; Oman et al. 2002).

No data exist to on the association between frequency of religious attendance and the prevalence of CHD and related risk factors among Canadians. Studies from the

United States are not necessarily generalizable to Canada, where the combined rate of weekly and monthly RSA is approximately 32%, compared to 40% in the United States (Eagle 2011). Further, differences in health care between the United States and Canada, including greater reliance on private funding and for-private delivery, as well as markedly higher expenditures, in the United States, may result in different health outcomes (Ross et al, 2000).

Given the large numbers of people who are religiously active, the association between religious indicators, including RSA, and CHD is relevant for many persons living in Canada. The large sample size of, and extensive data collected through, the 2007-2008 Canadian Community Health Survey (CCHS 4.1) provide a first and unique opportunity to examine the possible association between RSA and CHD and related risk factors. The results of this study have been published in the Journal of Religion & Health (Banerjee et al, 2012).

3.2 Research Questions

1) Is there an association between the frequency of attending religious services and the prevalence of each of the following chronic diseases among Canadians: (1) CHD, (2) diabetes and (3) high blood pressure.
2) Do age, gender, and ethnicity moderate the relation between RSA and prevalence of CHD and related risk factors (i.e., diabetes and high blood pressure) among Canadians?

3.3 Research Hypotheses

We hypothesize that the frequency of attending religious services is inversely associated with the prevalence of CHD and related risk factors among Canadians. In addition, we hypothesize age, gender, and ethnicity will moderate the association between RSA and CHD and related risk factors among Canadians. We expect the relation between RSA and each health outcome to be stronger among older people, women and ethnic individuals.

3.4 Methodology

3.4.1 Data Source and Study Population

The Social Sciences and Humanities Research Council of Canada approved access to the Canadian Community Health Survey 2007/2008 (CCHS 4.1) data to conduct this study. The purpose of the CCHS is to provide nationally representative, cross-sectional data on health determinants, health status, and health system utilization (Statistics Canada, 2007a). The CCHS targets Canadians aged 12 years or older who live in private dwellings. Excluded from the sample frame are persons living on Indian Reserves or Crown lands, residing in institutions, full-time members of the Canadian Forces, and persons living in remote regions of the country. The sample frame covers approximately 98% of the Canadian population (Statistics Canada 2007a). A detailed description of the survey design, sample, and interviewing procedures can be found elsewhere (Beland, 2002).

In CCHS 4.1, households are selected according to a multi-stage stratified cluster design and one individual is chosen within each household to respond to the survey according to a pre-defined strategy that ensures over-representation of young persons and seniors. One person aged 12 or older is randomly selected from each sampled household. Trained interviewers interview participants face-to-face. In some health regions, random digit dialing (RDD) was also used to recruit participants who were interviewed by telephone.

In 2007, Statistics Canada first included religion in the CCHS 4.1 as optional content. Specific health regions and provinces could choose whether to include this optional content in interviews administered to participants in their jurisdiction. Saskatchewan and Nunavut were the only provinces or territories to include the optional content on religion. Therefore, for this study, the sample included participants in Saskatchewan who responded to the question on RSA. Nunavut was excluded from this study because the sample size was small (n=350) and drawn from a limited number of communities that were not reflective of the Canadian population.

The Saskatchewan data were representative of the data collected from the other Canadian provinces and territories in the CCHS 4.1 (Table 3-1, page 79). The distribution of sample characteristics in the Saskatchewan population was similar to the distribution of these characteristics in the entire Canadian population as evidenced by the 2006 Census (Statistics Canada, 2009).

Figure 3-1 (page 76) shows the flow of unweighted sample selection (see Section 3.4.1.1, page 39 for a description of weighting). CCHS 4.1 contained 7144 participants

from Saskatchewan who were over the age of 18. However, 1629 (21.4% of 7144) were excluded from this study because they did not respond to the question about RSA. Among the participants who did respond to this question (n=5515), 73 (1.2%) were missing data for ethnicity and health outcomes including CHD, diabetes, and high blood pressure (Table 3-2, page 79) and were removed from this study. Therefore, the total unweighted sample was 5442 for this study.

3.4.1.1 Weighting

Statistics Canada produced a set of weights that must be used to analyze and present CCHS data results in all reports and publications (Statistics Canada, 2007a). These weights correct for sample selection probabilities and non-response to approximate the distribution of demographic variables in the overall Canadian population. Household weights for the area frame and RDD frame were calculated separately and integrated to produce one set of weights for the entire sample. Person-level adjustments were then applied to create person-level weights, followed by a combined post-stratification / seasonal adjustment step where the weights were post-stratified to projected population counts based on the most recent census (Statistics Canada, 2009). Therefore, the final weighted study sample for the analysis was 5457.

3.4.2 Concepts and Measures

3.4.2.1 Religious Service Attendance (Independent Variable)

The main independent variable in this study is *religious service attendance (RSA)* in the past 12 months. In the CCHS 4.1**,** *RSA* in the past 12 months was assessed by asking participants "Not counting events such as weddings or funerals, during the past 12 months, how often did you participate in religious activities or attend religious services or meetings?" Five response options were given, including *once a week or more, once a month, 3 or 4 times a year, once a year* and *not at all*. Because this question is restricted to only worship services, over reporting of religious attendance is minimized (Statistics Canada, 2007a). The numbers within strata of the categorical factors were not equal and bias due to sparse matched sets can easily double the magnitude of the odds ratio estimates, even when there is no confounding, selection bias, or measurement error (Greenland, Schwartzbaum & Finkle, 2000). Therefore, responses were collapsed to create matched sets in that *once a week or more* and *3 or 4 times a year/once a month* were dummy coded (took on a value of '1' and '2') while the responses *once a year/not at all* served as the reference category.

3.4.2.2 Health Outcomes (Dependent Variables)

CCHS 4.1 interviewers assessed the prevalence of CHD, diabetes and high blood pressure by asking "Now I'd like to ask about certain chronic health conditions that have lasted six months or more and have been diagnosed by a health professional, do you have CHD (or

diabetes or high blood pressure)? Participants answered *yes* (1) or *no* (0) separately for each condition.

3.4.2.3 Covariates

We adjusted our analyses for demographic, socio-economic and health behaviours factors (see Section 3.4.2.3.1-3.4.2.3.3 below) based on previous studies (Hummer et al, 1999; Oman et al, 2002; Goldbourt et al, 1993; King et al, 2001) that examined the relation between RSA and CHD health.

3.4.2.3.1 Demographics

The literature suggests people who attend religious services frequently may differ demographically from people who attend less often. People who attend more often tend to be immigrants, older, female, live in rural areas, and be part of an ethnic group (Hummer et al, 1999; Oman et al, 2002; Goldbourt et al, 1993; King et al, 2001). Therefore, we controlled for these factors in our statistical models.

Age was linear in the logit scale and treated as continuous. G**ender** was coded as 0 for *men* (reference) and 1 for *women*. **Marital status** was recoded as 0 for *married* (reference), 1 for *single/common law* and 2 for *separated/divorced/widowed.*

Classification of **ethnicity** was based on participants' self-report in the CCHS 4.1 and was coded as a binary variable for this study. The reference group was individuals who identified themselves as *White* and coded 0. Participants who identified themselves as Chinese, Japanese, Korean, South Asian, Filipino, Southeast Asian, Arab, West Asian, Black and Latin American was classified as *Non-White* and coded as 1.

Immigrant status was used to identify participants who were born in a country other than Canada and did not have Canadian citizenship (Tremblay et al, 2006). According to the Statistics Canada definition, immigrant status was categorized into 1 for *immigrant* and 0 for *Canadian Citizen* (i.e., participants born in Canada or who have citizenship), which was the reference category.

Geographic area is the variable that identifies whether the participants live in urban or rural areas. Urban areas are continuously built-up areas having a population concentration of 1,000 or more and a population density of 400 or more per square-kilometer based on current census population counts. This variable is a dichotomous variable coded as 0 for *rural* and 1 for *urban*.

3.4.2.3.2 Socio-economic

Previous studies show people who attend religious services more often have lower income and education compared to people who do not attend at all (Hummer et al, 1999; Oman et al, 2002). Household-level **income** and **education** were used as indicators of socio-economic status. Household income was recoded to represent standard Statistics Canada income categories (less than $19,999 [reference], $20,000 to $29,999, $30,000 to $39,999, $40,000 to $49,999, $50,000 to $59,999, $60,000 to $79,999, ≥ $80,000). Education was recoded into three levels for this study: 0 for *less than secondary graduation* (reference), 1 for *secondary school graduation,* 2 for *partial or complete post-secondary degree*.

3.4.2.3.3 Health Behaviours

Health behaviours (i.e., physical activity, fruit and vegetable consumption, and not smoking) might partially explain the religious effects on CHD and related risk factors (Oman et al, 2002). Physical activity and diet are factors associated with the development of CHD, diabetes and blood pressure (Yusuf et al, 2004). These factors are also linked with RSA in that biblical teachings encourage favourable health behaviours including avoidance of smoking, exercise and a healthy diet (Strawbridge et al, 2001). Therefore, these variables were included as potential confounders in the analysis.

Level of physical activity in the CCHS 4.1 was derived from participants' responses to questions about participation in leisure-time physical activities not related to work (Statistics Canada 2007c). From a list of activities in the CCHS, participants indicated the number of sessions for which they engaged in the activity and the average duration of each session. These data were used together with 'metabolic equivalent' (MET) values to derive a quantitative measure of physical activity. MET is a value of metabolic energy expenditure expressed as a multiple of resting metabolic rate. For example, an activity of 4 METS requires four times the amount of energy as compared to when the body is at rest. Physical activity level was recoded and categorized in the CCHS based on MET value expressed in kilocalories per kilogram of body weight per day (kkd): *inactive* (expending <1.5 kkd); *moderately active* (expending ≥1.5 kkd to <3.0 kkd); or *active* (expending ≥ 3.0). The reference category was *inactive*.

The question in the survey assessing smoking behaviour was "At the present time, do you smoke cigarettes daily, occasionally or not at all?" **Smoking status** was recoded

as 0 *not at all*, 1 *occasionally* and 2 *daily*. The reference category was *not at all*.

Total fruit and vegetable intake was the chosen dietary factor in the analysis. Clinical and biological investigations support the protective effect of fruit and vegetables against CHD, diabetes and high blood pressure (Van Dyun & Pivonka, 2000; Ness & Powles, 1997). This factor was estimated by totaling the frequency of intake of fruit juice, fruit (not including juice), green salad, carrots, potatoes, and other vegetables. Participants self-reported the frequency of intake in CCHS 4.1 over periods defined by day, week, month, year, or never. Total fruit and vegetable consumption was determined by the mean number of times per day subjects reported intake of fruits and vegetables. These data were then categorized and recoded as 0 for *less than five servings per day*, 1 for *five to 10 servings per day* or 2 for *greater than 10 servings per day*. The reference category was *less than five servings per day*.

3.5 Analysis

All statistical analyses were performed using Predictive Analysis Software (PASW) Statistics 18, Release Version 18.0.0 (PASW, 2009). Continuous variables were grand mean centered to aid in the interpretation of interaction effects and to maintain meaningful intercepts. Chi-square (for categorical variables) and t-tests (for continuous variables) were conducted to assess whether the prevalence of demographics, health outcomes and health behaviours differed by the frequency of RSA.

The moderating effects of age, sex and ethnicity on the relationships between each health outcome and RSA were assessed using a hierarchical multiple regression

procedure. For example, the main effect for RSA was entered at the first level in the model. At the second level, RSA and age were simultaneously entered into the model to estimate the amount of variance accounted for by these variables individually. At the third level, the interaction term between RSA and age was entered into the model.

3.5.1 Missing Values and Multiple Imputation

Subjects with non-responses for the independent variable (frequency of RSA) were eliminated from the analysis. Then, subjects with missing values for the dependent variables (CHD, diabetes and high blood pressure) were eliminated from the analysis because the proportions of subjects with missing data on these variables were less than 5% (Schafer & Graham, 2002). Subjects with missing values for the variable ethnicity were also eliminated. Subjects with missing values for all covariates except ethnicity were retained in the analyses. The percentage of missing data ranged from 0% for age to 14.5% for household income (Table 3-3, page 80).

The purpose of multiple imputation is to generate plausible values for missing values and create "complete" datasets (Rubin, 1987). Multiple imputation was conducted using an iterative Markov Chain Monte Carlo (MCMC) method in PASW 18. MCMC is used when the pattern of missing data is arbitrary, and creates multiple imputations by drawing simulations from a Bayesian predictive distribution for normal data. For each iteration and for each variable, the fully conditional specification (FCS) method fitted univariate (single dependent variable) models using all other available variables as predictors to impute missing values for the variable being fit. The method continued

through five iterations. The results from the five complete imputed datasets were combined to obtain an average regression coefficient, which was used for the analyses in this study.

Two datasets were created: one contained only subjects with complete data and the other contained all subjects (missing data were replaced by multiple imputations). Descriptive analyses examining frequencies for all variables were run on each dataset to assess whether the multiple imputation dataset could be used to conduct the regression analyses (Table 3-4, page 81). Results were similar across both datasets and the multiple imputation dataset was chosen for the regression analyses.

3.5.2 Multivariable Models

A series of multivariable logistic regression models was developed to evaluate associations between RSA and self-reported CHD, diabetes and high blood pressure. Unadjusted and adjusted odds ratios were calculated for RSA and adjusted odds ratios were calculated for each covariate. Odds ratios greater than 1 indicated increased odds of reporting prevalent CHD, diabetes or high blood pressure. Odds ratios less than 1 indicated decreased odds of reporting the prevalence of these outcomes.

Prior research does indicate a certain order for predictor variables (Hummer et al, 1999; Oman et al, 2002) that guided the analyses of this present study. Five sequential multivariable models were used to assess the impact of potential confounding variables on the association between RSA and CHD and related risk factors. The first model was unadjusted and the second model was adjusted for the demographic block, which

included age, sex, marital status, immigrant status, ethnicity, and geographic location. The third model adjusted for the demographic block and the socioeconomic block, which contained education and income. The fourth and "full" model adjusted for the demographic and socioeconomic blocks, along with the health behaviours block (physical activity, fruit and vegetable intake, and smoking status), to produce a full model.

Models were accompanied by summary statistics describing how well the models fit the data, i.e., -2 log-likelihood test, Akaike Information Criterion (AIC), and Concordance Index of the Area under the ROC Curve (AUC). The AUC was used to select the best model from among the five models constructed for each outcome variable.

3.5.3 Power

Power calculations were conducted using OpenEpi 2.3 (Dean, Sullivan & Soe, http://www.openepi.com/Menu/OpenEpiMenu.htm) to estimate the minimum detectable odds ratio between the participants who attended more than once week and participants who attended less than once a year in the CCHS 4.1. Participants who attended more than once a week were categorized as the 'exposed' group (n=1494) with an 8.4% prevalence of CHD and participants who attended less than once a year were categorized as the unexposed group (n=2057) with a 5.6% prevalence of CHD. At alpha=0.05, there is 90.64% power to detect an odds ratio of at least 0.67.

3.6 Results

3.6.1 Sample Characteristics

Differences between responders (n=5515) and non-responders (n=1629) to the question on RSA in CCHS 4.1 are shown in Tables 3-5 (page 82) [unweighted]. Both groups were similar, although responders were more likely to be older, female, married, and less likely to be smokers compared to non-respondents.

Table 3-6 (page 83) presents the weighted sample characteristics of the 5442 study participants living in Saskatchewan who were included in the analysis. The mean age was 48.1 years and roughly half the participants were male (53.9%). A majority of the sample was married (60.1%), most had at least a post-secondary education (61.6%), and almost all were White (97.2%) and Canadian citizens (94.5%). About 27.4% of the sample attended religious services more than once a week. In terms of health conditions, the prevalence of CHD, diabetes, and high blood pressure was 5.9%, 6.8%, and 20.3% respectively. For health behaviours, some participants reported being very (21.3%) or moderately (24.2%) physically active. Reported fruit and vegetable intake was quite low (with 60.1% of participants eating less than five servings per day). Approximately three-quarters of the sample did not smoke.

3.6.2 Moderating Effects of Gender, Age and Ethnicity on the Relationship between Religious Service Attendance and Health Outcomes

Gender, age and ethnicity did not moderate the association between RSA and CHD or related health outcomes (Table 3-7a to 3-7c, pages 84-86). Therefore, interaction terms were not included in the multivariable models.

3.6.3 Determinants of Religious Service Attendance

A number of variables were associated with RSA (Table 3-8, page 87). Participants who were older, male, married, with at least some or completed post-secondary education, in the higher income group (i.e., greater than $60,000), or living in an urban area more were likely to attend religious services more than once a week. Participants who attended more than once a week appeared to have a higher prevalence of CHD and high blood pressure and lower prevalence of diabetes compared to participants who attended less than once per year (Figures 3-2 to 3-4, pages 77-78). In addition, participants who attended more than once a week were more physically active, ate more fruit and vegetables, and were less likely to smoke compared to participants who attended less than once per year.

3.6.4 Determinants of Coronary Heart Disease and Related Risk Factors

Significant univariate associations were found between many covariates and the prevalence of CHD, diabetes and high blood pressure (Tables 3-9, page 88). Primarily age, being widowed, separated or divorced, or having high blood pressure or diabetes

were significantly associated with a higher prevalence of CHD. Conversely, being single/common law, having some or completed post-secondary education, higher income or being moderately active or active was associated with a lower prevalence of CHD. Similar trends existed for diabetes and high blood pressure. Living in a rural area was significantly associated with a higher prevalence of diabetes and high blood pressure, but not a higher prevalence of CHD.

3.6.5 Multivariable Models of Religious Service Attendance and Coronary Heart Disease and Related Risk Factors

Tables 3-10 through 3-12 (pages 89-91) show the multivariable adjusted effects of attending religious services on the prevalence of CHD, diabetes and high blood pressure.

3.6.5.1 Coronary Heart Disease

The first model of Table 3-10 (page 89) displays the crude odds ratio of CHD and RSA. Those who attended more than once a week exhibited increased odds of prevalent CHD (OR=1.56, 95% CI 1.20-2.03, $p<0.05$) compared to those who attended less than once a year (Model 1: X^2=2416; AIC=2620.1; AUC=0.55). This association was not significant after adjusting for demographic (Model 2), socio-economic (Model 3) and health behaviour (Model 4) variables.

Participants who attended three to 12 times a year had significantly lower odds of CHD (OR=0.74, 95% CI 0.554-0.99, $p<0.05$) compared to those who attended less than

once a year (Model 1). The association remained significant even after controlling for demographic variables (Model 2), but was not significant after controlling for socio-economic and health behaviour variables.

3.6.5.2 Diabetes

In the initial model, there was no significant association between RSA and the prevalence of diabetes (Table 3-11, page 90). However, after controlling for demographic variables in Model 2, participants who attended more than once a week had a significantly lower odds of prevalent diabetes (OR=0.57, 95 CI% 0.43-0.75, $p<0.05$) compared to those who attended less than once a year. The magnitude of this association did not alter and remained significant after controlling for socio-economic and health behaviour variables (Models 3 and 4).

There was no significant association between participants who attended three to 12 times a year versus to those who attended less than once a year across all models.

3.6.5.3 High Blood Pressure

Attending religious services more than once a week was significantly positively associated with a higher prevalence of high blood pressure in Model 1 (Table 3-12, page 91). The association reversed direction and became negative after adjusting for demographic variables (OR=0.81, 95% CI 0.67-0.97, $p <0.05$) in Model 2. This

association remained negative and significant after further adjustment for socio-economic and health behaviours (Model 3 and 4).

There was no significant association between participants who attended three to 12 times a year versus to those who attended less than once a year across all models.

3.7 Discussion

Published data show that attending religious services is associated with a lower risk or incidence of CHD, diabetes and high blood pressure (Hummer et al, 1999; Oman et al, 2002; Goldbourt et al, 2003; King et al, 2001). Since about one-third of adult Canadians attend religious services at least monthly (Statistics Canada, 2009), this study was conducted to examine whether the relation between RSA and chronic diseases holds within the Canadian context. The analysis reveals important findings, possible directions for future research and implications for health promotion.

Past studies, primarily those that were cross-sectional, did not always adjust for all possible confounding variables. RSA may be associated with a number of socio-economic, lifestyle, and geographic factors that may affect CHD health. The set of potential confounding variables considered in this study is greater than in any prior research and thus responsive to concerns about the quality of previous studies. Therefore, model building was used to assess the impact of potential confounding variables on the association between RSA and CHD and related risk factors. Considering, any of the models could adequately fit the data, statistical model selection criteria provided methods for choosing the best-fit model. As indicated by lower -2 log likelihoods and AICs, as

well as higher AUC scores, Model 4 (Tables 3-10 to 3-12, pages 89-91) appeared to be the best model for describing each outcome. Overall, participants who attended religious services more than once a week had a lower prevalence of CHD (non-significant), diabetes and high blood pressure compared to participants who attended less than once a year after adjustment for a range of demographic, socio-economic and health behaviour factors.

Previous studies showed people who attend places of worship more than once a week have a significantly lower risk of developing CHD (Hummer et al, 1999; Oman et al, 2002). Our results did align with these findings as people who attended religious services more than once a week had lower adjusted prevalence risk of CHD compared to those who did not attend though non-significant. Age is a primary confounder in the statistical models that correlate with both RSA and CHD. Indeed, the literature suggests that older persons are more likely to be religious and also more likely to have CHD (Powell et al, 2003). Further, religious attendance is most prevalent among Canadians in their fifties and sixties (Statistics Canada, 2009). Approximately 50% of participants reporting weekly RSA in the CCHS 4.1 were over the age of 50 years. The higher prevalence of heart disease among participants attending more than once a week could be due to the fact that older people are more likely to have heart disease. Further, being diagnosed with heart disease may influence subsequent RSA among older people. Attending religious services may provide greater meaning in older people's lives and, in turn, help patients better cope with having CHD. A study by Oxman, Freeman and Manheimer (1995) studied six-month mortality in patients undergoing elective cardiac

surgery. A significant association between the single item "strength and comfort from religion" and CHD mortality was observed (OR=0.31, p=0.04) after adjustment for confounders and established risk factors. Therefore, attending religious services may play an important role on the physical recovery from an acute illness like CHD though more studies are needed.

Prior studies primarily dichotomize RSA and focus on individuals who attend religious services more than once a week in comparison to individuals who do not attend at all. This study was able to assess the effects of attending religious services three to 12 times a year, in addition to more than once per week. The doctoral students' findings show individuals who attended three to 12 times per year had a significantly lower prevalence of CHD compared to non-attenders after adjusting for demographic factors. This finding highlights the importance of examining dose-response relations between RSA and health outcomes. Health benefits may accrue to those with moderate levels of RSA.

While the above discussion pertains primarily to heart disease, our study also focused on diabetes and high blood pressure. Our findings add information to the understanding of the connection between RSA and diabetes and high blood pressure. The multivariable models in this study show a negative relationship between RSA and the prevalence of high blood pressure after controlling for several covariates that were not included in previous studies (e.g., physical activity and fruit and vegetable intake). Participants attending at least once a week had a lower prevalence of high blood pressure. As such, the findings are consistent with previous older cross-sectional studies (Koenig et

al, 1989; Larson et al, 1989; Graham et al, 1978; Gillum, 2006).

There are no studies specific to diabetes to support our finding of an inverse association between RSA and a lower prevalence of diabetes. However, studies have been conducted to examine the association between RSA and inflammatory markers among people with diabetes. King et al used the National Health & Nutrition Examination Survey III 1988-1994 and found religious service nonattendees with diabetes were more likely than diabetic attendees to have elevated C-reactive protein (CRP) after controlling for demographic variables, health status, smoking, social support, mobility, and BMI. CRP is an acute inflammatory marker found among diabetic patients that increases their risk for cardiovascular disease (Morrow & Ridk, 2000).

The analyses of this study were limited to examining the association between specific health outcomes and RSA. CHD, diabetes and high blood pressure were primarily studied because of their higher prevalence compared to other medical conditions in Canada (PHAC, 2009). Further, CHD and related risk factors are influenced by a combination of behavioral (e.g. avoidance of smoking) and psychosocial factors (e.g. social support) that are provided through RSA (Yusuf et al, 2004).

Hummer et al (1999) studied other health outcomes including cancer, respiratory diseases, infectious diseases in relation to RSA. The authors found persons who attended services more than once a week had a lower incidence of mortality from respiratory and infectious diseases compared to persons who never attended.

According to Hummer et al (1999), the impact of RSA on cancer mortality was significant after adjustment for age, sex and race, and no association was found after

further adjustment for preexisting health status. Powell et al (2003) concluded from a literature review that there is longitudinal evidence for an association between RSA and a variety of different health outcomes with the exception for cancer. They suggest the link between RSA and cancer can be explained by the confounding effects of prior health status, which raises the possibility that the temporal relationship of RSA and health is reversed in people who are at risk for cancer mortality. That is, those who become sick with cancer are then more likely to become religious.

How RSA may be associated with diabetes and high blood pressure has not been studied empirically to the same extent as CHD. Explanations that focus on lifestyle and health behaviours suggest that RSA is instrumental in health behaviours that are consequential for the prevention and management of physical conditions such as diabetes and high blood pressure. This includes directly and formally proscribing specific behaviours that are health risks (e.g., dietary restrictions and prohibitions against tobacco), as well as encouraging behaviours that are conducive to health (e.g., regular exercise). These distinctive patterns of lifestyle and health behaviours could result in the lower prevalence of diabetes and high blood pressure observed in this study among those who attend religious services frequently.

Physical activity in this study was positively associated with RSA and all three health outcomes in our study, which concurs with previous studies looking at characteristics of people who attend religious services more often (Strawbridge et al, 1997; Kennedy, Kelman, Thomas & Chen, 1996; Oman et al, 2002; Hummer et al, 1999).

Two other health behaviour variables of interest in this study were fruit and vegetable intake and smoking status. Fruit and vegetable intake was not significant in the multivariable models of diabetes and high blood pressure perhaps because of limited variation in consumption levels. Approximately 60% of the study sample consumed less than five fruits and vegetables per day, which could be attributed to seasonal effects (Beland, 2002).

Smoking status remained a significant covariate in the multivariable models examining the relation between RSA and high blood pressure. Those who attended religious service more than once a week were less likely to smoke compared to those who attended less than once a year, which is a common finding in the literature (Strawbridge et al, 1997; Kennedy, Kelman, Thomas & Chen, 1996; Oman et al, 2002; Hummer et al, 1999). It should be noted that that those who did not smoke at all had higher odds of having high blood pressure and CHD in the univariate analyses compared to those who smoked daily. Participants who have CHD and related risk factors could have stopped smoking upon diagnosis and therefore reported themselves as non-smokers. Information about past smoking and quitting habits are not available in the CCHS 4.1 to determine whether this speculation holds true.

This study did not find age, gender and ethnicity to be significant moderators in the relation between RSA and CHD, though there were variations in the prevalence of CHD and frequency of attending religious services across age groups. Studies have found religious attendance protective against CHD mortality and morbidity in both younger (Hummer et al, 1999; Musick et al, 2004) and older adults (Koenig et al, 1999). Also,

some studies found a stronger protective effect among women than men (Koenig et al, 1999). In Oman et al's study, some initial differences were found among participants based on religious attendance, with African Americans and Hispanics attending religious services more frequently than other ethnic groups (2002).

3.7.1 Limitations

The CCHS 4.1 provides population-based prevalence data on the association between RSA and CHD and related risk factors in a representative sample of Canadians.

A variety of physical, social, and lifestyle mechanisms may exist to explain the association between RSA and health outcomes. Due to the cross-sectional nature of the study, we were unable to test for mediation of several variables since such testing consists of causal processes that unfold over time (Maxwell & Cole, 2007).

The exclusion of social support variables in the analyses deserves special attention. A limitation of the present study includes the lack of a measure of social support, which CCHS 4.1 did not collect from Saskatchewan participants and we therefore could not control in the regression models. Although many studies control for social support, these studies have also suggested social support to be a potential mediator as risk ratios were largely reduced once social support variables were included in models for CHD, diabetes and high blood pressure (Oman et al, 2002; Hummer et al, 1999; Gillum, 2006). Research has shown that people involved in religious practices enjoy increased social support, which is recognized as being an important potential mediator in physical health (Strawbridge et al, 2001; Hummer et al, 1999; Oman et al, 2002). That is,

variations in levels of RSA account for variation in social support. Also, variations in social support account for variations in health outcomes. When these two pathways are controlled for, the relationship between RSA and health outcomes is no longer significant because social support variables act as mediators in the regression models. However, few studies have formally tested the potential mediating role of social support. Therefore, evidence is inconclusive about whether the effects of RSA directly affect health outcomes or operate indirectly through other factors such as social support.

The cross-sectional nature of the CCHS 4.1 prevented assessment of the temporal sequence of religious attendance and prevalence of CHD, diabetes, and high blood pressure. The associations found in this study might reflect reverse causal pathways, whereby attending religious services has been the consequence, rather than influencing prevalence of CHD and related risk factors. Further, if attending religious services is not only associated with a lower prevalence of CHD and related risk factors but also adversely affects survival once these diseases are developed. The relative prevalence odds, typically underestimate the causal parameters of interest (i.e., the relative incidence odds) due to prevalence incidence (survival) bias (Schlesselman & Stolley, 1982). Until RSA and health outcomes can be measured prospectively, any associations suggested by cross-sectional analyses remain hypothesis generating.

The present work is probably affected by some inaccuracy of self-reported CHD, diabetes and high blood pressure. Under-reporting of chronic conditions by self-report may have affected the results of this study. For example, the prevalence of diabetes was found to be under-reported in the CCHS in comparison with the Ontario Diabetes

Database (Manual et al, 2003). In addition, people with less severe disease are less likely to report disease in the CCHS (Manual et al, 2003). Thus, CCHS estimates are likely to under-report the true prevalence in this study for CHD, diabetes and high blood pressure.

Various dimensions of religiousness have been defined (Koenig, 2001) and attendance at religious services is only one dimension. As data on multiple religious dimensions were unavailable in the CCHS 4.1, this study was limited to using the RSA variable. This measure is a reliable and traditional measure of the public and collective expression of religion, and captures involvement in a religious community across cultures and several religions (Koenig, 2001). It is most often used in U.S based longitudinal studies examining the link between religion and health outcomes (Hummer et al, 1999; Oman et al, 2002; Chatters, 2000). Our analysis may have yielded different results had other dimensions of religiousness been used (e.g., frequency of prayer or meditation).

Caution must be exercised when generalizing this study's results to other populations. The representativeness of the sample and the use of sample weights provide generalizability of results to the Canadian population. However, the sample does contain many older, white, Christian, and non-immigrant individuals, which is similar to the other samples in the published literature (Hummer et al, 1999; Oman et al, 2002). There are limits regarding the extent to which our findings can be generalized to populations outside of Canada or to smaller ethnic subgroups or populations within Canada. Ethnic populations require larger sampling sizes to study the relations between RSA and CHD and related risk factors. Further examination of the interactions between ethnicity and RSA is necessary considering Canada's cultural diversity.

Despite the limitations, this is the first Canadian study to examine the relation between RSA and CHD and related risk factors in a representative sample of Canadians. The large sample of the CCHS permits the estimate of effect sizes, of interest per se and designing smaller studies containing only participants from one province such as Saskatchewan in this study. A strength of this study is the inclusion of various socio-demographic and other key variables (e.g., fruit and vegetable intake and geographic area [urban versus rural]) that were possible to evaluate compared with previous studies. In addition, the current study adds to the literature of religion and health by providing more up to date data on the relationship between RSA and CHD and related risk factors.

3.7.2 Future Directions

A value of this cross-sectional study is in helping to formulate hypotheses for subsequent longitudinal investigations. National Canadian longitudinal data collection that focuses on detailed measures of CHD and related risk factors should include measures of religion. This is needed to provide a fuller understanding of the effects of religion on morbidity and mortality across specific diseases and populations in the Canadian context. Religion and participation in religious activities is an important social determinant of health just like education and income (Wilkinson & Marmot, 1998). Further, more research is clearly needed to investigate whether a chain of events exists to link religious attendance with CHD and related risk factors by way of psychosocial mediators such as social support and behavioural variables (e.g., physical activity, dietary intake, smoking status). Future exploration should involve the examination of moderators (e.g., age, gender and

ethnicity) longitudinally and focus on determining whether there is an independent effect of religious commitment separate from social support.

Future studies should also use more complete measures of religious practices aside from service attendance, e.g., frequency of praying and meditation. Such research will add to our understanding of how psychosocial factors like religious constructs may influence physical health, as well as provide insight into improving the management of CHD, diabetes, and high blood pressure.

The literature has shown older and ethnic individuals are more likely to be religious and have a higher risk of developing certain chronic conditions (Powell et al, 2003). Therefore, focused research is required to study the links between religious involvement and dimensions of physical health, with particular attention paid to the elderly and ethnic groups. Canadian studies should include questions on RSA in the provinces where there are large ethnic communities such as Ontario, Quebec, British Columbia. In Canada, certain ethnic groups attend religious services more frequently compared to the general population (Statistics Canada, 2003) Thus, it would be worthwhile to investigate religious practices among ethnic groups and how these practices may be connected to CHD health outcomes.

Lastly, the usefulness of qualitative data in research on religion and health should not be overlooked. Because researchers are still working to validate measures of spirituality, religious coping styles, and other important constructs, in-depth interviews and focus groups may be crucial to help clarify the multiple, complex ways in which religion is involved in shaping various health outcomes. Further, qualitative research can

assist to develop measures or religion besides attendance that may be of importance and influence CHD and related risk factors. Essentially, qualitative studies can yield a rich portrait of religious effects and would nicely complement the types of epidemiologic studies focusing on the religion-health connection (Creswell & Clark, 2007).

3.8 Conclusion

The findings of this study are the first to suggest RSA may be associated with the prevalence of CHD and related risk factors in Canada. This study supports further and careful investigation of the role of religious factors on CHD and other health outcomes in large epidemiologic studies. There could be several potential pathways by which RSA can affect health outcomes. Such findings will add to our understanding of how RSA may influence health and provide insight for improving primary and secondary prevention of CHD and related risk factors in Canada.

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Figure 3-1: Sample Selection

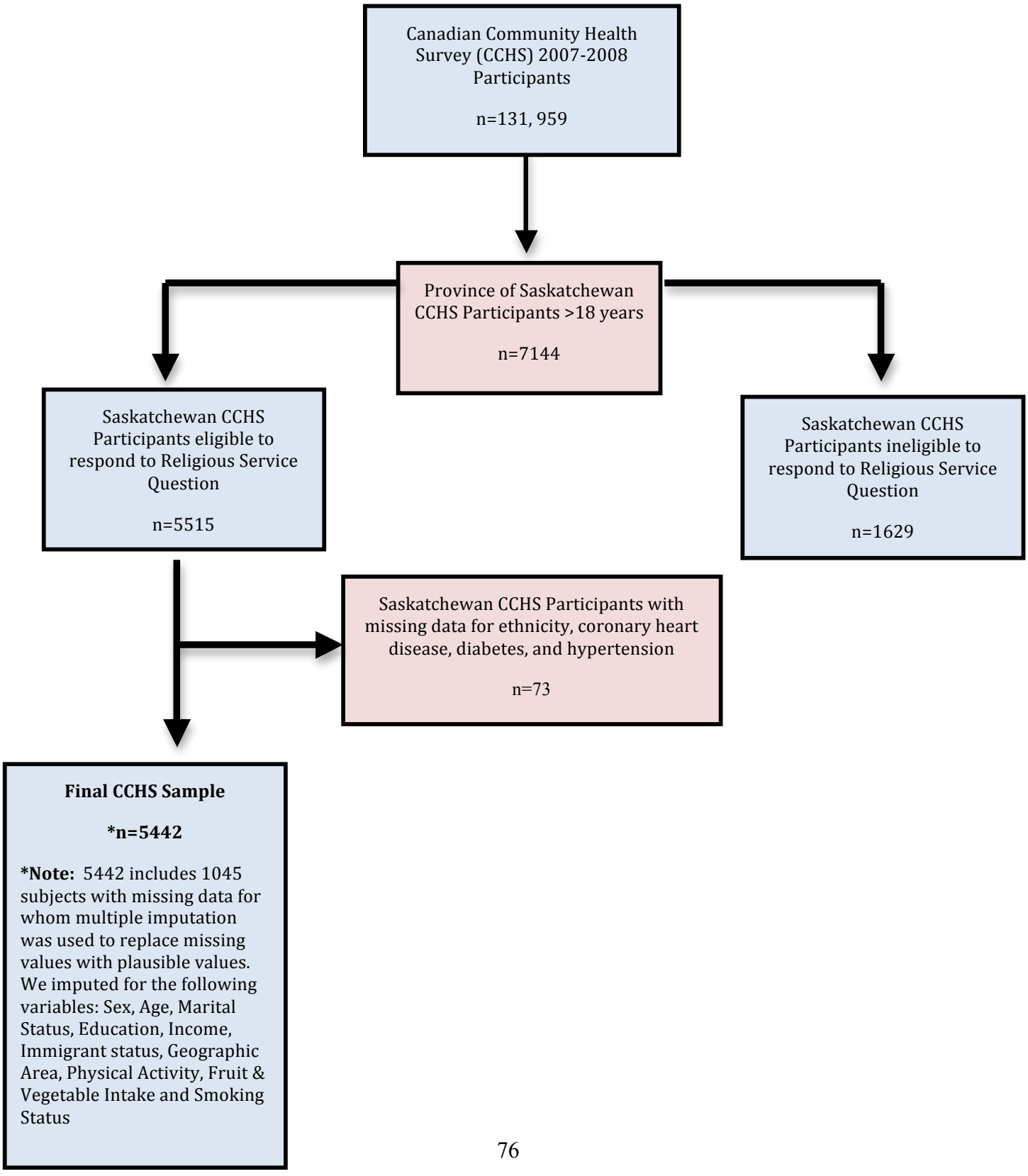

Figure 3-2: Prevalence of Coronary Heart Disease by Frequency of Religious Service Attendance

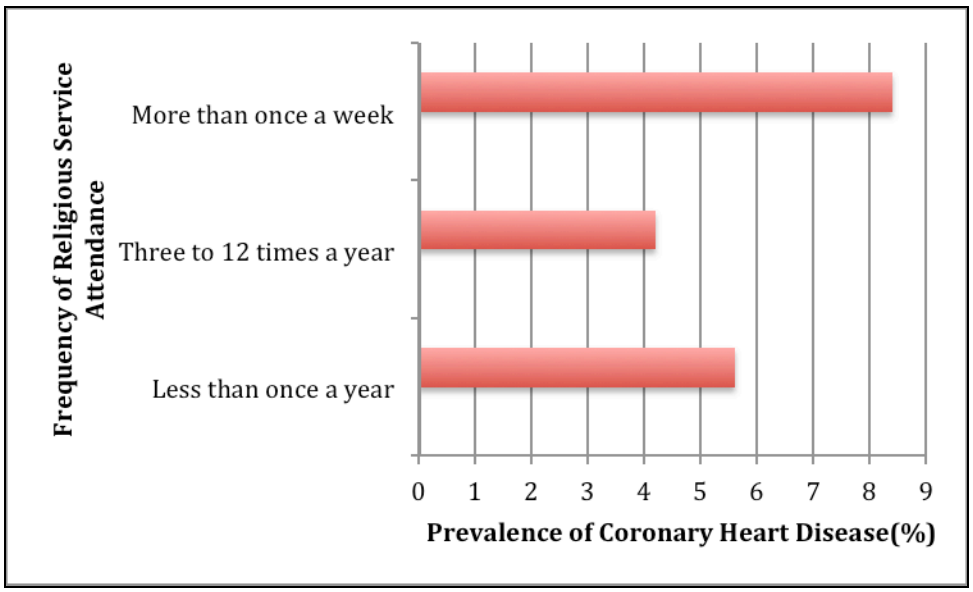

Figure 3-3: Prevalence of High Blood Pressure by of Frequency Religious Service Attendance

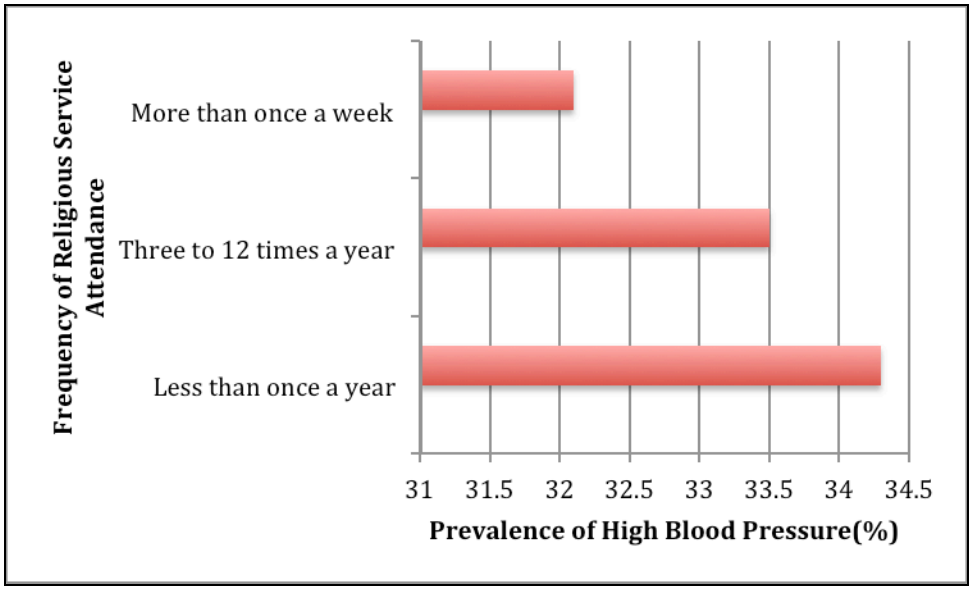

Figure 3-4: Prevalence of Diabetes by Frequency of Religious Service Attendance

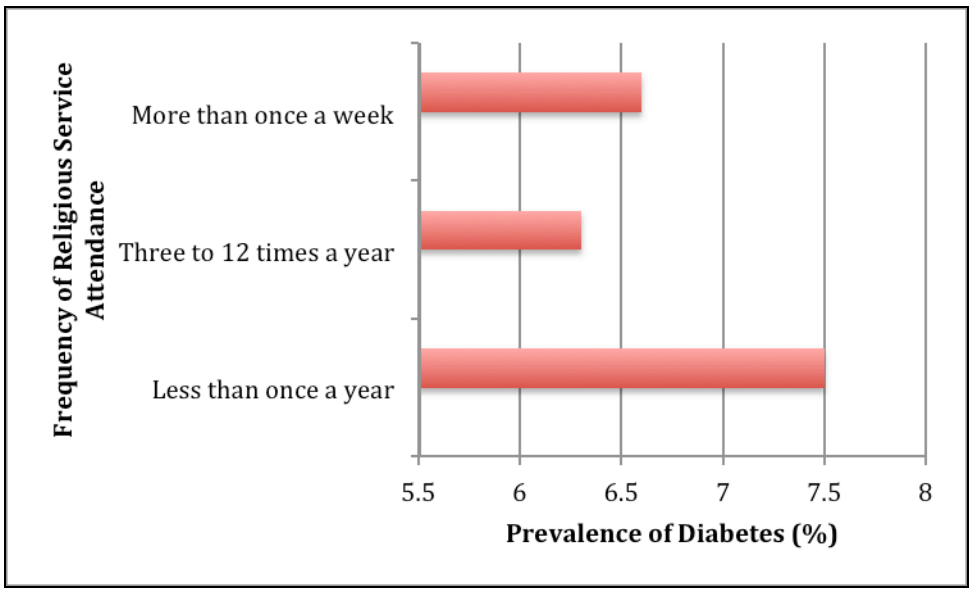

Table 3-1: Demographic Characteristics of Participants Living in Saskatchewan Versus Rest of Canada (CCHS 4.1).

Characteristics	Saskatchewan (CCHS 4.1)		Rest of Canada (CCHS 4.1)	
	n	%	n	%
Age				
12 to 17 years	665	8.5%	10375	8.4%
18 to 24 years	647	8.3%	9466	7.7%
25 to 34 years	1139	14.6%	16509	14.0%
35 to 44 years	970	12.4%	18521	15.0%
45 to 54 years	1130	14.5%	19497	15.8%
55 to 64 years	1179	15.1%	20774	16.9%
65 +	2079	26.6%	28100	22.8%
Sex				
Male	3451	45.3%	56027	45.5%
Female	4278	54.7%	67215	55.5%
Income				
No Income	215	3.5%	4591	4.4%
< $20,000	1916	31.4%	30838	29.3%
$20,000-$39,999	1808	29.6%	28716	27.3%
$40,000-$59,999	1083	17.6%	17428	16.5%
$60,000-$79,999	568	9.3%	9456	9.0%
$80,000 +	510	8.4%	8239	7.8%
Marital Status				
Married	3633	46.6%	53041	43.1%
Common Law	467	6.0%	10719	8.7%
Widow/Separate/Divorce	1568	20.1%	24258	19.7%
Single	2130	27.3%	34961	28.4%

*CCHS 4.1 : Canadian Community Health Survey Cycle 4.1

Table 3-2: Missing Data for Ethnicity and Health Outcomes in CCHS 4.1 Participants with Complete Data for Religious Service Attendance (n=73)

Variables	n	% Missing
Ethnicity	25	0.4%
Coronary Heart Disease	24	0.4%
High Blood Pressure	19	0.3%
Diabetes	5	0.1%

Table 3-3: Missing Data for Covariates in CCHS 4.1 Participants with Complete Data for Religious Service Attendance, Ethnicity and Health Outcomes (n=1045)

Variables	n	% Missing
Sex	0	0%
Age	0	0%
Marital Status	17	0.3%
Education	33	0.6%
Income	795	14.5%
Immigrant Status	5	0.1%
Geographic Area	0	0%
Physical Activity	2	0.01%
Fruit & Vegetable Intake	193	3.5%
Smoking	0	0%

Table 3-4: Sample Characteristics of Multiple Imputation and Case Deletion Datasets – Weighted

	Multiple Imputation (n=5457)	Case Deletion (n=4497)
Demographics		
Age mean (S D)	48.1 (18.4)	47.7 (17.9)
Sex Male	2939 (53.0%)	2004 (48.1%)
Marital status		
Married	3281 (60.1%)	2606 (62.2%)
Single/Common Law	1415 (25.9%)	1006 (24.2%)
Widowed/Separated/Divorced	761 (13.9%)	552 (13.3%)
Education		
Less than high school	1031 (18.9%)	649 (15.6%)
High school	1067 (19.5%)	797 (19.1%)
Post-secondary	3359 (61.6%)	2719 (65.3%)
Household Income		
Less than $19,999	457 (8.4%)	334 (8.0%)
$20,000 to $29,999	514 (9.4%)	355 (8.5%)
$30,000to$39,999	635 (11.6%)	449 (10.8%)
$40,000to$49,999	575 (10.5%)	354 (8.5%)
$50,000to$59,999	601 (11.0%)	380 (9.1%)
$60,000to$79,999	902 (16.5%)	697 (16.7%)
Greater than $80,000	1773 (32.5%)	1597 (38.3%)
Immigrant status		
Canadian citizen	5160 (94.6%)	3937 (94.5%)
Immigrant	297 (5.4%)	227 (5.5%)
Ethnicity		
White	5302 (97.2%)	4042 (97.0%)
Non-white	155 (2.8%)	123 (3.0%)
Geographic Area		
Urban	4018 (73.6%)	2999 (68.0%)
Rural	1439 (26.4%)	1413 (32.0%)
Health Condition		
Coronary Heart Disease	321 (5.9%)	230 (5.5%)
High Blood Pressure	1108 (20.3%)	814 (19.6%)
Diabetes	373 (6.8%)	262 (6.3%)
Health Behaviours		
Physical Activity Level		
Inactive	2972 (54.5%)	2174 (52.2%)
Moderately Active	1320 (24.2%)	1073 (25.8%)
Active	1165 (21.3%)	918 (22.0%)
Fruit & Vegetable Intake		
Less than 5 per day	3279 (60.1%)	2541 (61.0%)
5 to 10 per day	1981 (36.3%)	1488 (35.7%)
Greater than 10 per day	197 (3.6%)	136 (3.3%)
Smoking Status		
Not at all	4070 (74.6%)	3180 (76.3%)
Occasionally	265 (4.8%)	193 (4.6%)
Daily	1122 (20.6%)	792 (19.0%)
Frequency of attending religious services		
Less than once a year	2057 (37.7%)	1603 (38.5%)
Three to 12 times a year	1906 (34.9%)	1431 (34.4%)
More than once a week	1494 (27.4%)	1131 (27.2%)

Table 3-5: Differences between Non-responders (n=1629) and Responders (n=5515) to the Question on Religious Service Attendance in CCHS 4.1- Unweighted

	Non-Responders n (%)	Responders n (%)
DEMOGRAPHICS		
Age *mean (SD)*	43.3 (18.3)	48.1(18.4)
Sex		
Male	961 (59.0%)*	2555 (46.3%)*
Female	668 (41.0%)*	2960 (53.7%)*
Marital Status		
Married	747 (46.1%)*	3306 (60.1%)*
Single/Common-Law	704 (43.5%)*	1424 (25.9%)*
Widowed/Separated/Divorced	169 (10.4%)*	767 (14.0%)*
Education		
Less than high school	346 (23.0%)*	1039 (19.0%)*
High School	295 (19.6%)	1062 (19.4%)
Post-Secondary	863 (57.4%)	3381 (61.7%)
Household Income		
Less than $19,999	104 (8.4%)	446 (9.5%)
$20,000 to $29,999	111 (9.0%)	420 (8.9%)
$30,000 to $39,999	111 (9.0%)	505 (10.7%)
$40,000 to $49,999	138 (11.2%)	386 (8.2%)
$50,000 to $59,999	95 (7.7%)	434 (9.2%)
$60,000 to $79,999	172 (13.9%)	769 (16.3%)
Greater than $80,000	505 (40.9%)	1750 (37.2%)
Immigrant Status		
Canadian Citizen	1418 (92.1%)	5212 (94.6%)
Immigrant	122 (7.9%)	298 (5.4%)
Ethnicity		
White	1293 (93.8%)	4873 (97.0%)
Non-white	86 (6.2%)	152 (3.0%)
Geographic Area		
Urban	1220 (74.9%)	4059 (73.6%)
Rural	409 (25.1%)	1455 (26.4%)
HEALTH CONDITION		
Coronary Heart Disease	71 (4.4%)	322 (5.9%)
Diabetes	104 (6.4%)	376 (6.8%)
High Blood Pressure	298 (18.5%)	1418 (20.4%)
HEALTH BEHAVIOURS		
Physical Activity Level	778 (54.6%)	2998 (54.4%)
Inactive	324 (22.7%)	1335 (24.2%)
Moderately Active	323 (22.7%)	1179 (21.4%)
Active		
Fruit & Vegetable Intake		
Less than 5 per day	869 (64.6%)	3233 (60.8%)
5 to 10 per day	438 (32.6%)	1890 (35.6%)
Greater than 10 per day	38 (2.8%)	192 (3.6%)
Smoking Status		
Not at all	1084 (67.0%)	4115 (74.6%)
Occasionally	83 (5.1%)	265 (4.8%)
Not at all	452 (27.9%)	1135 (20.6%)

Table 3-6: Sample Characteristics of Final CCHS 4.1 Sample for Study (n=5442) - Weighted

Variable	(%)
DEMOGRAPHICS	
Age *mean (SD)*	48.1 (18.4)
Sex	
Male	53.0%
Female	47.0%
Marital Status	
Married	60.1%
Single/Common-Law	25.9%
Widowed/Separated/Divorced	14.0%
Education	
Less than high school	18.9%
High School	19.5%
Post-Secondary	61.6%
Household Income	
Less than $19,999	8.4%
$20,000 to $29,999	9.4%
$30,000 to $39,999	11.6%
$40,000 to $49,999	10.5%
$50,000 to $59,999	11.1%
$60,000 to $79,999	16.5%
Greater than $80,000	32.5%
Immigrant Status	
Canadian Citizen	94.6%
Immigrant	5.4%
Ethnicity	
White	97.2%
Non-white	2.8%
Geographic Area	
Urban	73.6%
Rural	26.4%
HEALTH CONDITIONS	
Coronary Heart Disease	5.9%
Diabetes	6.8%
High Blood Pressure	20.3%
HEALTH BEHAVIOURS	
Physical Activity Level	
Inactive	54.5%
Moderately Active	24.2%
Active	21.3%
Fruit & Vegetable Intake	
Less than 5 per day	60.1%
5 to 10 per day	36.3%
Greater than 10 per day	3.6%
Smoking Status	
Not at all	74.6%
Occasionally	4.8%
Daily	20.6%
FREQUENCY OF RELIGIOUS SERVICE ATTENDANCE	
Less than once a year	37.7%
Three to 12 times a year	34.9%
More than once a week	27.4%

Table 3-7a: Test of Moderating Effects of Age, Sex and Ethnicity on the Relationship between Coronary Heart Disease and Religious Service Attendance

Variable	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)
RSA Less than once a year (ref) Three to 12 times a year More than once a week	 **0.74(0.55-0.99)*** **1.56(1.20-2.03)***	 0.98(0.74-1.28) 0.73(0.72-.1.20)	 0.26(0.17-1.00) 0.77(0.21-2.84)
Age		**1.07 (1.07-1.09)***	**1.07 (1.06-1.08)***
RSA X Age Less than once a year*Age (ref) Three to 12 times a year* Age More than once a week*Age			 0.96 (0.91-1.04) 0.82 (0.92-1.03)
RSA Less than once a year (ref) Three to 12 times a year More than once a week	 0.74(0.55-0.99) **1.56(1.20-2.03)***	 0.92(0.71-1.19) **1.58(1.25-2.00)***	 0.87(0.59-1.30) **1.74(1.22-2.49)***
Sex Male (ref) Female		 0.97(0.81-1.21)	 1.02(0.72-1.45)
RSA X Sex Less than once a year*male (ref) Three to 12 times a year*female More than once a week*female			 0.87(0.81-1.32) 0.74(0.70-1.24)
RSA Less than once a year (ref) Three to 12 times a year More than once a week	 0.74(0.55-0.99) **1.56(1.20-2.03)***	 0.92(0.71-1.19) **1.61(1.27-2.04)***	 0.93(0.72-1.20) 1.**86(1.38-2.19)***
Ethnicity White (ref) Non-White		 **0.24(0.08-0.76)***	 0.44(0.36-3.25)
RSA X Ethnicity Less than once a year*White (ref) Three to 12 times a year* Non-white More than once a week*Non-white			 0.39 (0.30-1.25) 0.89 (0.53-1.44)

Note: *p<0.05

Table 3-7b: Test of Moderating Effects of Age, Sex and Ethnicity on the Relationship between Diabetes and Religious Service Attendance - Weighted

Variable	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)
RSA Less than once a year (ref) Three to 12 times a year More than once a week	 0.84(0.66-1.08) 0.87(0.67-1.13)	 0.96(0.75-1.24) **0.68(0.53-0.89)***	 **0.30(0.18-0.78)*** 0.57(0.20-1.59)
Age		**1.05 (1.04-1.05)***	**1.07 (1.06-1.08)***
RSA X Age Less than once a year*Age (ref) Three to 12 times a year* Age More than once a week*Age			 1.04 (0.98-1.05) 1.00 (0.99-1.02)
RSA Less than once a year (ref) Three to 12 times a year More than once a week	 0.74(0.55-0.99) **1.56(1.20-2.03)***	 0.93(0.73-1.19) 1.03(0.80-1.31)	 0.79(0.55-1.13) 0.94(0.66-1.36)
Sex Male (ref) Female		 0.83(0.68-1.08)	 0.71(0.51-0.99)
RSA X Sex Less than once a year*male (ref) Three to 12 times a year*female More than once a week*female			 0.88 (0.81-1.03) 0.70 (0.46-1.26)
RSA Less than once a year (ref) Three to 12 times a year More than once a week	 0.74(0.55-0.99) **1.56(1.20-2.03)***	 0.92(0.72-1.18) 1.01(0.79-1.29)	 0.91(0.71-1.16) 0.98(0.77-1.26)
Ethnicity White (ref) Non-White		 0.68(0.32-.1.48)	 0.57(0.41-1.22)
RSA X Ethnicity Less than once a year*White (ref) Three to 12 times a year* Non-white More than once a week*Non-white			 0.83 (0.76-1.29) .868 (0.78-1.21)

Note: *p<0.05

Table 3-7c: Test of Moderating Effects of Age, Sex and Ethnicity on the Relationship between High Blood Pressure and Religious Service Attendance - Weighted

Variable	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)
RSA Less than once a year (ref) Three to 12 times a year More than once a week	 1.06(0.91-1.25) **1.37(1.16-1.61)***	 1.13(0.95-1.34) 0.97(0.81-1.14)	 1.09(.589-2.02) .792(.395-1.59)
Age		**1.06(1.06-1.07)***	**1.06(1.05-1.07)***
RSA X Age Less than once a year*Age (ref) Three to 12 times a year* Age More than once a week*Age			 1.04 (0.92-1.07) 1.10 (0.08-1.02)
RSA Less than once a year (ref) Three to 12 times a year More than once a week	 1.06(0.91-1.25) **1.37(1.16-1.61)***	 0.93(0.73-1.19) 1.03(0.80-1.31)	 0.79(0.55-1.13) 0.94(0.67-1.36)
Sex Male (ref) Female		 0.83(0.68-1.08)	 0.71(0.51-0.99)
RSA X Sex Less than once a year*male (ref) Three to 12 times a year*female More than once a week*female			 0.87 (0.81-1.30) 0.70 (0.46-1.26)
RSA Less than once a year (ref) Three to 12 times a year More than once a week	 1.06(0.91-1.25) **1.37(1.16-1.61)***	 1.05(0.90-1.23) **1.55(1.34-1.81)***	 1.04(0.90-1.22) **1.56(1.33-1.81)***
Ethnicity White (ref) Non-White		 **0.25(0.13-0.47)***	 0.24(0.06-1.05)
RSA X Ethnicity Less than once a year*White (ref) Three to 12 times a year* Non-white More than once a week*Non-white			 0.54 (0.46-1.18) 0.33 (0.25-1.10)

Note: *p<0.05

Table 3-8: Prevalence of Socio-Demographic Variables, Health Outcomes, Health Behaviours by Frequency of Religious Service Attendance - Weighted

	Less than once a year	Three to 12 times a year	More than once a week
DEMOGRAPHICS			
Age			
18 to 29	467 (22.7%)	432 (22.7%)	185 (12.4%)
30 to 39	336 (16.3%)	347 (18.2%)	185 (12.4%)
40 to 49	399 (19.4%)	346 (18.2%)	224 (15.0%)
50 to 59	410 (19.9%)	378 (19.8%)	284 (19.0%)
60 to 69	238 (11.6%)	197 (10.3%)	224 (15.0%)
70 to 79	117 (5.7%)	132 (6.9%)	247 (16.5%)
+80	89 (4.4%)	74 (3.9%)	146 (9.7%)
Sex			
Male	1004 (48.8%)	1066 (55.9%)	869 (58.2%)
Female	1053 (51.2%)	840 (44.1%)	625 (41.8%)
Marital Status			
Married	1113 (54.1%)	1130 (59.3%)	1037 (69.4%)
Single/Common-Law	653 (31.8%)	537 (28.2%)	225 (15.1%)
Widowed/Separated/Divorced	290 (14.1%)	239 (12.5%)	232 (15.5%)
Education			
Less than high school	394 (19.2%)	301 (15.2%)	336 (22.5%)
High School	464 (22.6%)	385 (20.2%)	217 (14.5%)
Post-Secondary	1199 (58.2%)	1220 (64.0%)	941 (63.0%)
Household Income			
Less than $19,999	172 (8.4%)	129 (6.8%)	155 (10.4%)
$20,000 to $29,999	169 (8.2%)	157 (8.2%)	189 (12.7%)
$30,000 to $39,999	232 (11.3%)	194 (10.2%)	210 (14.1%)
$40,000 to $49,999	228 (11.1%)	182 (9.5%)	165 (11.1%)
$50,000 to $59,999	235 (11.4%)	211 (11.1%)	154 (10.3%)
$60,000 to $79,999	311(15.1%)	349 (18.3%)	242 (16.2%)
Greater than $80,000	710 (34.5%)	685 (35.9%)	378 (25.2%)
Immigrant Status			
Canadian Citizen	1985 (96.5%)	1817 (95.3%)	1359 (91.0%)
Immigrant	72 (3.5%)	89 (4.7%)	135 (9.0%)
Ethnicity			
White	2022 (98.3%)	1862 (97.7%)	1418 (94.9%)
Non-white	35 (1.7%)	44 (2.3%)	76 (5.1%)
Geographic Area			
Urban	1548 (75.3%)	1398 (73.3%)	1074 (71.9%)
Rural	509 (24.7%)	508 (26.7%)	420 (28.1%)
HEALTH CONDITION			
Coronary Heart Disease	115 (5.6%)	80 (4.2%)	126 (8.4%)
Diabetes	154 (7.5%)	121 (6.3%)	98 (6.6%)
High Blood Pressure	381 (34.3%)	371 (33.5%)	356 (32.1%)
HEALTH BEHAVIOURS			
Physical Activity			
Inactive	1203 (58.5%)	951 (49.9%)	819 (54.8%)
Moderately Active	474 (23.0%)	490 (25.7%)	356 (23.8%)
Active	380 (18.5%)	465 (24.4%)	320 (21.4%)
Fruit & Vegetable Intake			
Less than 5 per day	1425 (69.3%)	1070 (56.1%)	784 (52.5%)
5 to 10 per day	561 (27.3%)	763 (40.0%)	657 (44.0%)
Greater than 10 per day	71 (3.4%)	73 (3.9%)	53 (3.5%)
Smoking			
Not at all	1328 (64.6%)	1398 (73.4%)	1343 (89.9%)
Occasionally	103 (5.0%)	115 (6.0%)	46 (3.1%)
Daily	625 (30.4%)	392 (20.6%)	105 (7.0%)

Table 3-9: Factors Associated with the Prevalence of Coronary Heart Disease (CHD), Diabetes and High Blood Pressure- Univariate Analysis - Weighted

	CHD	Diabetes	High Blood Pressure
	Odds Ratio (95%CI)	Odds Ratio (95%CI)	Odds Ratio (95%CI)
DEMOGRAPHICS			
Age	**1.09 (1.08-1.10)***	**1.05 (1.04-1.05)***	**1.06 (1.06-1.07)***
Sex			
Male (ref)			
Female	0.84 (0.68-1.04)	0.97 (0.78-1.22)	**1.16 (1.01-1.32)***
Marital Status			
Married (ref)			
Single/Common-Law	**0.41 (0.30-0.57)***	**0.28 (0.18-0.43)***	**0.31 (0.25-0.38)***
Widowed/Separated/Divorced	**1.52 (1.17-1.98)***	**2.56 (1.99-3.29)***	**1.65 (1.39-1.96)***
Education			
Less than high school (ref)			
High School	**0.40 (0.29-0.55)***	**.025 (0.17-0.36)***	**0.47 (0.38-0.57)***
Post-Secondary	**0.38 (0.30-0.48)***	**0.30 (0.23-0.38)***	**0.37 (0.32-0.48)***
Household Income			
Less than $19,999 (ref)			
$20,000 to $29,999	1.09 (0.73-1.61)	1.05 (.721-1.54)	1.05 (0.80-1.37)
$30,000 to $39,999	0.73 (0.49-1.10)	0.70 (0.48-1.04)	1.01 (0.78-1.32)
$40,000 to $49,999	**0.57 (0.37-0.88)***	**0.35 (0.21-0.56)***	**0.66 (0.50-0.88)***
$50,000 to $59,999	**0.56 (0.37-0.87)***	**0.48 (0.32-0.74)***	**.659 (0.50-0.87)***
$60,000 to $79,999	**0.50 (0.34-0.75)***	**0.33 (0.22-0.50)***	**0.51 (0.39-0.67)***
Greater than $80,000	**0.35 (0.24-.051)***	**0.15 (0.09-0.23)***	**0.35 (0.28-0.45)***
Immigrant Status			
Canadian Citizen (ref)			
Immigrant	0.83 (0.49-1.42)	0.80 (0.48-1.33)	0.87 (0.64-1.17)
Ethnicity			
White (ref)			
Non-white	0.65 (0.30-1.38)	0.37 (0.13-1.07)	**0.31 (0.17-0.56)***
Geographic Area			
Urban (ref)			
Rural	1.20 (0.96-1.52)	**1.35 (1.06-1.71)***	**1.38 (1.20-1.60)***
HEALTH CONDITION			
Diabetes	**4.78 (3.59-6.35)***	**6.38 (5.06-8.06)***	**6.38 (5.06-8.06)***
High Blood Pressure	**5.76 (4.64-7.15)***	**4.77 (3.59-6.35)***	**5.76 (4.64-7.15)***
HEALTH BEHAVIOURS			
Physical Activity Level			
Inactive (ref)			
Moderately Active	**0.65 (0.49-0.87)***	**0.56 (0.42-0.73)***	**0.77 (0.65-0.90)***
Active	**0.38 (0.27-0.56)***	**0.34 (0.24-0.48)***	**0.43 (0.35-0.52)***
Fruit & Vegetable Intake			
Less than 5 per day (ref)			
5 to 10 per day	0.99 (0.78-1.25)	0.92 (0.73-1.15)	**1.21 (1.05-1.39)***
Greater than 10 per day	0.77 (0.39-1.52)	1.03 (0.59-1.79)	0.68 (0.45-1.03)
Smoking Status			
Not at all (ref)			
Occasionally	1.23(0.98-1.43)	1.14(1.01-1.29)	1.28 (0.91-1.80)
Daily	**0.74(0.65-0.88)***	0.92 (0.90-1.03)	**1.41 (1.19-1.68)***

*p<0.05

Table 3-10: Odds Ratios for Prevalence of Coronary Heart Disease by Frequency of Religious Service Attendance – Weighted (*p<0.05)

	Model 1	Model 2	Model 3	Model 4
RELIGIOUS SERVICE ATTENDANCE				
Less than Once a year (ref)	0.74(0.55-0.99)	**0.72(0.52-0.98)***	0.73(0.53-.1.00)	0.75(0.55-1.03)
Three to 12 times a year	**1.56(1.20-2.03)***	.819(.612-1.10)	0.80(0.60-1.07)	0.82(0.61-1.11)
More than once a week				
DEMOGRAPHICS				
Age		**1.09(1.08-1.10)***	**1.08(1.07-1.09)***	**1.08(1.07-1.09)***
Sex				
Male (ref)				
Female		**1.30(1.01-1.69)***	**1.37(1.06-1.78)***	**1.35(1.03-1.76)***
Marital Status				
Married (ref)				
Single/Common Law		0.82(0.52-1.30)	0.73(0.46-1.16)	0.74(0.46-1.18)
Separated/Divorced/widowed		1.05(0.78-1.42)	0.98(0.72-1.34)	0.98(0.71-1.35)
Immigrant Status				
Canadian Citizen (ref)				
Immigrant		0.57(0.31-1.06)	.569(.305-1.06)	0.58(0.31-1.08)
Ethnicity				
White (ref)				
Non-white		1.51(0.45-5.01)	1.51(.456-5.06)	1.52(0.46-5.08)
Geographic Area				
Urban (ref)				
Rural		0.98(0.76-1.28)	0.97(0.74-1.26)	0.96(0.71-1.23)
SOCIOECONOMIC				
Education				
Less than high school (ref)				
High School			0.80(0.53-1.20)	0.81(0.54-1.21)
Post-Secondary			1.00(0.75-1.34)	1.03(0.77-1.38)
Household Income				
Less than $19,999(ref)				
$20,000 to $29,999			1.05(.688-1.61)	1.05(0.68-1.61)
$30,000 to $39,999			.882(.566-1.37)	0.89(0.57-1.39)
$40,000 to $49,999			**.499(.294-.845)***	**0.51(0.30-0.86)***
$50,000 to $59,999			.850(.517-1.40)	0.85(0.52-1.41)
$60,000 to $79,999			.874(.530-1.44)	0.90(0.54-1.46)
Greater than $80,000			**.507(.300-.858)***	**0.51(0.30-0.88)***
HEALTH BEHAVIOURS				
Physical Activity				
Inactive (ref)				
Moderately Active				0.85(.646-1.11)
Active				**0.77(0.49-0.89)***
Fruit & Vegetable Intake				
Less than 5 per day (ref)				
5 to 10 per day				1.01(0.74-1.39)
Greater than 10 per day				0.74(0.50-1.11)
Smoking				
Not at all (ref)				
Occasionally				1.05(0.89-1.09)
Daily				0.82(0.76-1.03)
GOODNESS OF FIT TEST				
-2 Log Likelihood Chi-square/df	2416.9/2	1889.9/9	1870.5/17	1865.5/23
Change in Chi-Square	----	527.0	19.3	5.0
AIC	2620.1	1907.9	1904.5	1911.5
Area Under the ROC Curve (p-value)	.55 (.002)	.87 (.000)	.87 (.000)	.87 (.000)

Table 3-11: Odds Ratios for Prevalence of Diabetes by Frequency of Religious Service Attendance – Weighted (*p<0.05)

	Model 1	Model 2	Model 3	Model 4
RELIGIOUS SERVICE ATTENDANCE				
Less than Once a year (ref)	0.84(0.66-1.08)	0.85(.657-1.09)	0.86(0.66-.1.11)	0.90(0.69-1.16)
Three to 12 times a year	0.87(0.67-1.13)	**0.57(.431-.752)***	**0.56(0.42-0.74)***	**0.60(0.45-0.80)***
More than once a week				
DEMOGRAPHICS				
Age		**1.05(1.04-1.06)***	**1.04(1.03-1.05)***	**1.04(1.03-1.05)***
Sex				
Male (ref)				
Female		**1.29(1.03-1.61)***	**1.33(1.06-1.66)***	**1.36(1.08-1.72)***
Marital Status				
Married (ref)				
Single/Common Law		0.80(0.57-1.13)	**0.69(0.48-0.98)***	**0.69(0.48-0.99)***
Separated/Divorced/widowed		0.89(0.67-1.19)	0.79(0.59-1.08)	0.79(0.58-.1.07)
Immigrant Status				
Canadian Citizen (ref)				
Immigrant		0.61(0.34-1.09)	0.60(0.33-1.09)	0.61(0.33-1.11)
Ethnicity				
White (ref)				
Non-white		1.79(0.74-4.32)	1.80(0.74-4.37)	1.76(0.72-4.34)
Geographic Area				
Urban (ref)				
Rural		0.94(0.74-1.19)	0.90(0.70-1.14)	0.88(0.69-1.12)
SOCIOECONOMIC				
Education				
Less than high school (ref)				
High School			0.77(0.55-1.09)	0.79(0.56-1.12)
Post-Secondary			0.79(0.60-1.04)	0.83(0.63-1.09)
Household Income				
Less than $19,999(ref)				
$20,000 to $29,999			1.00(0.66-1.52)	0.98(0.65-1.49)
$30,000 to $39,999			0.77(0.50-1.19)	0.77(0.50-1.19)
$40,000 to $49,999			0.66(0.41-.1.06)	0.66(0.41-1.06)
$50,000 to $59,999			0.68(0.42-1.09)	0.68(0.42-1.09)
$60,000 to $79,999			0.77(0.49-1.22)	0.79(0.50-1.25)
Greater than $80,000			**0.57(0.37-0.89)***	**0.59 (0.38-0.93)***
HEALTH BEHAVIOURS				
Physical Activity				
Inactive (ref)				
Moderately Active				**0.70(0.52-0.93)***
Active				**0.49(0.35-0.72)***
Fruit & Vegetable Intake				
Less than 5 per day (ref)				
5 to 10 per day				0.98(0.77-1.25)
Greater than 10 per day				1.55(0.86-2.77)
Smoking				
Not at all (ref)				
Occasionally				1.07(1.04-1.12)
Daily				1.00(0.94-1.06)
GOODNESS OF FIT TEST				
-2 Log Likelihood Chi-square/df	2720.4/2	2476.5/9	2459.5/17	2438.3/23
Change in Chi-Square	---	243.9	17.0	21.3
AIC	2724.4	2494.5	2493.5	2484.3
Area Under the ROC Curve (p-value)	0.52 (0.23)	0.74 (.000)	0.74 (.000)	0.75 (.000)

Table 3-12: Odds Ratios for High Blood Pressure by Frequency of Religious Service Attendance –Weighted (*p<0.05)

	Model 1	Model 2	Model 3	Model 4
RELIGIOUS SERVICE ATTENDANCE				
Less than Once a year (ref)	1.06(.908-1.25)	1.07(0.90-.1.27)	1.08(.909-.1.29)	1.08(.907-1.30)
Three to 12 times a year	**1.37(1.16-1.61)***	**0.81(0.67-0.97)***	**0.81(0.67-0.97)***	**0.82(0.68-0.99)***
More than once a week				
DEMOGRAPHICS				
Age		**1.06(1.06-1.07)***	**1.06(1.05-1.06)***	**1.06(1.05-1.06)***
Sex				
Male (ref)				
Female		0.93(0.80-1.08)	0.95(0.82-1.11)	0.99(0.85-1.16)
Marital Status				
Married (ref)				
Single/Common Law		**0.75(0.60-0.95)***	**0.67(0.54-0.87)***	**0.69(0.54-0.87)***
Separated/Divorced/widowed		**0.79(0.64-0.96)***	**0.72(0.59-0.89)***	**0.72(0.59-0.90)***
Immigrant Status				
Canadian Citizen (ref)				
Immigrant		0.78(0.54-1.11)	0.77(0.53-1.11)	0.81(0.56-1.17)
Ethnicity				
White (ref)				
Non-white		0.72(0.36-1.45)	0.73(0.36-1.46)	0.66(0.33-1.33)
Geographic Area				
Urban (ref)				
Rural		1.02 (0.87-1.20)	0.99(0.84-1.16)	0.98(0.84-1.16)
SOCIOECONOMIC				
Education				
Less than high school (ref)				
High School			1.06(0.84-1.34)	1.07(.852-1.35)
Post-Secondary			0.87(0.72-1.05)	0.89(0.74-1.08)
Household Income				
Less than $19,999(ref)				
$20,000 to $29,999			0.87(0.65-1.22)	0.88(0.64-1.21)
$30,000 to $39,999			1.12(0.82-1.52)	1.09(0.80-1.49)
$40,000 to $49,999			0.77(0.56-.1.07)	0.78(0.56-1.08)
$50,000 to $59,999			0.84(.601-1.16)	0.82(0.59-1.15)
$60,000 to $79,999			0.87(.629-.1.20)	0.87(0.63-1.20)
Greater than $80,000			**0.69(0.50-0.98)**	**0.68(0.50-0.93)***
HEALTH BEHAVIOURS				
Physical Activity				
Inactive (ref)				
Moderately Active				1,00(0.83-1.19)
Active				**0.64(0.52-0.80)***
Fruit & Vegetable Intake				
Less than 5 per day (ref)				
5 to 10 per day				1.13(0.96-1.33)
Greater than 10 per day				0.86(0.55-1.35)
Smoking				
Not at all (ref)				
Occasionally				**1.04(1.03-1.07)***
Daily				**1.62(1.60-1.67)***
GOODNESS OF FIT TEST				
-2 Log Likelihood Chi-square/df	5490.2/2	4609.8/9	4586.5/13	4559.9/23
Change in Chi-Square	----	880.37	23.38	26.55
AIC	5494.2	4627.8	4612.5	4605.9
Area Under the ROC Curve (p-value)	0.53 (.003)	0.79 (.000)	0.79 (.000)	0.79 (.000)

CHAPTER 4: STUDY II

ATTENDING RELIGIOUS SERVICES AND THE RELATION OF CORONARY HEART DISEASE AND RELATED RISK FACTORS: A QUALITATIVE STUDY OF CHURCH PASTORS' AND PARISHIONERS' PERSPECTIVES

4.0 Abstract

A recent cross-sectional study of Canadian Community Health Survey (CCHS) 4.1 data showed persons who attend religious services more than once a week, compared to persons who do not attend at all, have lower prevalences of coronary heart disease (CHD), diabetes and high blood pressure after controlling for several demographic, socio-economic and health behaviour variables. Due to uncertainty over why this association exists, a qualitative study was undertaken to obtain a greater understanding of how attending religious services influences these health outcomes.

Twelve semi-structured interviews with ordained pastors and three focus groups with parishioners across Catholic, Anglican and United churches were conducted in Canada. Interviews were transcribed, coded, and analyzed for emergent themes through an iterative process of direct content analysis.

All pastors and parishioners claimed that attending religious services indirectly influenced a lower prevalence of heart disease and related risk factors. They felt religious service attendance: (1) promotes mental health; (2) provides social support and activities; and (3) promotes health and lifestyle behaviours to lower CHD risk. This study suggests these three themes are mechanisms that explain the inverse association between religious service attendance and the prevalence of health outcomes found in the CCHS 4.1 data.

Keywords: Religious Service Attendance; Coronary Heart Disease; Diabetes; High Blood Pressure; Qualitative

Publication: This study is in preparation for submission as a journal manuscript.

4.1 Introduction & Background

Epidemiological studies shows religious service attendance (RSA) is inversely associated with health outcomes such as coronary heart disease (CHD) and related risk factors like diabetes and high blood pressure (Hummer et al, 1999; Oman et al, 2002, King et al, 2001; Goldbourt et al, 1993). Most findings are based on longitudinal studies done primarily in the United States. A recent cross-sectional study of Canadian Community Health Survey (CCHS) 4.1 (Chapter 3) data showed persons who attend religious services more than once a week, compared to persons who do not attend at all, have lower prevalences of CHD (OR=0.82; 95% CI 0.61-1.11), diabetes (OR=0.60; 95% CI 0.45-0.80) and high blood pressure (OR=0.82; 95% CI=0.68-0.99) after controlling for several demographic, socio-economic and health behaviour variables (Banerjee et al, 2012).

The literature suggests parishioners who attend church regularly may have more of a positive outlook on life and experience mental health benefits when engaging in religious practices (Ellison & Levin, 1998; Levin, Taylor & Chatters, 1994). For example, studies report attending religious services increases optimism and decreases depression, both known to be associated with CHD health outcomes (Rasmussen et al, 2009; Tindle et al, 2009; Ellison, 1995; Kraus, 1992).

Persons who practice religious coping strategies (e.g., prayer) to handle stress more effectively compared to persons who do not have better mental health status (Koenig, Pargament & Nielsen, 1998). There is evidence that religious coping is important for mental and physical health outcomes in a variety of life circumstances, like unemployment and bereavement (Pargament et al, 1998; Pargament, 1997; Pargament et

al, 1990). Religious coping has also been shown to reduce levels of depression and anxiety in connection with stressful events, which in turn could impact the risk of developing CHD or related conditions (Koenig, 1999; McIntosh, Silver & Wortman, 1993; Koenig et al, 1997).

Social support within a religious community has been a vital factor discussed in studies explaining the relationship between RSA and better health outcomes (Musick et al, 2004; Strawbridge et al, 2001). Religious settings are known to be suitable environments for support exchanges because of certain organizational characteristics such as expressed norms that advocate supportive interactions between parishioners (Chatters, 2000).

Finally, adherence to religious precepts can lead to direct and formal prohibitions against specific risky behaviours (e.g., poor diet, smoking), as well as encouragement to engage in behaviours that are conducive to health (e.g., regular physical activity). These distinctive patterns of lifestyle and health behaviours could result in lower prevalent rates of chronic and acute illness within people who attend religious institutions regularly (Levin, Taylor & Chatters, 1994; Chatters, 2000).

As discussed in Chapter 2, Harold Koenig built a framework (Figure 2-1, page 30) for theorizing linkages between religion and physical health (Koenig, 2001; 2001b). Drawing on empirical evidence, he shows the linkage between religion and health is intervened through "pathways that are psychological, social and behavioural". Koenig's model highlights the way religion (including RSA) as a coping strategy, a source of social support, and a method of behavioural control, may have a strong influence on the risk of

developing CHD and related risk factors.

This is the second study of a mixed method sequential explanatory research design characterized by the collection and analysis of quantitative data followed by the collection and analysis of qualitative data (Creswell, 2011). Guided by the framework of religion and health (Koenig, 2001b), this qualitative study seeks to explain how attending religious services influenced lower prevalences of CHD, diabetes and high blood pressure in Canadian churches, as per the results found in the first thesis study (Banerjee et al, 2012).

The data from this qualitative study will help to address the gaps in the first thesis study (Banerjee et al, 2012). First, it was uncertain whether health behavioural factors could act as mechanisms, through which RSA influences physical health. This qualitative study specifically explores how RSA affects health directly or indirectly from the perspective of church pastors and parishioners who attend religious services regularly.

The first thesis study did not include many of the psychosocial variables (e.g., social support) in Koenig's model in the analyses. Given the amount of epidemiological evidence for religion's role in providing social support (Musick et al, 2004; Strawbridge et al, 2001; Ellison & George, 1994), it is unclear whether this variable could have intervened in the relationship between RSA and CHD and related risk factors. Understanding how social support within a religious setting influences better health outcomes can be answered in this qualitative study.

A qualitative investigation providing in-depth explanations of a quantitative relation between RSA and CHD health has not been conducted and is warranted as

current evidence is mainly generated by quantitative studies alone (Koenig et al, 2001). This qualitative study will explain the quantitative study results regarding the relation between RSA and CHD and related risk factors in Chapter 3. Further, data will be analyzed in the context of Koenig's model on religion and health. Integrating the findings from the quantitative and qualitative studies has significant implications for research and practice in the prevention of CHD, high blood pressure and diabetes.

4.2 Research Question:

1. How do church pastors and parishioners in Canadian churches explain the finding (Banerjee et al, 2012) of an inverse association between attending religious services and the prevalence of CHD, diabetes and high blood pressure?

4.3 Methodology

4.3.1 Design

A qualitative descriptive study design (Sandolowski, 2000) was employed to help interpret and explain the quantitative results from the study described in Chapter 3. Figure 4-1 (page 143) shows the data collection and analysis procedures for this qualitative study.

4.3.2 Church Settings and Participants

Statistics Canada conducts the CCHS and does not release participant contact information. Therefore, researchers cannot directly access CCHS participants for inclusion in subsequent studies (Statistics Canada, 2009). Consequently, a "parallel" sample was used in this qualitative study. A parallel sample does not involve participants from the quantitative study. Rather, the sample consists of participants who are similar in characteristics to the participants in the quantitative study (Collins, 2007). In this study, the participants resemble the participants in the CCHS 4.1 who attended religious services more than once week in the CCHS 4.1 study and were mainly from the Catholic, United Church and Anglican denominations of Christianity.

Six churches were approached to be study sites that were in geographic proximity to the doctoral student. The churches were located in urban areas of Toronto & Hamilton, Ontario (2 Anglican, 3 Catholic and 1 United). The doctoral student contacted the senior pastor by telephone at their respective church, gave a brief summary of the study proposal (learning about the way RSA influences better health outcomes) and asked to schedule an initial meeting to discuss the project in greater detail. At the initial meeting, the doctoral student provided more detail about the study and what participation would involve. As well, the doctoral student obtained more general information about the church (e.g., history, size, unique characteristics of congregation). Each senior pastor was presented the study protocol and the McMaster Health Sciences Research Ethics Board study approval letter (Appendix C, page 226). Each of the six churches agreed to participate in the study.

4.3.2.1 Church Pastors

A purposive sample of ordained church pastors at each church site was invited to participate in the study. Church pastors, all of whom were ordained within the last six months, were authorized by their respective churches to perform functions such as teaching beliefs, leading services and providing religious guidance to the congregation. An inclusion criterion for pastors to participate was to have no known diagnosis of CHD, high blood pressure or diabetes. This criterion was important to understand how attending religious services could influence a lower prevalence of CHD and related risk factors (Banerjee et al, 2012). Church pastors are the core of religious organizations and functions as the representative leaders of his/her church members. Pastors are largely responsible for coordinating the religious services and delivering religious teachings to congregations. It was believed that pastors who did not have these chronic diseases could best answer the research question from a disease prevention point of view with their core role as clergy in religious organizations. Pastors could reflect on how their involvement in church could influence themselves and other congregant members to not have CHD, diabetes or high blood pressure.

4.3.2.2 Church Parishioners

The qualitative sample of the parishioners was also parallel to the sample of the CCHS 4.1 quantitative study on RSA and health outcomes. Out of the six participating churches in the study, three institutions agreed to partake in the focus groups. The other three

churches declined due to time restraints and lack of administrative staff to help organize the focus groups.

Parishioners for the qualitative study were recruited through an ordained pastor at each of the three participating congregation sites. The inclusion criteria for the parishioners denoted a parallel sample to the subjects in the quantitative study (Banerjee et al, 2012) and were: 55 years of age or older, white, non-immigrant, English speaking, no medical diagnosis of CHD, diabetes and high blood pressure, and attendance at United, Anglican and Catholic church services at least once a week during the last 12 months. The focus was on older adults (greater than 55 years of age) without disease because this is when age becomes a risk factor for CHD (PHAC, 2009). Further, RSA is most prevalent among Canadians over the age of 50 (Statistics Canada, 2009). Approximately 50% of participants reporting weekly RSA in the CCHS 4.1 were over the age of 50 years. Parishioners who did not have any health conditions could best answer how attending religious services could influence a lower prevalence of CHD and related risk factors. Essentially, it would give them the opportunity to discuss how they attributed their good coronary health in relation to attending religious services weekly. Participants with disease who had started going to church upon becoming ill were excluded because they might have a different perspective regarding the inverse relation between RSA and health outcomes. The focus of the qualitative study was to understand how RSA could prevent CHD, diabetes and high blood pressure. In summary, parishioners chosen for this study were able to provide the most detailed information relevant to explaining the results of the quantitative study.

4.3.3 Data Collection

Semi-structured interviews and focus groups, employed in two separate phases, were the methods of data collection in this study. Focus groups were conducted after the completion and analysis of interviews with the pastors in this study.

The literature suggests that small samples can provide complete and accurate information within a particular context, as long as there is a similar set of congruent behaviours, attitudes and beliefs among participants in the study (Guest, Bunce & Johnson 2006). Considering the homogeneity of the study participants, interviewing a minimum of six to eight pastors and conducting one focus group within each Christian denomination (consisting of six to eight parishioners) would be sufficient to reach saturation, where the collection of new data would not reveal any further information about the issue under investigation (Kuzel, 1999).

All interviews and focus groups were digitally recorded and transcripts of the interviews were prepared verbatim. A self-administered demographic questionnaire was given to all study participants at the start of the interviews or focus groups and collected by the interviewer (doctoral student) after completion.

4.3.3.1 Phase 1: Semi-structured Interviews

During October 2011, the senior pastor of each church verbally invited other pastors within the congregation who met the inclusion criteria to participate in a semi-structured one-on-one interview. Interested pastors were given an invitation letter and consent form by the senior pastor. The doctoral student scheduled appointments with the pastors to

conduct the interviews on church premises from November 2011 to January 2012. Interviews ranged in length from 30 to 90 minutes. At the start of the interviews, the results from the CCHS study were presented to all pastors, who were asked to explain how they believed weekly RSA could influence a lower prevalence of CHD and related risk factors among parishioners. The interview guide (Appendix D, page 232) contained questions to keep the dialogue focused and structured and to elicit descriptive responses that specifically addressed the research question. Interview questions were asked sequentially, but the doctoral student also probed beyond the responses provided (Berg, 2004). When novel issues were identified in the earlier interviews, questions were added to the interview guide for subsequent interviews. For example, during the 2nd interview, the pastor believed the relation between RSA and health outcomes would not hold in churches located in rural and remote areas, as access to healthcare was a challenge and there could be a higher prevalence of CHD, diabetes and high blood pressure. Questions geared to understanding differences between rural versus urban areas were added to the interview guide and asked in subsequent interviews.

4.3.3.2 Phase 2: Focus groups

Focus groups followed the completion and analysis of the interviews with the pastors. Among the six churches participating in this study, three churches representing each Christian denomination agreed to hold a focus group with their parishioners.

The senior pastor at each participating church verbally explained the purpose of the qualitative study and invited parishioners who met the inclusion criteria to participate

in a focus group after a Sunday church service in January 2012. The pastor gave interested parishioners an invitation letter and consent form to participate in the focus group.

Six to eight regular parishioners participated in each of the three focus groups, which were held in their respective church sites for periods of up to two hours. The doctoral student moderated the focus groups and a research assistant was present to take notes. The focus group guide was similar to the guide used for the semi-structured interviews. However, results from the analysis of the pastor interviews did suggest topics to emphasize and include in the focus groups.

The focus group guide enabled the doctoral student to evaluate whether similar themes from the interviews emerged. The guide also ensured overall accuracy, clarification and confirmation of the interpretations from the interviews with the pastors.

Participants in the first two focus groups (Anglican and United Church) provided insight into how attending religious services enabled parishioners with CHD and related risk factors to cope and manage their illnesses effectively. To challenge this finding, the doctoral student and members of the thesis committee had decided to conduct the last focus group with Catholic participants who met the inclusion criteria yet had a clinical diagnosis of CHD, diabetes and high blood pressure. This last focus group was also used to explain the results of the first thesis study and see if persons with disease had different conclusions from persons without disease.

4.3.3.3 Memos and Field Notes

Qualitative memos (Birks, 2008) containing reflective ideas and impressions were produced by the doctoral student after each completed interview and focus group. Memos reflected emerging ideas concerning the relationship between RSA and CHD and related risk factors. Each memo contained the doctoral students' novel insights about a completed interview and focus group. These insights were further explored in subsequent interviews and focus groups. Memoing primarily influenced the adaptation of questions in the interview/focus group guide throughout data collection. For example, in the ninth interview with a pastor who was also a parish nurse, the pastor discussed the important role parish nurses had in implementing health promotion activities at churches. Questions central to this topic (e.g., What value, if any, is there to have a parish nurse in a place of worship?) were recorded in the memo and added to the interview guide, and asked in the remaining interviews with the pastors.

While in the churches, the doctoral student made careful, objective notes about what she saw, recording all accounts and observations as field notes (Wolfinger 2002). Two types of observations were prominent in the notes. First, the doctoral student attended a religious service prior to conducting each focus group at the United, Catholic and Anglican churches. This helped the doctoral student develop a familiarity with the cultural milieu of churches. Second, she took a tour of each participating church in the study after the completion of interviews. Data obtained through these observations served as a check against study participants' subjective reporting of how attending religious services could influence a lower prevalence of CHD and related risk factors. For

example, pastors and parishioners described how health messages were given during some religious services. The doctoral student was able to observe if this was the case when observing the religious service.

4.4 Data Analysis

The main source of data for this study was the interview and focus group transcripts. Digital recordings were transcribed by a professional transcriptionist and checked for accuracy by the doctoral student prior to uploading into NVivo 8 (QSR International, 2008), a software program that facilitates qualitative data analysis by allowing for the coding and organization of data across themes and groups.

4.4.1 Phase 1: Semi-structured Interviews

For the semi-structured interviews, data analysis occurred after saturation was reached following 12 interviews. Saturation was determined to have occurred because no new information emerged through memos and field notes. Direct content analysis was conducted to elicit recurrent themes (Patton, 1999). The goal of a directed approach to content analysis was to specifically identify aspects of weekly RSA that may be related to a lower prevalence of CHD and related risk factors among parishioners. Each transcript was read independently by the doctoral student to extract themes through a process of coding that involved reading and rereading the transcripts to identify themes related to how weekly RSA may influence better CHD-related outcomes. The doctoral student read through the first transcript carefully and identified an initial coding list. This list was

checked with one of the thesis committee members (MO). A codebook was developed in NVivo and refined as the interviews and analyses proceed. Once pertinent themes were identified, similar themes were grouped together.

The doctoral student created summary sheets listing each of the themes and their subthemes, when analyses of all interviews were completed. The sheets contained a brief explanation of the themes and their sub-themes, along with illustrative quotes from the transcripts. The completed summary sheets were reviewed by two members of the thesis committee (MO and PS) to consolidate the generation of the final themes.

4.4.2 Phase 2: Focus Groups

The process for analyzing data from the focus groups was similar to the semi-structured interviews: direct content analysis occurred after all focus groups were completed. The doctoral student read each transcript and extracted similar themes through coding to understand how weekly RSA would influence a lower prevalence of CHD and related risk factors. Summary sheets were created and reviewed by two of the committee members (MO and PS), leading to the generation of final themes.

4.4.3 Data Integration

Data integration occurred at two points. First, the results of the interviews and focus groups were compared to examine potential similarities and differences between themes. Similar themes between the two qualitative methods were consolidated into final themes

explaining how RSA influences a lower prevalence of CHD and related risk factors. Next, the final themes were compared to the quantitative results to see how the final themes explained the quantitative findings.

4.5 Rigour

The following strategies helped the doctoral student identify when to continue, stop or modify the research process to ensure rigour and achieve credible results. This study utilized several approaches to maximize its credibility. Credibility means establishing that the qualitative findings were believable from the perspective of the participants in the research (Creswell, 2007). First, interviews and focus groups were digitally recorded and simultaneously transcribed to ensure the quality and reliability of the data.

Memos and field notes added rigour to the data collection process of this study. Memos were used to track the methodological aspects of the study, particularly in adapting the interview/focus group guide to expand on and verify emerging data in subsequent interviews and focus groups. Field notes supplemented text-based interview and focus group data with observations relating to the particular setting of churches and religious services. For example, notes were made during the religious services at each participating church in the study. The doctoral student noted any health-related scriptural messages given by the clergy. This production of useful observational data contributed to a clarified and satiated description of how attending religious services influences a lower

prevalence of CHD, diabetes and high blood pressure from the perspectives of pastors and parishioners.

Integrating data from individual interviews and focus groups within a single study is called 'triangulation' (Lambert & Loiselle, 2008), a strategy to increase the understanding and rigour of the issue under investigation (Mays & Pope, 1995). Parishioners in the focus groups provided feedback on the results from the pastor interviews, which confirmed interpretations of the findings (Lincoln & Guba, 2000). Triangulation ensured pastor perspectives reflected parishioner perspectives and experiences in how attending religious services influences a lower prevalence of CHD and related risk factors.

Peer debriefing was achieved through the thesis advisory committee consisting of the supervisor and three members. Two members in particular (MO and PS) met with doctoral student and helped uncover taken for granted biases, perspectives and assumptions on the doctoral student's part in the process of data collection and analysis (Lincoln & Guba, 2000). Through this process, the doctoral student defended her qualitative findings. She evaluated if the findings seemed reasonable to the committee members and considered their recommendations.

Reflexivity and positionality provided additional criteria for rigour in making the interpretation of qualitative data more transparent (Hall & Callery, 2001). The doctoral student demonstrated transparency in her decision-making through reflexivity, and by having an audit trial. The audit trial was a record of the doctoral student's design decisions, as the qualitative study progressed, about gaining access to the churches and

participants, writing memos to help adapt the interview guide and analyzing the data. The audit trial shows the research process of this study was reflexive, i.e., characterized by on-going self-critique and self-appraisal by the doctoral student.

The doctoral student was the research instrument of this study and had an effect on the research and vice versa. As the research instrument, the choice of methodology and the research design were influenced by her subjectivities at every stage of the research process, and this influenced the questions she asked and in the ways she tried to interpret the answers on the link between RSA and CHD health.

The doctoral student was constantly aware of her own religious values, attitudes and perceptions and how they might influence the research process, from the formation of the research questions, through the data collection stage, to the ways in which the data were analyzed and explained. Positionality in qualitative research refers to those aspects of the doctoral student's identity, for example, her gender, age, socio-economic status, ethnicity, or religion that could influence the qualitative research process. Among all of these positions, the doctoral student felt being Hindu and South Asian enabled her less likely to make certain assumptions or have expectations of the information provided by the White Christian participants in the qualitative study. As a result, the doctoral student was more likely to probe or ask clarification questions and obtain in-depth information about the relation between RSA and CHD and related risk factors. This was also because she did not hold any prior knowledge of the Christian religion nor attend any previous religious services in churches.

4.6 Findings

Table 4-1 (page 142) shows participant characteristics. Twelve ordained pastors (three Catholic, six Anglican and three United) from six Canadian urban churches participated in semi-structured interviews. Three focus groups with seven parishioners each were conducted separately in a Catholic, Anglican and United church. Among the pastors, three were women and nine were men while among the parishioners, twelve were women and nine were men. All participants provided written informed consent. It should be noted that no denominational differences in the data were observed and the findings represent the views of all participants in the interviews and focus groups. In addition, there were no differences in the findings between the first two focus groups with parishioners with no disease and the last focus group with parishioners with disease.

Most pastors and parishioners reported an indirect link between RSA and CHD and related health outcomes.

"From my perspective I would have to be looking at the parish playing an indirect role in the prevention of high blood pressure, diabetes and heart disease." (00301-Anglican Pastor)

Participants also discussed how attending religious services played a pivotal role in the secondary prevention of CHD. For example, they described the church as a source of healing when faced with illness.

"The healing process is vitally important at the church as well because we all believe that Christ has that healing process and we ask for his healing process when we go through

the different surgeries of our health problems relating to heart disease, diabetes and blood pressure." (05272-Catholic Parishioner)

The data from the pastor interviews and the parishioner focus groups generated three major overarching themes (each including three to four subthemes) that explain how attending religious services is associated with a lower prevalence of CHD and related risk factors (Figure 4-2, page 144). These themes are: (1) promotes mental health; (2) provides social support and activities; and (3) promotes health and lifestyle behaviours to lower CHD risk. It should be noted that these themes also explained how attending religious services deter the progression of CHD, diabetes and high blood pressure.

The themes were compared to Koenig's theoretical framework describing how religion affects physical health (2001b). Figure 4-3 (page 145) shows how the themes are situated in Koenig's framework as known mental, social and behavioural mechanisms that explain the inverse association between religious service attendance and prevalence of health outcomes found in the CCHS 4.1 data. The following themes are presented in detail with illustrated quotes.

4.6.1 Promotes Mental Health and Coping with Stress

There was a consensus that people who attend church weekly in general experience better mental health and this in turn had, an impact on cardiovascular health.

"I believe that there is a direct link between positive mental health and physical health. I think almost all the comments we have talked about here is we feel good mentally about

coming here and therefore I believe that will benefit my heart, my blood circulation and everything else." (02063- United Church Parishioner)

4.6.1.1 Religious Coping with Stress

Participants spoke of how stress is an important contributor to the development of heart disease, blood pressure and diabetes. For example, one Catholic pastor stated: *"I'm not a medical doctor you know that, but I would imagine the people who are constantly exposed to continuous tension and worries that those are some of the factors that contribute to the blood pressure, cholesterol, and heart disease." (01126-Catholic Pastor)*

Pastors and parishioners thought attending religious services enabled positive religious coping that was related to better mental health status. For example, an Anglican pastor discussed how parishioners were able to "unload" their stress during religious services, which enhanced mental health. They perceived this religious practice as helping attendees cope with constant stressors, thereby reducing heart disease risk.
"So we actually unload on God i.e., unload those things that burden us mentally. And of course the more stressed out we are in life, you know the more that affects us mentally and physically. So if there is this constant practice of letting things go, then it's also going to have that affect as well in reducing our risk for heart-related diseases." (01201-Anglican Pastor)

Several participants expressed the idea that attending religious services can instill a good mental state while being stressed. One United Pastor described this being beneficial to blood pressure:

"People talk about leaving this church with a good mental state and it can be from just one sentence that was said in the church of worship that spoke to them that day and which gave them something that they needed to hear if they were stressed which could impact their blood pressure." (01202-United Church Pastor)

The act of prayer within a religious setting was noted to be of particular importance for mental health. Most participants felt prayer helped them deal with life stressors. They believed prayer reduced harm to their mental and cardiovascular health.

"Oh my mental health, I would think um, I am definitely a person who goes on limited sleep because of personal stress, but I spend a lot of time in prayer which brings me peace often. If I didn't pray, I think I would be carrying a lot of psychological issues and I could be a person definitely on the edge of a stroke or high blood pressure like that just because of the level of stress." (02061-United Church Parishioner)

The practice of confession, or "sacrament of reconciliation" was also discussed by participants as another important religious practice that could relieve mental stress, guilt or burdens that might affect physical health and prevent depression.

"There is also an element in our service about confession and I think sometimes, a lot of times, people carry burdens and guilt in their mind, which act as stressors and lead to depression, which obviously affect the body in a lot of ways. Here, you are given an

opportunity to let that go and receive forgiveness and finally be at peace." (01207-Anglican Pastor)

4.6.1.2 Self-reflection

Attending religious services every week provided an opportunity for the participants to practice self-reflection or be quiet regularly which could lead to a greater sense of mental wellbeing and good health.

"I do suggest the discipline of quiet time in which they sit and recognize that they are in the presence of the creator and take time out of their busy schedule on a regular basis contribute to a greater sense of mental wellbeing and physical health as well." (00116-Anglican Pastor)

Some participants felt they were also able to reflect on important issues in their life during, including their health during their quiet time at church.

"An individual thing, which involves for me a bit of meditation usually 10 – 15 minutes after mass. It is a time of thinking of family and all sorts of things along with the health aspect. I ensure I am taking care of my health during this time and resolve to if I am not." (05275-Catholic Parishioner)

4.6.1.3.Keeping an Optimistic Attitude

Parishioners felt they were keeping an optimistic or positive attitude by coming to church more than once a week that was important for their physical health.

"I would support what's been said and add by saying I find the structure, the physical

structure of the church is a happy place. I feel optimism coming to this place, walking in the doors and I feel my heart is healthy, because of the activities, because of the people I see and interact with, I'm optimistic in what is to come or not." (02063- United Parishioner)

Participants also discussed the environment of a church was positive as everyone collectively aimed to keep a positive attitude and this could help people to heal from health problems.

"In fact my good health is all because of the church. When I had surgery it is very comforting to know the church it's practices are there for you in your religious and physical life. Very calming and optimistic. I wouldn't be able to cope or heal without the church." (05277-Catholic Parishioner)

4.6.2 Provision of Social Support and Activities

Participants discussed that people who attend religious services have greater availability of social support compared to those who do not attend and they felt this could protect health.

"Coming here is a social gathering for many of us. You know, you meet people weekly and everybody I think feels healthier, better if you've got friends and things to do and places to go because of this large social network." (02067-United Church Parishioner)

4.6.2.1 Facilitation of Social Connections

The church provided congregation members with the opportunity to meet one another prior to or after the service to facilitate social contact and support. Participants were aware social support was important for physical and mental health. For example,

"You have people that you can talk to and go to for advice when coming to church weekly, and know who are supporting you. So, you know that helps our lower blood pressure and risk for heart disease." (01207-Anglican Pastor)

This social connection and support was labeled as being unique because the connections made between congregation members was at a spiritual level. They knew everyone at church shared the mutual connection of having faith in a higher being which made them feel better during difficult times.

"I was going to say the reason we as versus. another type of community are unique is our spiritual connection and faith. It's almost as though they will use to booster you up and a testimonial in how God has helped them." (05277-Catholic Parishioner)

4.6.2.2 Having Access to a Caring Community

The idea of the church being a "caring community" and that care that was provided by church members during difficult times was expressed frequently. Parishioners described how this particular social connection, i.e., feeling cared for by fellow congregation members, could enhance their health.

"I think that's important in having the community aspect, we are all part of the same community. It is very important that we do care for our fellow people. We see the group

on a pretty regular basis attending mass and it's a great feeling to be cared for and have the social connection that could enhance our health." (05272-Catholic Focus Group Participant)

An Anglican minister thought having this type of caring support could help people through difficult situations that could affect their health.

"They have a particular kind of social support and what we do is care, which is central to who we are as a church to care for people who go through difficult times. I'm not a scientist but I can only assume that people who experience stress that probably has quite an effect on their bodies." (00216-Anglican Pastor)

During religious services, group prayers were also considered an important source of social support in times of illness for participants.

"We come to church together to pray so, and then also whatever offering we have, you know, let's pray that no one gets sick, let's pray that no one has heart disease and pray for those who have disease to recover quickly." (01210-Catholic Pastor)

4.6.2.3 Preventing Social Isolation

Participants coming to church regularly were more likely to engage in direct support activities for people in difficult times and prevent social isolation, which they felt could lead to depression, a risk factor for heart disease.

"Parishioners are good and they help, they see when, when something is not right and they will do what they can to help out, whatever is needed. And they do it automatically to

make sure no one is feeling depressed and isolated which could eventually risk someone's heart to be damaged." (01131-Anglican Pastor)

Parishioners who were seniors felt they were most vulnerable to social isolation and that having a sense of community and the social interaction from attending church weekly helped with all aspects of their health physically.

"Seniors feel that the sense of community, the social interaction which helps all aspects of health, that's one of the things of being healthy, especially as we get older. We don't go into social isolation." (03251-Anglican Parishioner)

4.6.2.4 Participating in Social Support Activities

People who frequently attended church said they participated in social activities that could benefit their health. Churches had age-appropriate social groups and held parish functions that encouraged social interactions and friendships.

"Social supports, we also have all kinds of activities for various age groups too. We have youth groups, we have adult groupings so they come together for social action, bible study. Then we have parish events, you know, dinners, and young people talent shows. All these prepare the people to belong, people to meet friends, people to make relationships which is important for physical health." (01124-United Church Pastor)

All participating churches in this study provided congregation members with opportunities to participate as volunteers in running the parishes and also in charitable events for groups outside the church community (e.g., homeless shelters). Parishioners felt people who volunteer are generally healthier.

"We encourage a lot of volunteering you know, we are all for that, example soup kitchens all those places, People who volunteer generally are healthy that's what I see. And even running these Parishes we need a lot of volunteers so they get up and they do something which is like keeping active that could lower their risk for disease." (01126-Catholic Pastor).

4.6.3. Promoting Physical Health and Lifestyle Behaviours

Several participants identified how attending religious services facilitated adherence to a healthier lifestyle. It appeared most of them recognized the importance of health and they were more open to practice a healthier lifestyle.

"*You have already an audience that recognizes the importance of health and it makes us receptive." (01116-Anglican Pastor)*

4.6.3.1 Understanding The Body as the Temple of God

The notion of the body as the temple of God was frequently cited as a scriptural basis for taking care of the body:

"And I would say to some extent I do directly attribute my own personal focus on my good health from coming to church and what I have learned from the bible that our body is the temple of God and I should take care of my body. I think to some extent that has sunk in." (02067-United Church Parishioner)

Almost everyone who referenced this scripture and its influence on health behaviour spoke in terms of avoidance behaviours such as not smoking and they focused

on engaging in behaviours such as healthy eating and exercise.

"But truthfully, you know, if you follow the scriptures, your body is a temple and it doesn't really belong to you, it belongs to God, therefore you are responsible for looking after it. But I think this coming out and attending church tends to make you committed to eat properly, exercise and not smoke which prevents disease." (020161-United Church Parishioner)

4.6.3.2 Fasting during Holy Occasions

Catholic priests in particular discussed how fasting once a week or giving up something during the season of Lent (40 weekdays from Ash Wednesday until Easter observed by Christians as a season of fasting and penitence in preparation for Easter) would encourage overall healthy eating as most people would stop eating high caloric foods that contribute to heart disease and diabetes, e.g., saturated meats or desserts.

"*As a religion we encourage fasting especially during leading up to the Easter celebration. The Catholic community in general take this time seriously, they abstain from meat. People also during lent give up dessert for 40 days and that's tough right. But that's good because it promotes health and influence overall healthy eating patterns." (01210-Catholic Pastor)*

4.6.3.3 Pastors' Encouraging Healthy Behaviours

Most Pastors in this study reported leading a healthy lifestyle in terms of eating healthy and exercising regularly. Pastors thought their healthy lifestyles could encourage

parishioners to also lead healthy lifestyles.

"I think I'm in pretty good health, like I said, I work out four or five times a week, play sports. I am definitely conscious every time I eat of what I am eating when I am with the congregation because I know they look up to us as role models." (01207-Anglican Pastor)

Pastors discussed the importance of reminding the members in the congregation particularly seniors to take care of their health, as they were aware they were more vulnerable to chronic diseases. For example an Anglican pastor said:

"Well, particularly with some of the elderly people, I do try to be aware of is are they eating properly. And you know, I can only do so much, but I can give a reminder and say you know, are you sure you are exercising and eating properly you know, do you get enough fresh vegetables and things?" (01129-Catholic Pastor)

4.6.3.4 Availability of Health Promotion Activities

There were examples of health promotion programs taking place in church settings that could be related to a lower prevalence of heart disease and related risk factors among people who attend regularly. For example an Anglican Pastor described a program called "Walk to Bethlehem" that encouraged congregation members to walk.

"In terms of the health promotion programs to reduce risk for heart disease, one of the programs we have run for a couple of years in the Fall during Advent called Walk to Bethlehem to encouraging people to walk more. So what the idea is, it's a virtual trip

from our church to Bethlehem and it's 12 weeks where parishioners aim to walk 12000 km as a whole." (00301-Anglican Pastor)

4.7 Discussion

The primary objective of this qualitative study was to explain the finding that attending religious services in Canada is associated with a lower prevalence of CHD, diabetes and high blood pressure. The doctoral student sought these explanations from the perspective of pastors and parishioners who attended religious services more than once a week. Overall, three consistent themes emerged in the qualitative data (e.g., promoting mental health, providing social support and promoting healthy lifestyles). These themes explained the inverse association between RSA and the prevalence of CHD and related risk factors.

4.7.1 Themes as Proposed Mechanisms Linking Religion and Health

Koenig (2001b) developed a theoretical framework (Figure 2-1, page 30) to explain how religion impacts on physical health. This model describes known psychological, social, and behavioural mechanisms by which RSA influences the development and course of chronic diseases, especially during stressful situations (Koenig, 2001b). The themes in this study fit well in Koenig's framework (Figure 4-2 and 4-3, pages 144-145). First, the framework provides the explanation for how the study themes are linked together. It shows religion (including RSA) impacts on mental health, social functioning and physical

health (Koenig, 2001b) and their connections. Collectively, these help to understand how attending religious services may influence a lower prevalence of health outcomes. RSA may benefit mental health by promoting religious coping that reduces the physiological effects of stress (e.g., high blood pressure). Fellowship with congregation members embeds formal social networks that facilitate receipt of tangible and emotional support during difficult times. Prayer may produce salutary emotions (e.g., optimism) and ameliorate distress, prevent unhealthy behaviors linked to CHD (e.g., overeating and smoking).

Second, Koenig's framework acknowledges that RSA is a multidimensional construct. The themes and subthemes, whether it is the religious coping strategies (e.g., prayer), instilling a sense of optimism, instrumental social support or proscribed health behaviours reflect several possible characteristics or mechanisms of RSA. RSA is a an indicator for many behavioral, social and mental dimensions, all of which potentially involve consequences for health outcomes.

4.7.1.1 Promotes Mental Health

Pastors and parishioners highlighted the mental health benefits attained during religious services. In particular, it appeared various religious coping strategies used in times of stress were important for mental health outcomes (e.g., depression), which could explain the lower prevalence of disease among those who attend church versus those who do not.

Religious beliefs may offer positive coping mechanisms, which would help provide meaning for difficult and stressful situations. Koenig's model (2001b) indicates

religious practices provide coping resources (e.g., prayer) that influence mental health and ultimately prevent physiological responses to stress. This, in turn lowers ones' risk for developing CHD, diabetes and high blood pressure.

Research has highlighted that people who attend religious services have better coping abilities through religious activities compared to people who do not attend (Kuper et al, 2002; Hemingway, Malik & Marmot, 2001). Participants in this study discussed in-depth how various religious practices during the weekly service, such as prayer and sacrament of reconciliation, were important coping strategies and prevented psychological distress and depression. Epidemiologic studies show RSA are associated with a lower incidence of depression (Levin, 2010), a well-known risk factor for CHD, diabetes and blood pressure (Van der Kooy et al, 2007).

There is evidence that prayer may be associated with improved cardiovascular parameters (Rapp, Rejeski and Miller, 2000) and a lower incidence of CHD (Gupta 1996; Gupta et al, 1997). Blood pressure has been studied by a number of researchers interested in the physiological impact of religious commitment (Levin and Vanderpool, 1989). Koenig and colleagues (1998) reported that regular church participation and prayer in a sample of older adults led to a reduction in the occurrence of diastolic hypertension. Hixon, Gruchow and Morgan (1998) also provided data in support of the blood pressure lowering effect of various dimensions of religion including religious coping and prayer in a group of middle-aged women. Overall, the positive impact of religion on health occurs at all gradations of stress and could partially compensate for the deleterious impact of stressors on CHD health.

Parishioners reported having a sense of optimism was linked to better mental and physical health. Numerous studies cite the beneficial psychological factors that may be associated with religion and its practice (Powell et al, 2003; Schnall et al, 2010). The Women's Health Initiative Study recently found women attending services weekly during the past month, compared with those not attending at all in the past month, were more likely to be optimistic (OR=1.22; CI=1.17-1.26) (Shnall et al, 2011). Indeed a sense of optimism has been shown to protect health (Rasmussan, 2009). Kubzansky et al prospectively studied the relationship of an optimistic or pessimistic attitude with CHD incidence in the Veterans Affairs Normative Aging Study (2001). Compared to men with high levels of pessimism, those reporting high levels of optimism had multivariable-adjusted relative risks of 0.44 (95% CI=0.26-0.74) for combined angina pectoris, nonfatal myocardial infarction and CHD death. A dose-response relation was also found between levels of optimism and each outcome. Generally, evidence concerning the impact of religious service on indicators of mental health indicates strong positive associations between religious involvement and mental health outcomes that could impact CHD health.

4.7.1.2 Provision of Social Support and Activities

Following Koenig's model, most of the participants in this study did report the relation between RSA and health outcomes was indirect via the provision of social support from congregation members. The participants discussed that people who attend religious services have greater levels of access to social support compared to those who do not

attend and they felt this could protect cardiovascular health during stressful times. Koenig (2001b) provides evidence that activity within a religious organization may provide increased social support from other organization members, which has been demonstrated to buffer the effect of stressors on health, including CHD. He explains RSA involves immediate experiences that people have in ongoing social networks, and in relations with family and friends that reinforce social support during difficult situations.

The literature suggests social support provided within religious settings may be deeper and broader than support obtained in secular settings (Powell, 2003). Participants in this study discussed the uniqueness of the social support available within religious settings, which they felt was linked to lower prevalence of CHD and related risk factors. Research has reported both structural and functional features of social support in religious settings (Kinney et al, 2003). Structural support can be described as membership in a religious group and the number of and frequency of contacts within a religious group. Functional aspects of social support include emotional and instrumental support, i.e., help and assistance (Kinney et al, 2003). Kinney et al (2003) suggested that structural support, in the form of church attendance, offered more opportunities for parishioners to receive help or emotional support.

Research has also shown that people involved in a religious practice enjoy increased social support, which has been recognized as playing a significant role in physical health (Jones, 2004). Strawbridge and colleagues (2001) investigated whether religious attendance would improve social relationships for 2,676 Alameda County Study participants, from 17 to 65 years of age in 1965, who survived to 1994. Weekly

attendance was significantly associated with increased social relationships (OR=1.62, 95% CI=1.13-2.31) compared to those who never attended. Most studies often conclude that social support as an important mechanism in the relation between RSA and health outcomes (Hummer et al, 1999; Oman et al, 2002, King et al, 2001; Goldbourt et al, 1993).

4.7.1.3 Promotes Physical Health and Lifestyle Behaviours

Pastors and parishioners thought lifestyle differences could account for some of the observed effects between RSA and the lower prevalence of CHD and related risk factors. Religious texts have proscriptive behaviour norms, including abstention from tobacco, alcohol and meat. Actively attending members of a religious organization may be more likely to follow these norms as a demonstration of their faith, simultaneously avoiding many potential health problems such as CHD, diabetes and high blood pressure (Levin & Vanderpool, 1987; Strawbridge et al, 2001). Koenig (2001b) also suggests RSA lowers mental stress that sometimes prevents unhealthy behaviours (e.g., cigarette smoking and overeating).

As discussed in the focus groups, Koenig (2001) posited the attention to physical health might be linked to religious teachings that say respect for ones' body is important. Many Christian churches cite the biblical teaching that the body is "a temple of God" and highlight the importance of taking care of one's physical health via adopting good health behaviours. In a longitudinal community-based study, Strawbridge et al tested the relationship between church/service attendance and reported improvement in health

behaviours (e.g., less smoking, increased physical activity, more medical check-ups). Weekly church/service attendance was associated with improvement in most of the physical health behaviours examined. On the whole, this suggests that weekly church/service attendance could be a vehicle for lowering risk factors for CHD and related risk factors.

4.7.2 Strengths

The strength of this study is the results offer structured and specific perspectives explaining the recent finding that RSA is associated with a lower prevalence of CHD and related outcomes in Canada (Banerjee et al. 2012). The vast majority of the research examining potential relations between religious factors and outcomes of CHD and related risk factors has been quantitative, with no supplemental explanations. Many quantitative studies have recommended the need to use a much greater variety of research designs and assessment strategies, as well as to combine more qualitative and quantitative studies (Chatters, Levin & Ellison, 1998).

Quantitative data alone do not increase understanding of the religion-health connection without qualitative studies to help make sense of the data (Creswell, 2007). Identifying qualitative perspectives to explain and interpret findings on religion and CHD health is important and timely, especially as supportive findings have been misinterpreted in epidemiology (Mertens, 2003). For example, results are often taken to mean that the relation between RSA and health outcomes as direct or indirect, depending on the study questions and hypotheses. However, most studies do not test indirect relations; they

mostly speculate on social support and health behaviours as mechanisms explaining the quantitative relations on religion and health. This qualitative study was able to show how the inverse relation between RSA and prevalence of CHD and related risk factors is indirect. The themes provided detail about how social support, proscribed health behaviours and religious coping are mechanisms of RSA and explain the lower prevalence of CHD and related risk factors in people who attend religious services.

The study brought forth the behavioural, social and psychological aspects of RSA that were not captured in the quantitative study. Further, the qualitative findings show RSA to be a rather complex construct that is multidimensional and could be an indicator for various factors in lowering the risk of developing CHD and related risk factors. Attendance at religious services alone cannot predict health outcomes, but it is features like prayer, social support and teachings of religious scriptures that encourage healthy lifestyles influence health outcomes indirectly from the perspective of pastors and parishioners.

A second strength of this study lies in the triangulation of two sources of information on the relation between RSA and CHD and related outcomes. Conducting two-phase data collection with pastors and parishioners from the same congregations produced more in-depth, comprehensive explanations on the inverse association between RSA and CHD and related risk factors (Birks, Chapman & Francis, 2007).

The advantage of the focus groups in this study is that the comments and statements of each participant were available to all other participants in a group setting. Alternative interpretations and more depth of information were likely to come from the

parishioners interacting and engaging with one another. In this regard, the focus groups provided insight on the data that were generated from the pastor interviews, but yielded detailed information from congregation members interacting among themselves, building on and replying to the comments of one another and having their experiences and interpretations of RSA questioned. This provides greater clarity and thoroughness in the qualitative data explaining how RSA influences a lower a prevalence of CHD and related risk factors.

In summary, integrating the interview and focus group data helped to determine overall themes explained the quantitative findings (Banerjee et al, 2012). Overall, triangulation improved the understanding and credibility of the qualitative findings.

4.7.3 Limitations

The findings of this research need to be interpreted with some caution because of the study's limitations. First and foremost, the study only consisted of Catholic, Anglican and United pastors and parishioners. This restriction was necessary to ensure that the present study sample was parallel to the participants in the quantitative study by Banerjee et al (2012). However, the results may not generalizable to the entire Christian population, which is comprised of several other religious denominations (e.g., Presbyterians, Baptists etc.) or to other major global religions (e.g., Hinduism, Islam, Judaism, etc.). It is possible that the themes identified here exclude or ignore unique factors associated with other Christian denominations or other religions.

The survey respondents in the quantitative study by Banerjee et al (2012) were

from Saskatchewan, Canada. There were no qualitative data collected from this province, which is a limitation of this study. However, the Saskatchewan data in the quantitative study were representative of the data collected from the other Canadian provinces and territories in the CCHS 4.1. Thus, it is unlikely qualitative data collected from pastors and parishioners from Saskatchewan would be different from data collected in Toronto and Hamilton, Ontario.

This study did not seek to recruit a matched sample of non-parishioners who do not attend religious services. Therefore, the research question in this study remains unanswered from the perspective of non-religious individuals. Findings from our focus group discussions noted parishioners were uncertain of how people who are not part of a religious community would cope effectively with difficult or stressful situations, which could be harmful to their CHD health.

4.7.4 Research Implications

There are research needs in the study of religion and CHD health. The literature on religious indicators and health outcomes is scarce in Canada. In studies of physical health outcomes, the most common religious measure is the single-item question on attendance at worship services because it is observable and quantifiable. However, this qualitative study found RSA is an indicator for various behavioural, social and psychological factors that could lead to a lower prevalence of CHD and related risk factors. This study gives attention to the meaning of RSA and the specific health benefits that various participants experienced as a result of attending religious services. For example, the act of prayer was

frequently mentioned in the interviews and focus groups as a religious coping mechanism to deal with stress and health issues. Therefore, examining a specific dimension of RSA, such as prayer should be done in relation to health outcomes. Understanding the relation between prayer and health will require consideration of which particular dimensions of prayer (e.g., private versus public) may be related to specific health outcomes. A mixed methods approach may best suit such a research investigation. Qualitative data should be collected to explore multiple types of prayer and the many different experiences during prayer. This information can form a quantitative study examining the nature, frequency, content and meaning of prayer in relation to health outcomes.

The findings of this qualitative study align with the various mechanisms proposed in Koenig's theoretical framework about religion and health outcomes. As noted, researchers speculate religion affects health outcomes indirectly and quantitative evidence on this indirect link is limited. Investigators are encouraged to test the themes identified as mechanisms when examining indirect relations between religion and health outcomes. For example, there is a need to examine how specific religious-coping methods (e.g., prayer) buffer the effect of stressors on cardiovascular health. Research that focuses on the health behaviour mechanisms (e.g., physical activity) through which religious scriptures and clergy influence health outcomes of parishioners is also required. Lastly, how RSA shapes the nature, type and extent of social support relationships in ways that indirectly benefit CHD health is important to understand.

There are very few studies examining how RSA is useful in disease management for parishioners diagnosed CHD, diabetes and high blood pressure. Most studies look at

associations of disease by examining the incidence or prevalence of health outcomes in people who attend religious services compared to those who do not. A study of religious coping in relation to anxiety and distress associated with being diagnosed with heart disease is important to understand. If positive forms of religious coping (e.g., prayer) are strongly linked to secondary prevention of CHD, then such findings can encourage health practitioners to make use of religious resources from patients' own religious institutions.

There may be inter- and intragroup variability that may alter the meaning and importance of religious factors. The literature has considered three potential moderators: age, gender and ethnicity. RSA could be beneficial for CHD risk, but the magnitude of this benefit may vary based on several factors. Attending religious services may be consequential for older people (Koenig, 1998). Women were more often to attend religious services than do men (Strawbridge et al, 1997). However, there were no noted differences between the men and women in the qualitative study. Lastly, religion is of special importance in the lives of ethnic groups in Canada such as South Asians, i.e. people who originated from India, Pakistan, Bangladesh and Nepal. Overall, it is expected that experiences of RSA on CHD and related outcomes may be stronger for older adults, women and ethnic groups and should be further investigated.

In summary, the findings of this qualitative study will encourage research on RSA and CHD health to instill interest and encourage health researchers to investigate religious indicators within the Canadian context.

4.8 Conclusion

This qualitative study has highlighted themes to explain why RSA influences a lower prevalence of CHD and related risk factors in Canada. The reported themes are mechanisms of RSA that warrant further research to determine their indirect impact on health outcomes. Research can advance knowledge about the patterns, determinants, and health outcomes of religious participation among Canadians and throughout the life course.

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Table 4-1: Demographics of Qualitative Study Participants (n=33)

Characteristics	N or Mean (Range)
Pastors (n=12)	
Age, *mean (range)*	55.3 (33-76)
Male	9
Education	
High school certificate	0
College or other non-university certificate	1
University degree at bachelor's level or above	11
Employment	
Employed full-time	8
Employed part-time	2
Student[a]	2
Retired	0
Christian Denomination	
Catholic	3
Anglican	6
United	3
Parishioners (n=21)	
Age, *mean (range)*	66.8 (55-79)
Male	9
Education	
High school certificate	2
College or other non-university certificate	6
University degree at bachelor's level or above	13
Employment	
Employed full-time	6
Employed part-time	1
Student	0
Retired	14
Christian Denomination	
Catholic	7
Anglican	7
United	7
Self-reported CHD and Related Health Outcomes[b,c]	
Coronary Heart Disease	2
Diabetes	4
High Blood Pressure	5
Years Attending Church once a week, *mean (range)*	49.5 (5-70)

[a]All pastors were employed at their respective church which of two were also students.
[b]Catholic focus group only had CHD and related health outcomes. The Anglican and United focus groups only included participants with no known disease of CHD, diabetes and high blood pressure.
[c]Participants reported having CHD, diabetes and/or high blood pressure

Figure 4-1: Qualitative Study Data Collection and Analysis Process

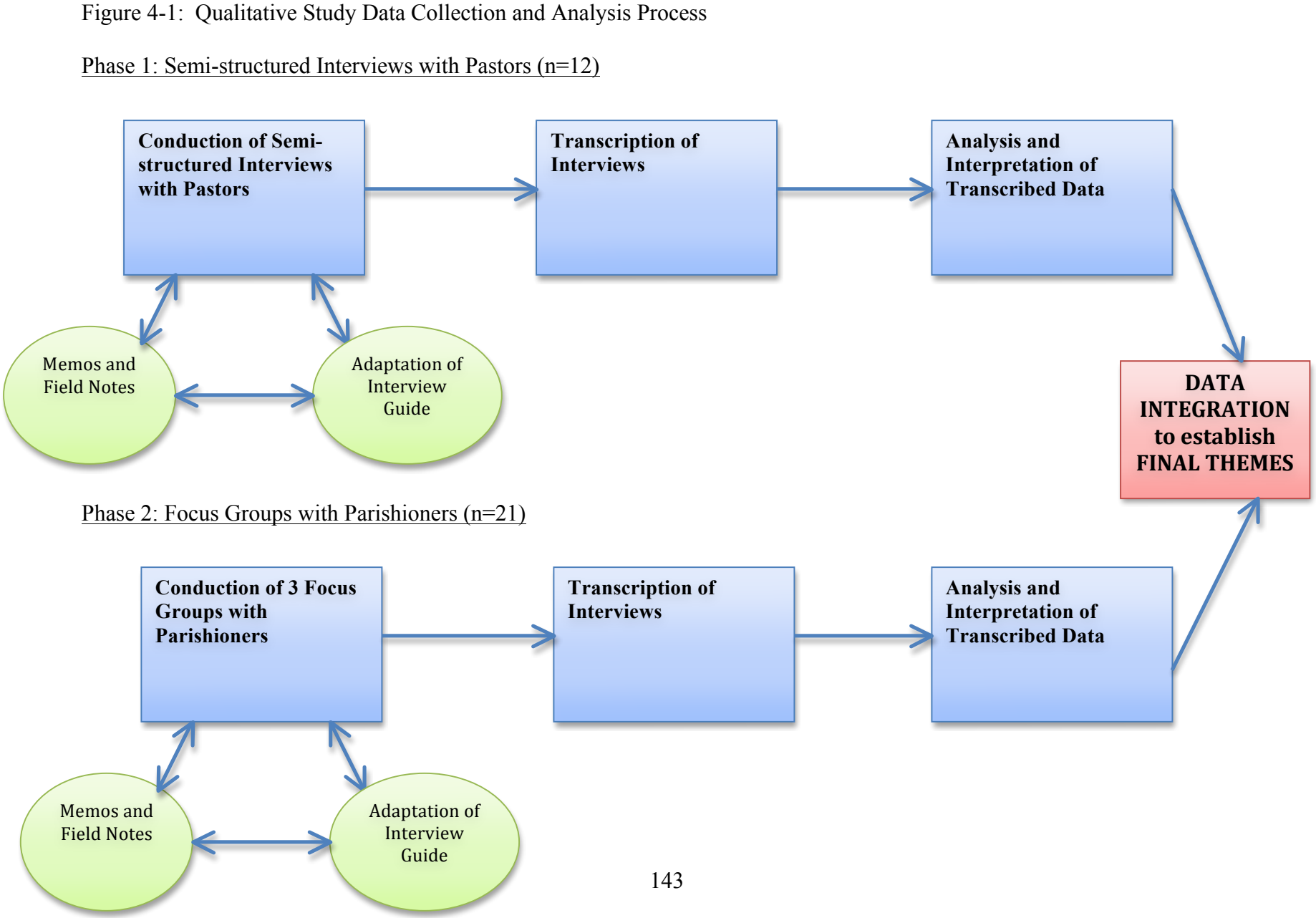


Figure 4-2. Themes Explaining How Attending Religious Services is Associated with a Lower Prevalence of Coronary Heart Disease and Related Risk Factors as Explained from the Perspectives of Pastors and Parishioners

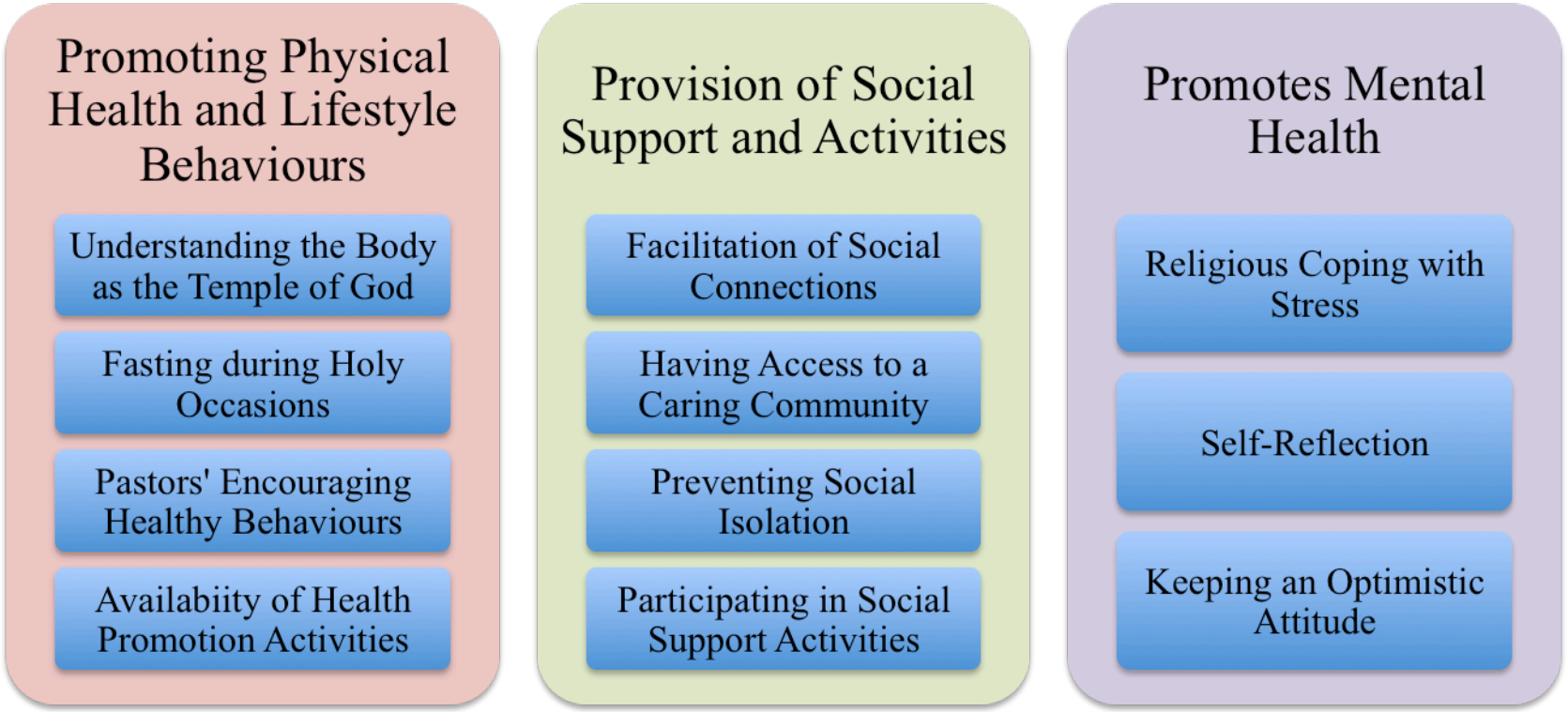
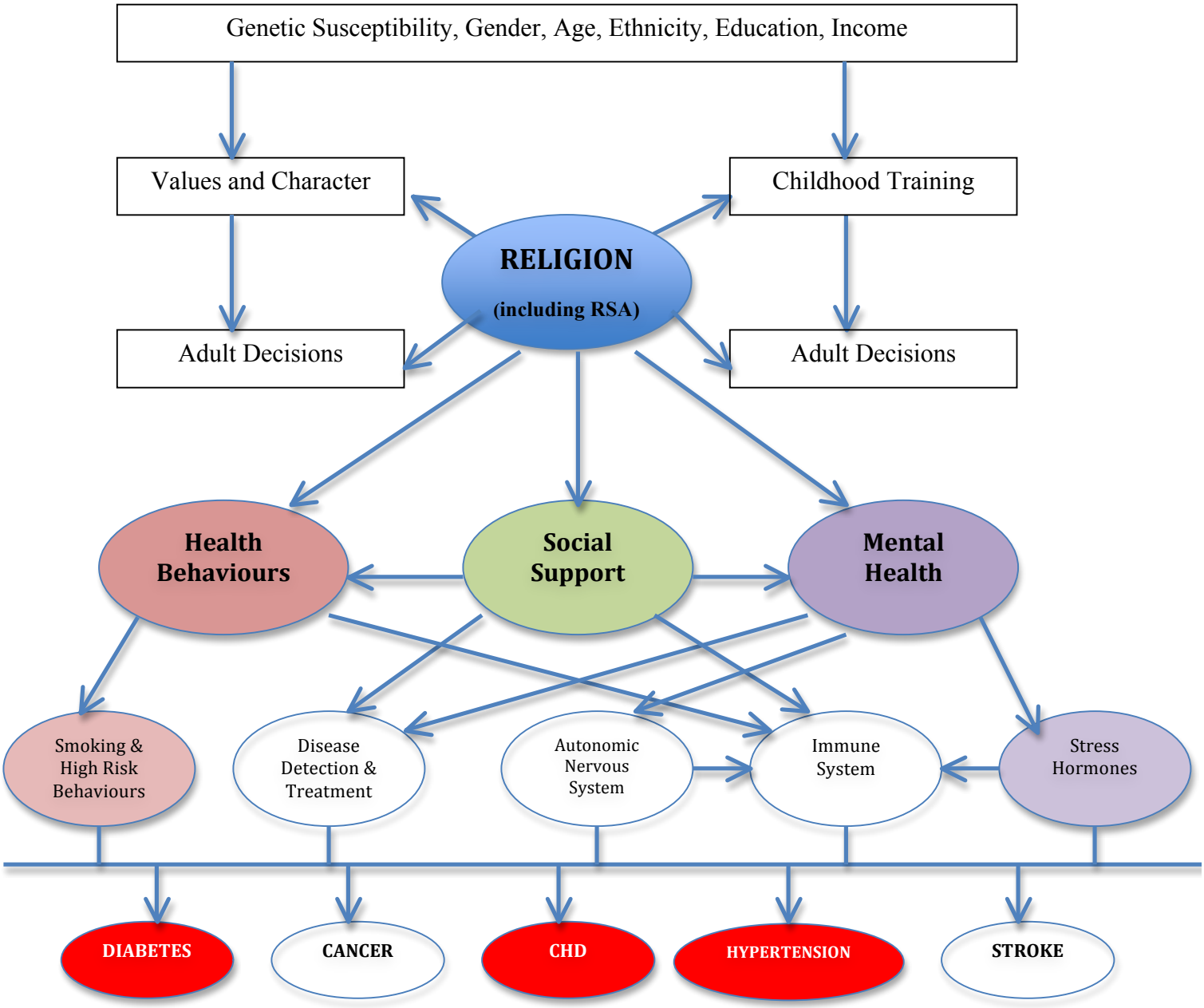


Figure 4-3: Themes situated in Koenig's framework describing the relationship between RSA and CHD Health Outcomes



From Koenig, H.G., McCullough, M.E., Larson, D.B. (2001). *Handbook of Religion and Health*. Oxford: Oxford University Press. Copyright 2011 by Oxford University Press. Reprinted with permission. (Appendix B, page 222)

CHAPTER 5: STUDY III

FACTORS TO FACILITATE THE IMPLEMENTATION OF HEART HEALTH PROMOTION PROGRAMS IN CANADIAN CHURCHES: A QUALITATIVE STUDY

5.0 ABSTRACT

The purpose of this study is to describe the factors that would facilitate the implementation of heart health promotion programs in churches for older adults from the perspective of the church pastors and parishioners. These factors emerged from a qualitative study conducted to understand the relationship between RSA and a lower prevalence of coronary heart disease and related risk factors in Canada. Twelve semi-structured interviews with ordained pastors and three focus groups with parishioners across Catholic, Anglican and United churches were undertaken. A component of the Precede-Proceed model (a model for planning health education and health promotion program and policies) was applied to the findings after direct content analysis of the data. Among the various factors identified, pastor leadership, funding for a parish nurse, community-focused interventions, secured infrastructure and social support were identified as pertinent factors for implementing health promotion programs in churches. The findings have particular relevance for health promotion and public health research because they suggest factors that would be necessary to design church-based health programs for older adults at risk of chronic diseases.

Keywords: Coronary Heart Disease; Churches; Health Promotion; Facilitating Factors; Qualitative; Older Adults

Publication: This study is in preparation for submission as a journal manuscript.

5.1 INTRODUCTION & BACKGROUND

Coronary heart disease (CHD), diabetes and high blood pressure are major concerns in Canada. Numbers are rising and 4.8% of the Canadian population reported a diagnosis of CHD, while 5.8% and 19% reported having diabetes and high blood pressure respectively (PHAC, 2009). The risk for developing these chronic and progressive disorders is highest among older adults. For example, in 2006/2007, 21% of the Canadian population over the age of 55 had diabetes (Statistics Canada, 2010), 23% reported some form of CHD (PHAC, 2009) and 56% reported high blood pressure (PHAC, 2009).

Numerous published reviews have summarized the links between religious variables (including RSA) and CHD-related outcomes in American older adults (Koenig, 2008; Koenig, 2007; Levin, 2010; Boland, 1998; Dornelas et al, 2007). Within the Canadian context, a recent paper by Banerjee et al (2012) showed Canadians who attended church services at least once a week had lower prevalences of CHD, diabetes and high blood pressure, compared to those who did not attend, after controlling for several demographic, socioeconomic and health behavioural characteristics. A follow-up qualitative study was developed with the objective of explaining this inverse association using methods such as interviews with pastors and focus group discussions with parishioners across churches in Toronto and Hamilton, Ontario (Banerjee et al, unpublished, see Chapter 4, page 92). Findings suggested that attending religious services: (1) promoted mental health; (2) provided social support and activities and (3): promoted health and lifestyle behaviours to lower CHD risk.

On the basis of the third finding, a number of church-based community health promotion programs were developed in the United States for older adults to aid in the prevention of CHD and related risk factors (Peterson, Atwood & Yates, 2002). The concept of health promotion places emphasis on the role of organizations (e.g., churches) in adopting health practices to optimize both individual wellness and collective well-being (Stokols, 1996).

Religious institutions have been shown be an effective channel for implementing health promotion programming for many reasons (cited in Lapane et al, 1997; Lasater et al, 1991): 1) the existence of well- established social networks within the organization; 2) suitable locations for health educational programs; 3) facilities located in virtually every neighbourhood; 4) the demonstrated receptivity of clerical and other church leaders to health programming; 5) a history of volunteerism; 6) very large membership of seniors', and 7) involvement of the entire family. Further, studies that have demonstrated health promotion programs in churches are associated with positive changes in diet, weight, exercise, and other health behaviours, particularly for older adults at high risk for CHD, diabetes and high blood pressure (Campbell, 2007; Kumanyika and Charleston, 1992; Dodani and Fields, 2010; Peterson, 2002; DeHaven et al, 2004).

Church-based community health promotion programs do exist for older adults in Canada, but they have not been researched. The doctoral student had an a priori interest in how religious institutions could be an important health promotion channel to inform communities about CHD preventative care. This a priori interest came from a literature review the doctoral student conducted for the first thesis study. Many of the articles in

the literature review highlighted the potential role of health promotion within religious organizations for congregation members. In addition, the doctoral student was involved in the planning of a heart health education seminar that was held for older congregation members at her religious institution. She questioned why a religious organization would be a suitable location to hold health promotion activities. Therefore, she supplemented questions pertaining to this subject area in the interview guide of Study II (Chapter 4) that formed the basis of Study III. The health promotion-specific data provided the first opportunity to evaluate the factors that facilitate church-based community health promotion programs for older adults in Canada.

As a health promotion-planning framework, the Precede-Proceed model draws on several health promotion theories (e.g., social learning theory), but is best described as ecological. An ecological model is one that considers multiple levels of factors that might influence health behaviours, including institutional factors (e.g., religious rules and regulations, and informal religious structures that enhance health promotion) (Stokls, 1996). The model has two components (Green & Kreuter, 2005): "Precede" (Predisposing, Reinforcing, and Enabling Constructs in Ecological Diagnosis and Evaluation), which generates information to guide subsequent decision making; and "Proceed" (Policy, Regulatory and Organizational Constructs in Educational and Environmental Development), which assesses implementation of strategies. Although there are many models for health promotion, studies have shown that the Precede-Proceed model is most useful for practitioners in planning and developing health promotion programs. (Best et al, 2003).

Conceptual models can be applied to qualitative studies at different times during the research process (Mitchell & Cody, 1993). There are seven phases in the Precede-Proceed model (Figure 5-1, page 192) (Green & Kreuter, 2005) to help plan a health promotion intervention. Resources and time do not allow all phases to be addressed and so areas must be prioritized (Glanz et al, 2002). There are many examples of studies that have used components of this model to inform research questions, methodology, data analysis and interpretation (Meador & Linnan, 2006; Mo & Mak, 2008). This study is focused on the application of the third phase (educational and ecological assessment) of the Precede-Proceed the model to the qualitative data. This phase provides a framework for the, organization and interpretation of the qualitative data centered on health promotion in churches. It also shows an understanding of the interplay between themes emerged from the data.

The educational and ecological assessment phase is specifically concerned with identifying predisposing, reinforcing and enabling factors that affect the implementation of, and people's participation in, heart health promotion programs conducted in places of worship (Lawrence et al, 1999). Green and Kreuter (2005) define *predisposing* factors as antecedents that provide the rationale or motivation for starting health promotion initiatives. For example, believing the body is the temple of the Holy Spirit could be a good rationale for church leaders to implement health promotion programs (Koenig, 2001). Religious beliefs can encourage parishioners to take better care of their health and engage in positive health behaviours (e.g., physical activity) (Conn, 2003). *Enabling factors* are features of the church groups or environments that facilitate health promotion

programs (Green & Kreuter, 2005). This could include church staff, services and resources necessary for implementing health promotion programs and in some cases; new skills that are needed to enable implementation (Peterson, 2002). Lastly, Green & Kreuter (2005) explain *reinforcing factors* as rewards, feedback or anticipated consequences of promoting health in a church setting. Examples include gaining social support and having peer influences for older parishioners from the church community that provide health promotion programs (Campbell, 2007).

This qualitative study identities factors predisposing, reinforcing and enabling the implementation of health promotion initiatives in Canadian churches. The aim of these programs will be to reduce the risk of developing CHD and related diseases for older adults. In addition, the study findings could have implications for public health initiatives, research and practice in the prevention and management of CHD, high blood pressure and diabetes in high-risk populations.

5.2 Research Objective:

1. To identify the predisposing, reinforcing and enabling factors that influence the implementation of heart health promotion programs in Canadian churches.

5.3 Methodology:

5.3.1 Design

The findings for this study were drawn from a qualitative dataset that examined how RSA influenced a lower prevalence of CHD, diabetes and blood pressure in Chapter 4 of this thesis. A more detailed description of the qualitative methodology is available in section 4.3, page 97. The McMaster Health Sciences Research Ethics Board approved the study (Appendix C, page 226).

5.3.2 Church Participants and Setting

The rationale for the criteria to participate in the qualitative study is explained in Chapter 4 (section 4.3.2, page 98). A purposive sample of twelve pastors and 21 parishioners were recruited from six urban churches located in Toronto and Hamilton, Ontario (2 Anglican, 3 Catholic and 1 United). Church pastors could participate in the study on the basis of being ordained and authorized by their respective churches for at least six months to lead religious services. Second, pastors could not have a known diagnosis of CHD, high blood pressure or diabetes.

The inclusion criteria for the parishioners to participate in the study were: 55 years of age or older, white, non-immigrant, English speaking, no medical diagnosis of CHD, diabetes and high blood pressure, and attendance at United, Anglican or Catholic church services at least once a week during the last 12 months.

5.3.3 Data Collection:

Semi-structured interviews and focus groups, employed in two separate phases, were the methods of data collection in this study. All interviews and focus groups were digitally recorded and transcribed verbatim. All participants completed a self-administered demographic questionnaire prior to the start of the interview or focus group.

After administration of informed consent, the doctoral student conducted individual semi-structured interviews with church pastors at their respective church sites. Interviews ranged in length from 30 to 90 minutes. The interview guide (Appendix D, page 232) contained questions to keep the dialogue focused and structured and to elicit descriptive responses that specifically addressed the research objective of this qualitative study. An example of a question in the interview that prompted discussion of the implementation of health promotion programs in churches included the following: "Considering the rise in CHD, diabetes and high blood pressure in Canada, do you think religious institutions could be an important channel through which to inform high-risk communities (e.g., older adults) about preventive care to reduce CHD risk?

Three focus groups followed when the analysis of the pastors' interviews was completed. Seven parishioners participated in each focus group, with one group held at an Anglican, United Church and Catholic church respectively. Groups were held after a Sunday religious service. The maximum length of each group was limited to two hours. The doctoral student moderated the focus groups and a research assistant was present to take notes. The focus group guide was similar to the guide used for the semi-structured interviews. This guide enabled the doctoral student to evaluate whether similar themes

from the interviews emerged and ensure overall accuracy, clarification and confirmation of the interpretations.

Participants in the first two focus groups (Anglican and United Church) provided insight into how attending religious services enabled parishioners with CHD and related risk factors to cope and manage their illnesses effectively. To challenge this finding, the doctoral student and members of the thesis committee decided to conduct the last focus group with Catholic participants who met the inclusion criteria, but had a clinical diagnosis of CHD, diabetes and/or high blood pressure.

The memos and field notes were helpful in this particular qualitative study. For example, the Anglican focus group participants discussed how health promotion programs may be difficult to hold in Catholic churches as daily masses take place at several times throughout the day. This finding was presented to the parishioners in the Catholic focus group to ensure it was accurate. While in the churches, the doctoral student made careful, field notes about what she saw in terms of how the church environment was conducive to health promotion activities (Wolfinger 2002). For example, parishioners and pastors highlighted the large rooms and gymnasium within most churches that could be used to hold health promotion activities. The doctoral student toured each church site in the study to observe the large rooms and gymnasiums to verify this information gained from the interviews and focus groups.

5.4 Data Analysis

The interview and focus group transcripts were the main sources of data for this study. Digital recordings were transcribed by a professional transcriptionist and checked for accuracy by the doctoral student prior to uploading into NVivo 8 (QSR International, 2008).

For the semi-structured interviews, direct content analysis was conducted after the completion of all interviews to elicit recurrent themes (Patton, 2002). The goal of a directed approach to content analysis was to specifically identify facilitating factors in the implementation of health promotion programs in places of worship. Each transcript was read independently by the doctoral student to extract themes through a process of coding that involved reading and rereading the transcripts to identify key themes related to how churches could be potential avenues for health promotion. The doctoral student developed an initial list of codes from the preliminary review of the first transcript. This list was checked with the thesis supervisor (MO). A codebook was developed and refined as the interviews and analyses proceeded. Once pertinent themes were identified, similar themes were grouped together. The same analysis process described above was followed for the focus groups. Themes from the interviews and focus groups were compared and integrated into final themes.

The final themes were then applied to phase three (educational and ecological assessment) of the Precede-Proceed model. Themes were organized into predisposing, enabling and reinforcing factors yielding a theoretical interpretation of the data. The application of this particular phase provided new insights into the facilitating factors

implementing health promotion programs in religious institutions. Two members of the thesis committee (MO and PS) reviewed the application of findings in the context of phase three of the Precede-Proceed model and confirmed the generation of the final themes.

5.5 Rigor

Strategies that helped the doctoral student identify when to continue, stop or modify the research process in order ensure rigour and achieve credible results are discussed in Chapter 4, section 4.5, page 107.

5.6 Findings

Participant characteristics are shown in Table 4-1 (page 142) in Chapter 4. Overall, pastors and parishioners supported the implementation of health promotion programs in religious institutions. They felt such programs were feasible to implement and would be well attended by church members. In addition, pastors reported they would open their health promotion programs to non-church or non-religious members to facilitate CHD risk reduction in the older adult population of Canada.

" So I think people trust coming here when they bring a representative from the medical world come in and speak. I think the church is a huge network for so many opportunities, health wise, spiritual wise, whatever it is. But community wise this church is a hub and whether you belong to this church or not, if something is being hosted, like a health

seminar, it's open to all and people will flock here. So I think it's a fabulous conduit for bringing people's attention to health." (02061-United Church Parishioner)

The findings were organized within the context of phase three (educational and ecological assessment) in the Precede-Proceed model (Green & Kreuter, 2005). Themes were mapped onto this portion of the model and demonstrated the interrelationships between the multiple factors influencing health promotion in churches. (Figure 5-1, page 192). This model shows health promotion programs in churches are dependent on many facilitating factors as outlined in Figure 5-2, page 193. Predisposing factors included instilled religious health values, established senior groups, good health status, secured infrastructure and accessibility. Pastor leadership, parish nurses, funding and faith-based health activities were enabling factors. Lastly, community involvement, free and affordable programs and social support were reinforcing factors. The following presentation of findings is focused on predisposing, enabling and reinforcing factors. Original quotations are presented from participants to illustrate each factor.

5.6.1 Predisposing Factors

Pastors and parishioners feel the following are five predisposing factors or core values that underpin the health promotion function in Canadian churches.

5.6.1.1 Instilled Religious Health Values

Pastors and parishioners discussed how the Christian religion promoted health values for the church community. Positive health values were demonstrated in religious scriptures

like understanding the "body as the temple of the Holy Spirit" and avoiding negative health behaviours like overeating.

"If you want to talk about historically the church's emphasis on sins, which these days isn't a hard list to name that it used to be. But certainly things like gluttony, overeating, recognizing that there is a scriptural phrase that talks about gluttony and the temple and the Holy Spirit." (01207-Anglican Pastor)

Pastors collectively felt this specific religious teaching could predispose parishioners to engage in health promoting activities when available in the church or provide a rationale for implementing health promotion initiatives for older adults at risk for chronic disease.

"But truthfully, you know, if you follow the scriptures, your body is a temple and it doesn't really belong to you, it belongs to God, therefore you are responsible for looking after it. I don't know that all of us get in the morning thinking, okay what do I need to look after this temple today. But I think you are a more active and committed person to health promotion initiatives in churches." (02061-United Church Parishioner)

5.6.1.2 Established Senior Groups

Pastors carefully considered whether seniors would likely participate in health interventions available at the church. They said most churches do have senior groups because of the large number of older adults in parishes and the church would be an ideal platform to present health promoting issues to older parishioners.

"I think that there's more that the church can do with seniors for health promotion in a running seniors drop-in group, maybe one day a week. Like you know, people are getting older out there, we have overflow of seniors and so I think that the church could be active in that way of promoting health to seniors part of a core group at the church." (00216-Anglican Pastor)

One Catholic pastor described how his church had a seniors group and there were health programs taking place for this group. He felt more churches could easily adopt similar health promotion programs for older adults.

"We have a seniors group that meet on a regular basis and there was a talk on heart disease and cholesterol you know, how to prevent them and these people took it seriously. More churches should be easily to implement such health programs during senior groups." (01126-Catholic Pastor)

5.6.1.3 Good Health Status

It was reported that older age parishioners who were in good health were likely to participate in and value church experiences and therefore may be more likely to attend health promotion programs in churches to prevent the development of CHD and related risk factors.

"You have already audience that recognizes the importance of health and are generally healthy and this makes us receptive to health promotion programs available in church." (01116-Anglican Pastor)

Health promotion programs were also likely to attract older parishioners who have CHD and related risk factors (e.g., diabetes and high blood pressure) to help them manage their diseases and keep up healthy lifestyles.

"I think people when they're sick they have a belief, they have a certain coping mechanism and they have a certain attitude. They think 'I am sick but I can be better'. But what will help them is going to church and be part of a seniors group by helping their heart disease, suffered strokes, diabetes and partake in any health activities." (01201-Catholic Pastor)

5.6.1.4 Secured Infrastructure

The Anglican and United parishioners discussed how churches had a secure infrastructure for health promotion activities. Auditoriums, recreation rooms, and in some cases gymnasiums were available during most days of the week to conduct health promoting activities.

"We can seat a number of people in the auditorium and gymnasium if need be for health seminars, but we've also got other rooms available for physical activity classes so we are quite flexible depending on the size of the group. It can be anywhere from a half dozen to a few hundred, we can accommodate and have accommodated within a secure infrastructure." (02067-United Church Parishioner)

The doctoral student through her field notes observed this finding, as she viewed the large spaces available within the study church sites. She did note the rooms were also

unoccupied during the times she conducted interviews and focus groups held in the mid-afternoon or evening.

Pastors also believed the church environment was pleasant in terms of design and colors and this would provide parishioners with extra motivation to engage in health promotion programs because they would feel strengthened and uplifted physically and spiritually.

"Well you use the word environment which in our tradition we are surrounded by symbols, beauty and in terms of design, colors and so forth which either are in some ways comforting, strengthening and uplifting physically and spiritually when engaging in any sort of health-related activity." (01116-Anglican Pastor)

However, Catholic pastors and parishioners reported space limitations within their parishes for health promotion programs because of masses held several times a day followed by other spiritual-related activities.

"I've tried to hold meetings and it's so hard to get space because of so many activities. Other denominations have a smaller congregation than Catholics. We are busy so having health promotion programs can be difficult because of limited space in our parish." (05274-Catholic Parishioner)

5.6.1.5 Accessible

Health promotion in churches would be easily accessible to large groups of church members (e.g., seniors) already in attendance and would induce shifts in health behaviours to reduce CHD risk.

"I would say one established factor being ease of access to a large senior population that's right there at someone's fingertips like marketing wise and would encourage healthy changes in this population." (01124-United Church Pastor)

Further, pastors thought health promotion activities in churches would be accessible to non-congregation members who lived in the area. For example, one pastor stated that half the people who had attended a recent health seminar at his church were non-congregation members.

"The health promotion programs would not only be for church people. We have our mental health things or our cancer workshop and it's open. The invitation goes out to the total community who live near our church, which makes it accessible for them. And I would say more then half who attend are from outside." (01122-United Church Pastor)

5.6.2 Enabling Factors

According to the participants, the following four features are necessary to enable health promotion programs (Green & Kreuter, 1999).

5.6.2.1 Pastor Leadership and Modeling

Pastors felt clergy should take a lead role in promoting physical health along with spiritual health during religious services to enable health promotion initiatives in a place of worship.

"In the sermons we should be promoting health though it's more about our spiritual health but of course we have to lead to promote the physical health. They should see it

coming from us first to partake in any health promotion programs." (01210-Catholic Pastor)

Pastors also felt they should be role models for healthy living and advocate for physical health. They felt this would enable parishioners to understand the importance of healthy living and take an interest in heart health promotion initiatives within the church. "*I do think it's important to model a healthy life, lifestyle, because I do think that's part of my faith, that is to eat properly, exercise etc. But I think more ministers are starting to see it that way too and could lead to future cardiovascular health projects in congregations." (01207-Anglican Pastor)*

5.6.2.2 Parish Nurses

Parishioners talked about the importance of having a parish nurse at all churches to enable health promotion activities and integrate faith and health in ways that reflect the context of the faith community. However, parishioners reported such nurses are not widely available in their churches.

"We have a parish nurse in our church as you know, which I think speaks to the situation of taking care of the body and the spirit at the same time, they are interdependent. I think church groups should put their money where their faith is by having that parish nurse to really bring out health promotion." (03255-Anglican Parishioner)

One of the pastors interviewed in this study was also a parish nurse and described her pivotal role in linking faith and health to encourage congregation members to adopt

healthier lifestyles in preventing CHD and related risk factors. She felt she brought a strong health promotion environment to her church.

"From my perspective, I would have to be looking at my parish that has strong health promotion focus. The role the parish nursing has is in the prevention of high blood pressure, diabetes and heart disease. So parish nursing is health promotion linking faith and health. So part of the whole focus of our ministry is to encourage people to adopt healthier lifestyles." (00301-Anglican Pastor and Parish Nurse)

5.6.2.3 Funding

Pastors discussed how government funding could help improve access to health resources and enhance delivery of health programs in church settings. Funding would also enable the hiring of a parish nurse or health promoter to work in the church and focus primarily on running health promotion activities.

"It's a matter of having another staff member like a nurse or someone from health promotion to expand our church to health promotion, starting with the senior groups and keep it ongoing in the church." (01129-Catholic Pastor)

Another option discussed by study participants was to raise funds or request funds from the district under the jurisdiction of a bishop for health promotion programs. They appeared unsure if the government would want to sponsor church related programs.

"We could raise our own funds or sometimes there is funding available through our Diocese, the government doesn't want to sponsor anything church-related these days, they are more and more against that." (01207AN-Anglican Pastor)

5.6.2.4 Faith-Related Health Activities

Parishioners were more likely to engage in the implementation of health promotion programs if they were faith-based. For example, one of the Anglican churches highlighted their "Walking to Bethlehem" program which is held annually to encourage parishioners to walk more.

"Congregants are more likely to engage in health activities that are faith based, for example, one of the programs we have run for a couple of years in the Fall during Advent is called Walk to Bethlehem. And what is involved is encouraging people to walk more. So what the idea is, it's a virtual trip from our church to Bethlehem and it's 12 weeks in time for Christmas. It's been quite successful." (00301-Anglican Pastor)

Study participants were aware that non-religious or non-Christian seniors would not likely be part of any faith-based health promotion program. Therefore, most pastors wanted older adults outside the church community to have access to their health promotion programs and were open to implement non-faith based health programs as well.

"Anyone from any religion or non-religion if they want to come to a church they can go to church. You don't have to be Catholic to come to a Catholic church right so I'm sure if there is a poster promoting a good health program and the person is not Catholic, he or she is so welcome to come in and we can ensure it is not promoting Christianity." (01210-Catholic Pastor)

5.6.3 Reinforcing Factors

The following three reinforcing factors emerged as rewards, or anticipated consequences of promoting health in church settings

5.6.3.1 Free and/or Affordable

Parishioners reported they would not be charged, or just asked for a nominal fee, to participate in health promotion programs. Therefore, affordable health promotion programs in churches were a major incentive for older parishioners to attend.

"Health promotion programs are also very affordable. It's usually free or a small fee and also the old element of trust, it's probably going to be a good and credible seminar or something and you look to this premise." (02064-United Church Parishioner)

Parishioners thought non-church groups could also use the facilities available in churches for health promotion programs at marginal costs compared to renting space from other public and community centers.

"If non-church senior groups wanted to use a room or the auditorium or the gym, whatever, there generally would be a very marginal cost compared to going to another public building or facility where they might have to spend $1200 on renting a room for three hours to conduct health programs." (02065-United Church Parishioner)

5.6.3.2 Community Involvement

Pastors talked about how church community involvement in health issues and taking ownership to help vulnerable populations at risk for CHD, diabetes and high blood

pressure would be the reward to the religious institution implementing health promotion activities.

"I think churches taking ownership and focusing on the health of vulnerable communities existing around them is very rewarding for us to do." (01116-Anglican Pastor)

Some pastors and parishioners felt religious organizations didn't focus on health issues. They felt more places of worship should take ownership of their congregation's health after learning about the results of the first thesis study (Banerjee et al, 2012).

"Your research questions made me think about health promotion in churches. Well, that's good, it helps us think about health issues and our health because we hardly talk about our health in our congregation and there are times when we don't even think about it and you know we should take the ownership to which could be gratifying." (01210-Catholic Pastor)

5.6.3.3 Social Support

Social support or contact with other congregation members was an important reinforcing factor prompting many parishioners who were over 55 years of age to attend health promotion programs in churches.

"The older adult community would benefit from an enormous amount of social contact and social commitment from attending health promotion programs in churches." (01116-Anglican Pastor)

There was one church that had a special health promotion program that was strongly linked to social support in promoting health behaviour change. The program was

called "Get My People Going", where parishioners were paired up during the Lent season and chose an area of their lifestyle they wanted to improve (e.g., walking more, having a healthier diet, etc.) The pastor reported that social support reinforced parishioners' drive to engage in such programs.

"It's called 'Get My People Going'. And people during lent are partnered up and encouraged to take up to three areas of their life that they want to improve their lifestyle. It might be walking more, it might be a healthier diet. So it's a combination of health and social support. Social support is a huge incentive for people to join." (00301-Anglican Pastor)

5.7 Discussion:

Canadian churches could play a central role in health promotion, but the factors that facilitate implementation have not until now been enumerated from the viewpoint of church pastors and parishioners in Canada. Through conducting interviews and focus groups with pastors and parishioners, it was possible to explore these individuals' perspectives on how churches could facilitate participation, given their regular involvement and experiences in religious settings. Further, for health promotion programs to be effective, they should be designed with an understanding of the recipients (e.g., parishioners) and their beliefs, attitudes and values (Glanz et al, 2002).

This paper identified predisposing, enabling and reinforcing factors facilitating the implementation of community-based heart health promotion in churches. Subsequently, the data results in an approach to the process of implementing health promotion programs

in religious organizations, which interconnects the themes and subthemes outlined in phase three (educational and ecological assessment) of the Precede-Proceed model (Green & Kreuter, 2005).

Five facilitators of heart health promotion emerged from the interview and focus group transcripts that will be discussed in-depth: pastor leadership; funding for a parish nurse; community-focused interventions, secured infrastructure and social support. These facilitators combine aspects of predisposition, enablement and reinforcement. These factors align quite closely with factors previously identified by public health agencies in Canada (Riley, 2000; Arnold & Breen, 2006; WHO, 1986; O'Loughlin, 1998; Taylor et al, 1998). For example, some factors reported as facilitators in community-based heart health promotion were: financial and material resources; staff experience, knowledge and skills; staff and positions dedicated to heart health.

5.7.1 Pastor Leadership

Pastor leadership fit as a crucial enabling factor in phase three of the Precede-Proceed model in the promotion of health among religious institutions and to create health promotion opportunities. The role of the clergy as an advocate for heart health was singled out by pastors and parishioners as being particularly important. The need for communication about health along with religious values was voiced among all participants as a necessary prerequisite for the implementation of any health promotion programs. One of the key elements for church- based health promotion programs identified in a literature review included commitments from church leaders to provide

health education to the congregation (Peterson et al, 2002). Church leaders must value and demonstrate commitment to health promotion projects in order for the projects to be successful.

In 1995, the Clergy United for the Renewal of East Baltimore (CURE) project was developed (Tuggle, 1995). Two hundred and thirty churches were involved and the clergy took an active role in encouraging physical activity and healthy eating, which contributed to improving cardiovascular risk in parishioners (Cook, 1997).

Despite the apparent importance of clergy, there is little information concerning the interface between religious leaders and health promotion. Campbell (2007) reported pastors in previous health promotion interventions agreed to support projects with sermons from the pulpit and to participate in project events. In some projects, pastors provided scripture-related messages and prayers for their congregations (Campbell, 2007; Saunders, 1997; Sutherland et al, 1997).

5.7.2 Funding for Parish Nurses

The allocation of sufficient funding and staff resources, mainly parish nurses for heart health programs, was identified as a critical enabling factor identified through educational and ecological assessment phase of the Precede-Proceed model. Funding was seen by study participants as a catalyst to hire parish nurses to implement and sustain health promotion programs in churches. In most cases, parish nurses are hired by faith communities to intentionally promote health within and beyond the faith community (Holstrom, 1999; McDermott et al, 1998). Participants in this and previous studies said

parish nursing services provided to members within or outside the congregation included scheduled health classes and programs (e.g., exercise), monthly bulletin boards, and newsletter articles on health topics, health screenings (e.g., blood pressure) and counseling (Wallace et al, 2002; Whisnant, 1999; Huggins, 1998).

Limited evidence-based research on parish nursing practices or outcomes-based practice has been reported in the literature. However, a quantitative analysis using the Nursing Minimum Data Set (NMDS) revealed 1,730 nursing diagnoses and 3,451 nursing interventions related to CHD, diabetes and high blood pressure from 23 U.S faith communities over a 5-month period (Coenen et al, 1999). The most frequent nursing diagnoses and nursing interventions reported and emphasized health promotion and illness prevention.

It is uncertain how many parish nurses there are in Canada, but there are approximately 15,000 parish nurses in the United States, of which about 35% are compensated for their time (Dixon, 1996). Further data are needed in the Canadian context to understand objective descriptions of parish nurse practice, including the identification of the most commonly used parish nurse interventions. For example, the Canadian Association for Parish Nursing Ministry (CAPMN) (2012) could be enlisted to provide accurate and current information on the delivery of health promotion from parish nurses. This information will assist health promotion researchers and funders to determine the need for more parish nurses in Canada.

5.7.3 Community-Focused Interventions

Community involvement in the Precede-Proceed model was noted to be of particular importance to reinforce health programs in the churches. The Jakarta Declaration on Leading Health Promotion into the 21st Century confirmed community participation is essential to sustain health promotion efforts. Community members have to be at the center of health promotion action and decision-making processes for them to be effective (4th International Conference on Health Promotion, 1997).

Church members and groups discussed the associated rewards, including effective diffusion of heart health education to target groups (e.g., older adults) who attend church or not. Peterson et al (2002) claimed churches are particularly effective in conducting community-focused health promotion programs since churches value "helping" people and have a spirit of volunteerism. The establishment of seniors' groups in most churches reflects community involvement and response to the rapidly growing community of persons over age 55 years. Thus, incorporating health promotion programs for this vulnerable group at risk for CHD and related risk factors is a logical approach to reach a significant number of seniors in Canada.

Conn (1998) found that health promotion programs like physical activity programs instituted in naturally occurring social groups, such as churches would be most sustainable. Having community involvement in churches, for health promotion programs ensures sustainability because strategies for transferring project ownership within active members of the church over time can be easily instituted compared to external health organizations (Maton & Wells, 1995; Campbell, 2007).

5.7.4 Social Support

Existing social support systems and the incentive of receiving social support from congregation members and clergy provide natural foundations for conducting health promotion programs for seniors in religious organizations (Peters, 2002). The Ottawa Charter for Health Promotion outline creative support environments for health is a priority for successful health promotion programs (1986).

Program evaluation studies suggest congregant peer support to be an important contributor to cardiovascular health promotion. Further, participants in these evaluations ranked social support as the most useful aspect of church-based programs to reinforce changed health behaviours, a finding that concurs with phase three of the Precede-Proceed model in this study (Kumanyika & Charlestib, 1992; Stillman et al, 1993).

Churches that have existing social groups provide promising settings to incorporate social support interventions that promote health education and activities like exercise. Religious organizations may be distinctive regarding health information that they provide to church members, about their value and worth as individuals (e.g., sense of being cared for and supported by church members), which may contribute to positive perceptions of health promotion programs (Chatters, 2000).

Social support within the church can be strengthened and used to sustain health initiatives at the community level. In the health promotion literature, there has been concern about the need to maintain and retain health promotion programs long term (Schwartz et al, 1993). Studies show social cohesion and support in community organizations, including churches produce sustainable health programs, as a result of

congregation members feeling empowered to help each other to attain and maintain health goals (Campbell, 2007).

5.7.5 Secured Infrastructure

As a predisposing factor in the third phase of the Precede-Proceed model, the infrastructure components of the churches are very instrumental in the implementation and success of church-based health promotion programming. The World Health Organization (1997) identified secured infrastructure as a priority for health promotion programs. Most churches, including other faith-based facilities, have large spaces and utilities to hold health promotion programs. Previous studies have linked the success of health promotion programs in churches to the availability of facilities within the church that can be utilized at no or relatively low costs for health educational meetings and physical activity sessions (Lapane et al, 1997; Lasater et al, 1991).

In a study of older women's attendance at exercise programs based in churches versus health clinics, attendance was higher in the church-based programs ($p>0.05$) (Dornelas et al, 2007). The authors confirmed churches are feasible locations for exercise programs designed for older adults because they are naturalistic settings for those already in attendance at their respective church (Dornelas et al, 2007).

There are no data showing whether older adults who are not religious prefer church -based versus non-church-based setting for health promotion programs. Campbell (2007) suggests churches may be preferable for non-religious older adults because

churches are located in virtually every neighbourhood in Canada and are relatively accessible from the perspective of distance.

5.7.6 Effectiveness of Church-Based Health Promotion Programs

In the United States, churches are proven venues for screening and risk factor reduction with regards to CVD, high blood pressure and diabetes (Campbell, 2007; Peterson, Atwood, & Yates, 2002; Boltri et al, 2008). Many studies, though non-specific to older adults, have demonstrated the benefit of church-based health activities, including smoking cessation and cardiovascular disease risk factor reduction (Oexmann et al, 2001; Oexmann et al, 2001; Schorling et al, 1997; Flack & Wiist, 1991; Smith, Merrit, Patel, 1997; Smith, 1992; Wilson, 2004: McNabb et al, 1997: Kumanyika & Charleston, 1992; Ruesch & Gilmore, 1999). Dehaven et al (2004) conducted a systematic review of studies describing faith-based health programs, including cardiovascular health, and whether program effects were reported. Important effects included reductions in cholesterol and blood pressure weight, and disease symptoms. The authors of this review concluded churches have the potential to help improve health at the community level and become leading change agents for the health of vulnerable populations such as older adults, people of low socio-economic status and minority groups.

One major church-based weight-loss program geared towards cardiovascular risk reduction combined group nutritional education, behavioural counseling, and support sessions, as well as individual consultation with an on-site registered dietician and exercise programs (Kumanyika and Charleston, 1992). Pre- and post program weight and

blood pressure measurements were analyzed for 184 black and 3 white women aged 18–81 years who participated in the program in 1984–1986: 88 were taking antihypertensive medication and 99 were not. Mean weight loss was 6 pounds in both groups: −18 to +7 pounds in the group taking medication and −31 to +3 pounds in the group not taking medication. The mean systolic/diastolic blood pressure (SBP/DBP) decrease was 10/6 mmHg in the treatment group and 5/3 mmHg in the no treatment group ($P < 0.001$ for all pre/post comparisons). The authors concluded weight loss and related dietary or behavioural changes resulting from participation in church-based health programs can enhance blood pressure control.

More recently, the National Institutes of Health (NIH) Diabetes Prevention Program was implemented in a church-based setting (Boltri et al, 2008). Church members of an African American Baptist church completed a risk screen during Sunday service, followed by fasting glucose testing at the church during the week. Fifty people identified with prediabetes participated in a 16-session Diabetes Prevention Program conducted over four months. Following the intervention, weight, systolic and diastolic blood pressure, and fasting glucose decreased by 7.5 lb (3.6%), 16 mm Hg (11.7%), 12 mm Hg (14.0%) and 5 mg/dL (4.8%) respectively ($p<0.05$). In comparison with baseline, significant reductions were evident at 6 and 12 months post-intervention for all endpoints.

The evidence on the effectiveness of church-based health programs is still limited by the relative paucity of studies that have included appropriate comparison groups and reported outcome data and statistics. In addition, much of the published research to date has focused on African Americans and Black churches, and evidence indicates that health

promotion based interventions can be successful in this population. However, more research is needed to evaluate the effectiveness of church-based health promotion programs for the general older adult population in Canada.

One should note, though, that the use of churches for health promotion programs may be important from a public health perspective. However, public health is not the primary purpose or the major focus of places of worship. Churches are not health promotion organizations and allocating adequate pastoral time or space to such a function may not be possible for many religious organizations. In the focus groups, Catholic parishioners did report space was limited for health promotion activities in Catholic churches because the organization's priorities were focused on the provision of several daily masses and faith-based activities for congregation members.

5.7.7 Strengths

The major strength of this qualitative study is the application of the third phase (educational and ecological assessment) of the Precede-Proceed model (Green & Kreuter, 2005) to the qualitative findings. This allows a conceptual organization and contextualization of the factors influencing health promotion activities in religious organizations, which adds rigor to the study. Further, the study findings will be more useful and comprehensible to researchers, practitioners and policy makers, who may take interest in the implementation of health promotion activities in religious organizations. Practitioners have widely applied components of the Precede-Proceed model (Green & Kreuter, 2005) to develop ways to promote physical activity and blood pressure screening

through primary health care initiatives (Paradis et al, 1995; Green & Kreuter, 2005).

5.7.8 Limitations

This study was conducted in Christian churches in Ontario and therefore the findings may not be generalizable to other religions and locales. Factors that facilitate health promotion programs in the settings of other religions (e.g., temples, gurudwars, synagogues, and mosques) may differ from the factors observed in Christian churches.

Our study focused on the older adult population and it is uncertain whether religious organizations would be ideal health promotion sites for younger people or children. Lastly, this study did not seek to recruit a matched sample of non-parishioners, i.e., who did not attend religious services. The extent to which the facilitating factors identified in this study would influence interest and participation in church-based health promotion programs among non-parishioners is unknown.

5.7.9 Research and Health Policy Implications

Much of the published research to date has originated in the United States and evidence indicates church-based health promotion programs can be successful. There is potential for church-based CVD prevention programs in Canada, but considerably more research is required to reach the level of knowledge about prevention programs in other areas such as worksites and schools (O'Neill et al, 2007; O'Neill & Stirling, 2007). Because substantial time and resources can be invested in program development, adaptation, and

implementation, it is important to research factors that facilitate the development of new health promotion programs in community and organizational settings (O'Loughlin et al, 1998).

The findings of this qualitative study are important because they could provide content for a large survey of Canadian churches to examine the facilitating factors in relation to implementation of church-based heart health programs. The survey might provide details about how to implement such programs, as well as potential obstacles and how to overcome these obstacles. This will ensure health programs are acceptable and feasible in church settings. Pastors and parishioners in this study reported pastor leadership, funding for a parish nurse and community involvement to be important facilitating factors required to implement health promotion programs in churches. Similarly, Thomas et al. (1994) found minister endorsement, community ownership and paid health workers to be the strongest predictors of health promotion programs.

Assessing the predictors of parishioner involvement in church-based health promotion programs and how risk factors are related to parishioners' on-going participation will also be important to understand. Programs targeting higher risk parishioners nested within church-based health programs may be useful to increase the extended participation of individuals at elevated risk for CHD and related risk factors.

The effectiveness of existing and current heart health promotion programs in Canadian churches could be evaluated on general health status and health outcomes in older adults. Future observational studies could be conducted to compare the effectiveness of interventions in a church setting versus non-secular setting on various

CHD related risk factors such as control of blood pressure, diabetes and weight. Lastly, the cost-effectiveness of church based health programs could be studied. Lasater et al. (1997) highlights the expense of CVD risk reduction within communities and partnerships with health sectors and places of worship may be a critical resource to contain costs.

The Precede-Proceed model does not emphasize the specifics of program development. Health promoters may feel the need for additional guidance on methods and strategies for addressing the selected predisposing, reinforcing and enabling factors in this study. For example, information about the structure and operation of support networks within a congregation would be useful in designing specific health interventions. Identifying whether existing network members (e.g., clergy) in the church who are committed to providing support and have the resources to sustain their commitment in health promotion programs is important (Sternberg et al, 2006). This will result in increased perceived support and adherence to church-based health programs among parishioners (Campbell, 2007).

In summary, health promoters/researchers and religious organizations could seize the opportunity for partnerships to improve health in the older and general populations. The knowledge gained from this study will hopefully encourage population health research and the public health/promotion system to develop ways of including religious organizations in health research and behaviour change programming.

5.8 Conclusion

In this chapter, the doctoral student identified various features that could encourage the implementation of church-based health promotion programs for older adults who are at risk of CHD and related risk factors. There is a need for more effective means of reducing CHD, as well as the potential benefits of church-based programs, suggest public health interventions within religious organizations should be considered. Researchers can help assess the best means of designing and implementing these programs, as well as evaluate these programs.

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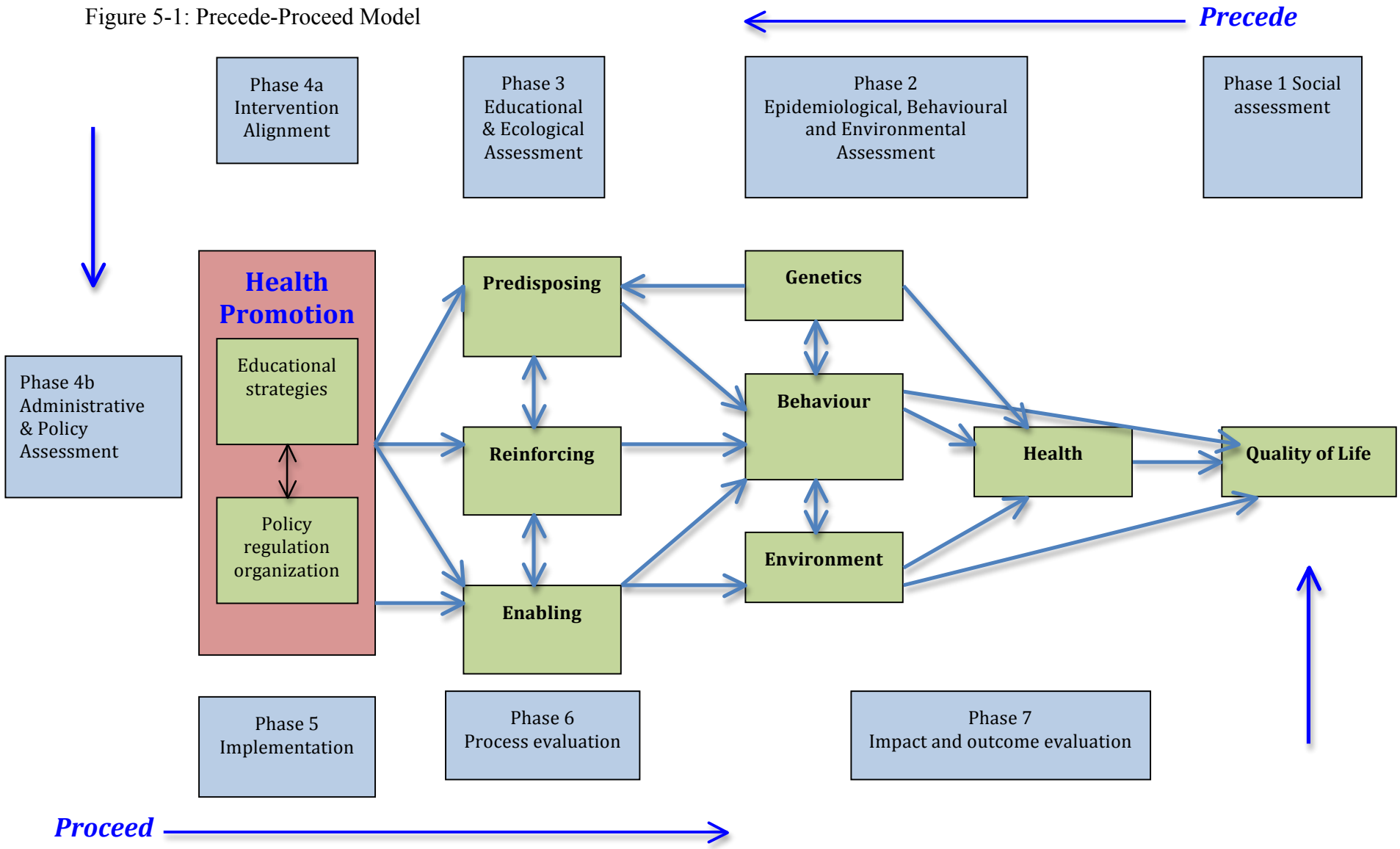
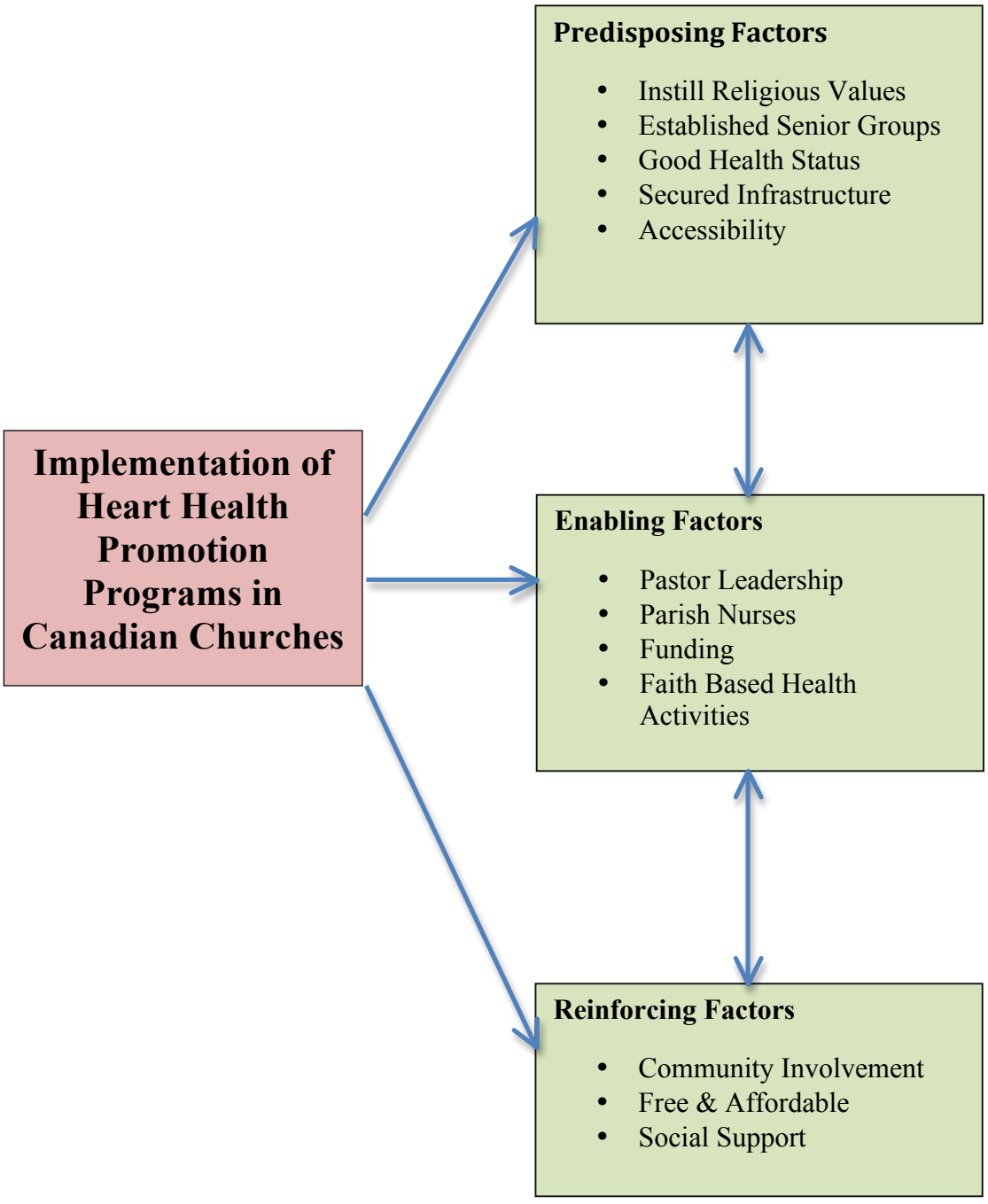
Figure 5-1: Precede-Proceed Model



From Green LW, & Kreuter, Health Program Planning, 4th ed, N.Y: McGraw-Hill, 2005. Reprinted with permission. (Appendix B, page 222)

Figure 5-2: Facilitating Factors in the Implementation of Health Promotion Programs in Canadian Churches. Findings Applied within the Educational and Ecological Assessment Phase of the Precede-Proceed Model



CHAPTER 6: INTEGRATED DISCUSSION OF STUDIES I, II, and III

This dissertation demonstrates how bridging quantitative and qualitative methods provide clarity and in-depth information on the complex relationship between religion, health outcomes and health promotion across all three studies.

The qualitative study provided information on the impact of certain variables that could not be examined in Study I. For example, CCHS 4.1 did not have data on social support. This made it difficult to filter out the effects of social support on the relation between RSA and CHD and related risk factors. Concurring with previous work in the United States, the qualitative findings revealed how RSA may enhance social ties (e.g., membership in community organizations) and social support (e.g., receiving instrumental aid from relatives and friends (Peterson, 2002; Strawbridge et al, 2001).

Due to the cross-sectional nature of the CCHS 4.1 data, Study I could not examine certain variables (e.g., health behaviours, social support, and coping) as mechanisms to explain the association between RSA and health outcomes. Employing a qualitative study provided an in-depth means of helping to understand the beneficial health effects of RSA that stem from the act of participating in worship services. The qualitative data showed the indirect impacts of social contact and promotion of health behaviours among people who attend religious services. Also, religious coping and promotion of mental health were shown to be important mechanisms for parishioners to ease the impact of stressful life events and in turn reduce risk of developing CHD, diabetes and high blood pressure (Kraus, 1998 ; Ano & Vasoncelles, 2004: Krause, 1992).

Integrating quantitative and qualitative findings is a reflection of the diversity of Koenig's theoretical framework on religion and health (Koenig, 2001b). His framework illustrates the complex pathways by which religious practices influence physical health. Koenig's model suggests, and the qualitative data from this doctoral thesis show, that RSA alone does not protect against CHD, diabetes and high blood pressure. Rather, the combination of social, behavioural and psychological factors that are accessed by attending religious services act as the real protective mechanisms. Essentially, the qualitative study helped elicit these factors and Koenig's framework provided a way of organizing these various factors to understand how they come together and protect against CHD and related risk factors.

The doctoral student did have a longstanding interest in exploring the potential role of religious institutions in the implementation of health promotion programs for older adults. Qualitative interviewing and focus groups provided the opportunity to ask opened-ended questions about the factors that could facilitate health promotion programs in religious organizations. Discussions central to the idea of implementing health promotion programs in Canadian churches for older adults among the pastors and parishioners led to the third study of this thesis. Phase three (educational and ecological assessment) of the Precede-Proceed model (Green & Kreuter, 2005) was applied to the qualitative findings. Predisposing, reinforcing and enabling factors influencing the implementation of church-based health promotion programs were identified through the model.

An ideal approach would have been to construct a community survey to examine quantitatively which predisposing, enabling and reinforcing factors might predict the implementation of health programs in churches. However, the existing data from Study II provided an opportune resource to explore these factors from the viewpoints of persons who would be at the base of any health promotion program. These qualitative data could be used to guide the development of a community survey and might thus be viewed as the first step in a future program of research for the doctoral student.

Some of the factors that influence the implementation of health promotion programs in churches in the third qualitative study also explained the relationship between RSA and CHD and related risk factors in the second qualitative study. For example, from the perspective of pastors and parishioners, provision and greater availability of social support could not only protect coronary heart health (Study II), but could also reinforce parishioner participation in health promotion programs (Study II). Also, pastors were identified to have an indirect role in encouraging positive health behaviours (Study II) and endorsing health promotion programs in church settings (study III). Aligning findings from both qualitative studies shows how various dimensions of RSA could explain a lower prevalence of CHD, diabetes and high blood pressure and facilitate the implementation of church-based health promotion programs.

This doctoral thesis aimed to understand RSA. This specific construct is a reliable and traditional measure of the public and collective expression of religion, and captures involvement in a religious community across several religions (Koenig, 2001). It is most often used in U.S-based longitudinal studies examining the link between religion and

health outcomes (Hummer et al,1999; Oman et al, 2002). Integration of quantitative and qualitative findings in this thesis demonstrates how RSA is not a simple independent variable. Instead, RSA is a an indicator for multiple dimensions that serve as protective mechanisms against chronic diseases.

Koenig and Bissing (2010) recognized the need for a brief measure of religiosity (including attendance) that can be included in epidemiological surveys to examine relationships between religion and health outcomes. The Duke University Religion Index (DUREL) is a five-item measure of religious involvement and was developed for use in large cross-sectional and longitudinal studies. This five-item scale assesses three major dimensions of religious involvement including organizational religious activity (e.g., RSA), non-organizational religious activity (e.g., prayer) and intrinsic religiosity (e.g., degree of religious commitment). The overall scale has high test-retest reliability (intra-class correlation=0.91), and high internal consistency (Cronbach's alpha's=0.78-0.91), high convergent validity with other measures of religiosity (r's=0.71-0.86). The factor structure of the DUREL has been demonstrated and confirmed in separate samples by other independent investigative teams (Koenig & Bissing, 2010). The first study of this thesis could not use the DUREL index because it was not employed in the CCHS 4.1. Koenig and Bissing (2010) encourage epidemiologists to use this index in studies assessing the determinants of CHD and related risk factors.

There are two important methodological limitations in this doctoral thesis. First, assessing the direction of causality between RSA and health outcomes could not be studied using cross-sectional CCHS data. It could be that a diagnosis of CHD, diabetes or

high blood pressure may encourage greater religious attendance among older persons who previously rarely attended religious events. However, reverse causality is unlikely to be a significant source of bias because patterns of RSA are likely to be established well before the development of CHD and related risk factors. At the same time, RSA has been reported to be a more stable trait among parishioners beginning in childhood (Koenig, 2001).

Second, the qualitative component did not include a sample of non-parishioners who did not attend religious services. Comparisons of the perceptions of parishioners versus non-parishioners would have been ideal because it could have illuminated what RSA adds to keep people at a lower risk for developing CHD and related risk factors. For example, qualitative data in this thesis, along with previous studies, show people who attend religious services have more instrumental and social support compared to those who do not attend (Strawbridge et al, 2001). Therefore, comparing perceived availability and types of social support between parishioners and non-parishioners would bring more transparency to the distinctiveness of social support within religious organizations.

This thesis used theoretical frameworks relevant to understanding how religious institutions are associated with CHD health and the implementation of health promotion programs. Harold Koenig's theoretical framework describing how religion affects physical health (Koenig et al, 2001b) and the Precede-Proceed model (Green & Kreatuer, 2005) provided direction in defining the processes underlying the link between RSA and CHD related health outcomes and health promotion. The use of theoretical frameworks did not simply add strength to the studies, but was imperative to advance the research

field of religion and health given the skepticism that continues to evolve around it (Koenig, 2001b). The theories helped to essentially interpret the quantitative and qualitative data in a given context. The end result is this thesis thoroughly builds on and concurs with prior knowledge and provides new results that serve to advance the understanding of religion and health in Canada.

Study I of this thesis has ignited public interest in Canada. The *National Post* reported on the study in a front-page article called "Attending religious services linked to better health" (Blackwell, 2012) [Appendix E, page 235]. As well, *Global News Television* (2012) featured the doctoral student discussing and interpreting her findings. Her findings will also be highlighted in a future upcoming issue of *Chatelaine Magazine*. The media interest underscores the need to develop more research on religious indicators and health in Canada. The factors linking religion and health, as outlined in this thesis (e.g., social support, coping resources, health behaviours), suggest avenues for future research and health promotion.

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CHAPTER 7: CONCLUSION

This doctoral thesis used mixed-methods to investigate the relation between RSA and the prevalence of CHD and related risk factors in Canada. No other study has examined this issue in Canada. Furthermore, facilitating factors influencing the implementation of church-based heart health promotion programs were explored qualitatively in this thesis.

The CCHS 4.1 is the only population-based dataset available that contains information on the association between RSA and health outcomes in a representative sample of persons living in Canada. Given the shortcomings of cross-sectional data, further research, in the form of a longitudinal study, is needed to explore the findings of this thesis in greater depth. Further, longitudinal data will provide opportunities to examine whether the mechanisms identified in the qualitative work, which could not be tested using the CCHS 4.1 data, might explain the association between RSA, CHD and related risk factors.

Canadians who attend religious services may be healthier by virtue of some or all of the mechanism highlighted in this dissertation. Persons who attend religious services on a regular basis may benefit from positive health behaviours and low-stress lifestyles, larger social ties and effective coping strategies. These dimensions of RSA must be measured directly to detangle the effects of all putative mechanisms, such as social support, that are directly associated with membership in religious organizations. This will also show evidence on how social support is quantitatively different from that obtained in secular settings.

Future research needs to be sensitive to the likelihood that the relation between RSA and CHD and related risk factors may vary across specific ethnic and religious groups in Canada. More study is required to understand the relation between RSA and health outcomes in highly religious ethnic groups, such as South Asian and First Nations communities. South Asians and First Nation communities exhibit a higher prevalence of CHD and diabetes and compared to the general population in Canada. Implementing health promotion programs in religious settings with a high concentration of South Asians or First Nations people may help reduce the onset of CHD, diabetes and high blood pressure in these high-risk communities.

To summarize, RSA is linked to a lower prevalence of CHD, diabetes and high blood pressure in Canada. Qualitative data suggested that this association is explained by a combination of social, behavioural and psychological mechanisms. Qualitative data helped to show how these mechanisms come together and protect against CHD, diabetes and high blood pressure. These mechanisms also serve to facilitate innovative health promotions programs in religious institutions providing positive health and cost outcomes.

The findings of this dissertation add a Canadian dimension to the growing body of research linking religion and good health. Hopefully the results of this thesis will encourage Canadian health researchers to take a lead and expand the study of how religion might affect the health of Canadians.

APPENDIX A

STUDY I PUBLICATION

J Relig Health
DOI 10.1007/s10943-012-9609-6

ORIGINAL PAPER

The Relationship Between Religious Service Attendance and Coronary Heart Disease and Related Risk Factors in Saskatchewan, Canada

Ananya Tina Banerjee · Michael H. Boyle · Sonia S. Anand · Patricia H. Strachan · Mark Oremus

Abstract Research suggests that attending religious services could provide small yet important protective benefits against coronary heart disease (CHD) and CHD risk factors (e.g., diabetes, hypertension). The extent to which these benefits apply to Canada deserves study because approximately one-third of adult Canadians attend religious services at least monthly. Therefore, the objective of this study is to examine the association between frequency of religious service attendance and prevalence of (1) CHD, (2) diabetes, and (3) hypertension in Canada. We used the Saskatchewan sample ($n = 5{,}442$) of the Canadian Community Health Survey (CCHS-4.1) and built multivariable logistic regression models to evaluate associations between religious service attendance and self-reported CHD, diabetes, and hypertension. After controlling for demographic, socioeconomic and health behavior variables, the association between religious service attendance and prevalence of CHD was not significant (OR = 0.82; 95 % CI 0.61–1.11). However, persons who attended religious services more than once a week exhibited lower prevalence odds of diabetes (OR = 0.60; 95 % CI 0.45–0.80) and hypertension (OR = 0.82; 95 % CI 0.68–0.99) compared to persons who attended less than once a year. The findings of this

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study are the first to suggest religious service attendance may be associated with a lower prevalence of CHD risk factors in Canada.

Keywords Coronary heart disease · Diabetes · Hypertension · Religious service attendance · Canada

Background

Coronary heart disease (CHD) and the related risk factors of diabetes and hypertension are the leading causes of morbidity and mortality in Canada (PHAC 2005, 2009). There are a number of underlying determinants of CHD, diabetes, and high blood pressure. These determinants include a range of clinical (e.g., obesity and cholesterol), sociodemographic (e.g., income and ethnicity), and behavioral (e.g., exercise and diet) variables (Tanuseputro et al. 2003; Yusuf et al. 2004; Lee et al. 2009). Indicators of religion are equally important social determinants that have not been examined in Canadian studies of CHD and related risk factors.

The World Health Organization (WHO) Commission on Social Determinants of Health states that religion is a social determinant of health similar to income, gender, and ethnicity (Kelly et al. 2007) and identified in recent years as a potential influence on coronary health. In studies examining the relationship between different dimensions of religious involvement and health, associations have been stronger for religious attendance than for other dimensions such as spirituality or prayer (McCullough et al. 2000). In longitudinal studies, religious service attendance is inversely associated with CHD (Hummer et al. 1999; Oman et al. 2002; Goldbourt et al. 1993; King et al. 2001). For example, Hummer et al. (1999) examined data collected from 22,080 people participating in the eight-year follow-up study of the 1987 US National Health Interview Survey (NHIS). Compared with people who attended church more than once per week, people who did not attend church at all were 1.87 ($p < 0.001$) times as likely to die from cardiovascular disease (including CHD) after controlling for demographic variables such as age, gender, education, and ethnicity. This excess risk dropped slightly, but remained statistically significant, after controlling for health behaviors (e.g., cigarette smoking) and social ties (e.g., having friends to count on for help).

Oman et al. (2002) also found inverse associations between frequency of religious attendance and mortality from cardiovascular disease (including CHD) between 1965 and 1996 among 6,545 residents of Alameda County, California. Their results were similar to Hummer et al's longitudinal study. After adjusting for age and sex, Oman et al. found that infrequent religious service attendees (i.e., never or less than weekly) had significantly higher mortality from cardiovascular disease (including CHD) [hazard ratio = 1.41, $p < 0.0001$] compared to frequent attendees (i.e., greater than weekly). In models controlling for demographic (e.g., ethnicity, country of birth, age, education, income, and marital status), social support, and health behavior (e.g., smoking status, exercise level, and alcohol consumption) variables, infrequent attendees had higher rates of death from circulatory diseases (hazard ratio = 1.21, $p < 0.001$).

Oman et al. and with Hummer et al stated that their findings were partly due to enhanced social ties and improved health behaviors among frequent attendees. Frequent attendees had more social connections than infrequent attendees. These connections were characterized by close relatives and friends, as well as non-religious group membership (Oman et al. 2002).

The relationship between religious service attendance and diabetes has been studied less frequently. Hummer et al. (1999) reported that individuals who never attended religious

services were about 3.76 ($p < 0.05$) times more likely to die from diabetes compared to persons who attended more than once a week after controlling for age, gender, physical activity, and smoking. Studies examining an association between attendance at religious services and high blood pressure are rare and based on cross-sectional designs. Examined whether frequency of attendance at religious services is related to the prevalence of hypertension (blood pressure $\geq$140/90 mmHg) among 14,475 Americans participating in the Third National Health and Nutrition Examination Survey (NHANES III). After controlling for sociodemographic variables, respondent health status, and blood pressure treatment, weekly and more than weekly religious attendance versus non-attendance were associated with a significantly reduced prevalence of hypertension.

Overall, available research indicates that attending religious services could provide small yet protective benefits against CHD and related risk factors. There is evidence that better CHD outcomes for people who frequently attend religious services are explained partially by better health behaviors (physical activity and not smoking), which suggests that religious involvement may serve a general health promotion function (Oman et al. 2002). In this health promotion function, attending religious services could provide the impetus for people to engage in positive lifestyle and health behaviors that result in the reductions in risk for CHD, diabetes, and hypertension (e.g., via healthy diets, not smoking, and exercising) (Hummer et al. 1999; Oman et al. 2002).

No data exist on the association between frequency of religious attendance and the prevalence of CHD and related risk factors among Canadians. Studies from the United States are not necessarily generalizable to Canada, where the combined rate of weekly and monthly religious service attendance is approximately 32 %, compared to 40 % in the United States (Eagle 2011). Further, differences in health care between the United States and Canada, including greater reliance on private funding and for-private delivery, as well as markedly higher expenditures, in the United States, may result in different health outcomes (Ross et al. 2001).

Given the large numbers of people who are religiously active, the association between religious indicators, including religious service attendance, and CHD is relevant for many persons living in Canada. The large sample size of, and extensive data collected through, the 2007–2008 Canadian Community Health Survey (CCHS 4.1) provides a first and unique opportunity to examine the possible association between religious service attendance and CHD and related risk factors. The purpose of this study is to examine the association between the frequency of attending religious services and the prevalence of each of the following health conditions in Canada: (1) CHD; (2) diabetes; and (3) hypertension. We hypothesize that the frequency of attending religious services is inversely associated with the prevalence of each health condition.

Methodology

Data Source and Study Population

This study uses information collected in the Canadian Community Health Survey 2007/2008 (CCHS 4.1). The CCHS 4.1 contains nationally representative, cross-sectional data on health determinants, health status, and health system utilization (Statistics Canada 2007a). A detailed description of the survey design, sample, and interviewing procedures may be found elsewhere (Beland 2002).

In 2007, Statistics Canada included religion as optional content in CCHS 4.1. Saskatchewan and Nunavut were the only jurisdictions to ask Statistics Canada to administer the optional content on religion. Thus, our sample frame included only participants in Saskatchewan who were eligible to be asked the question on religious service attendance. Nunavut was excluded from this study because the sample size was small ($n = 350$) and drawn from a limited number of communities.

CCHS 4.1 contained 7,144 participants from Saskatchewan who were 18 and over. However, 1,629 (21.4 % of 7144) were deemed ineligible for our study because they identified no religious affiliation and were not asked about religious service attendance. Among the participants who were eligible to be asked this question by specifying a religious affiliation ($n = 5{,}515$), 73 (1.2 %) were missing data for ethnicity and health outcomes including CHD, diabetes, and hypertension and were removed from this study. The total sample was 5,442 for this study (see Fig. 1).

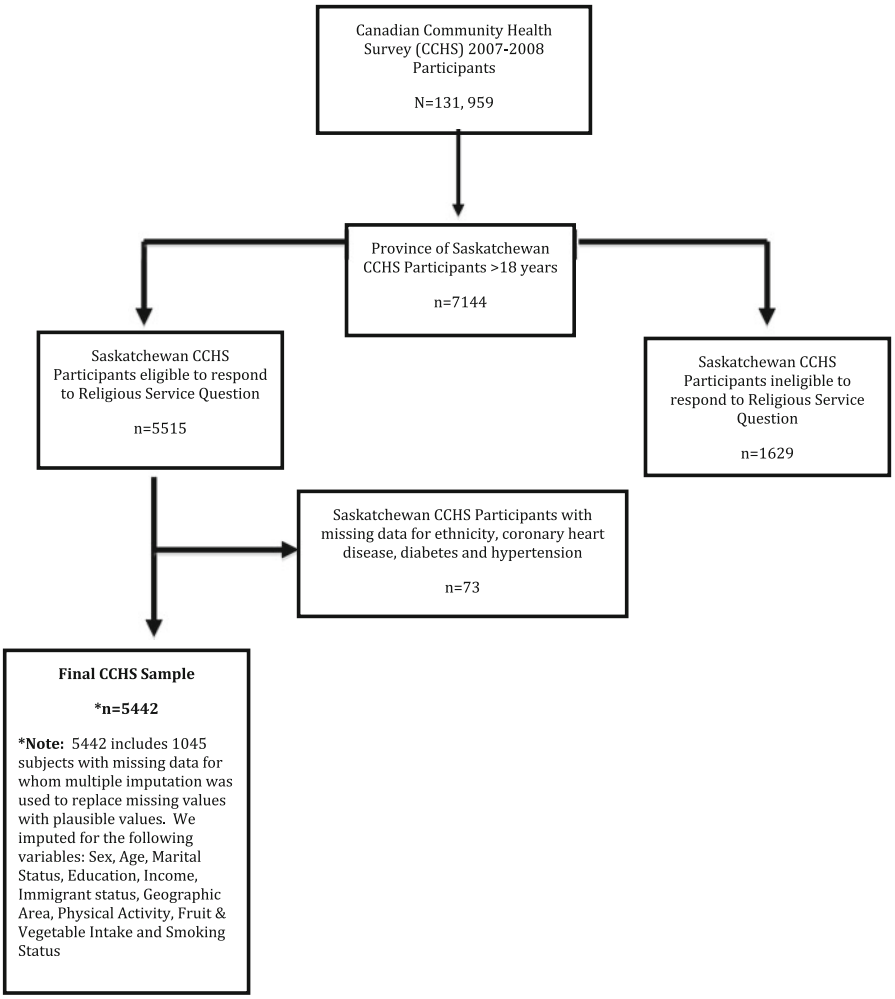

Fig. 1 Sample selection

Concepts and Measures

The main independent variable in this study is religious service attendance in the past 12 months. In CCHS 4.1, *religious service attendance* was assessed by asking participants, "Not counting events such as weddings or funerals, during the past 12 months, how often did you participate in religious activities or attend religious services or meetings?" Five response options were given, including *once a week or more, once a month, 3 or 4 times a year, once a year,* and *not at all*. Because this question is restricted to only worship services, overreporting of religious attendance is minimized (Statistics Canada 2007a). The responses were collapsed for the analyses in that *once a week or more* and *3 or 4 times a year/once a week* were dummy coded (took on a value of '1' if applicable or '0' if not applicable) while the responses *once a year/not at all* served as the reference category.

CCHS 4.1 interviewers assessed the prevalence of CHD, diabetes, and hypertension by asking, "Now I'd like to ask about certain chronic health conditions that have lasted 6 months or more and have been diagnosed by a health professional, do you have heart disease (or diabetes or high blood pressure)?" Participants answered *yes* (1) or *no* (0) separately for each condition.

We also included demographic, socioeconomic, and health behavior variables to serve as control variables in regression modeling. Selection of these variables was based on previous research (Hummer et al. 1999; Oman et al. 2002). The demographic variables were age, sex, marital status, immigrant status, ethnicity, and geographic area. Education and household income were the socioeconomic variables. Health behaviors included physical activity, fruit and vegetable consumption, and smoking status.

Analysis

Proportions and means were computed for all variables. Prior to modeling the associations between religious service attendance and the three health outcomes, we tested for potential moderating effects of age, sex, and ethnicity.

Four sequential multivariable models were used to assess the impact of potential confounding variables on the association between religious service attendance and CHD and related risk factors. Model building in the present study followed the order for predictor variables established in prior research (Hummer et al. 1999; Oman et al. 2002). The first model was unadjusted; the second model was adjusted for the demographic block, including age, sex, marital status, immigrant status, ethnicity, and geographic location; the third model adjusted for the demographic block and the socioeconomic block, including education and income; the fourth and "full" model adjusted for the demographic and socioeconomic blocks, along with the health behaviors block (physical activity, fruit and vegetable intake, and smoking status).

All statistical analyses were performed using SPSS v18 (IBM Corporation, Armonk, NY). We used multiple imputation to replace missing values with plausible values on sociodemographic and health behavior variables (Rubin 1987). Multiple imputations were conducted using an iterative Markov Chain Monte Carlo (MCMC) method in SPSS to impute for missed responses.

Statistics Canada produced a set of weights for use to analyze and present CCHS data in reports and publications (Statistics Canada 2007a). These weights correct for sample selection probabilities and non-response to approximate the distribution of demographic variables in the overall Canadian population. Household weights for the area frame and random digit-dialing frame were calculated separately and integrated to produce one set of

weights for the entire sample. Person-level adjustments were then applied to create person-level weights, followed by a combined post-stratification/seasonal adjustment step where the weights were post-stratified to projected population counts based on the most recent census (Statistics Canada 2009). The sampling weights developed by Statistics Canada were used to calculate all estimated regression coefficients.

Results

The *unweighted* characteristics of the demographic and health outcomes were compared between eligible ($n = 5{,}442$) and ineligible ($n = 1{,}629$) respondents to the question on religious service attendance in CCHS 4.1. Eligible respondents were significantly older (43.3 ± 18.3 vs. 48.1 ± 18.4, $p < 0.0001$) and less likely to be men (46.3 vs. 59.0 %, $p < 0.0001$). Further, respondents were more likely to be married (60.1 vs. 46.1 %, $p < 0.0001$), held Canadian citizenship (94.5 vs. 87.1 %, $p < 0.0001$), had higher education (61.3 vs. 52.9 %, $p < 0.0001$) and were diagnosed with CHD (5.8 vs. 4.4 %, $p = 0.02$) hypertension (25.4 vs. 18.53 %, $p < 0.0001$).

Table 1 presents the *weighted* sample characteristics of the 5,442 study participants living in Saskatchewan who were included in the analysis. The mean age was 48.1 years, and roughly half the participants were men (53.0 %). A majority of the sample was married (60.1 %), most had at least a post-secondary education (61.6 %), and almost all were White (97.2 %) and Canadian citizens (94.6 %). Approximately 27.4 % of the sample attended religious services more than once a week. The prevalence of CHD, diabetes, and hypertension was 5.9, 6.8, and 20.3 %, respectively. Some participants reported being very (21.3 %) or moderately (24.2 %) physically active. Reported fruit and vegetable intake was low, with 60.1 % of participants eating less than five servings per day. Approximately three-quarters of the sample did not smoke.

Gender, age, and ethnicity did not moderate the association between religious service attendance and CHD or related health outcomes. Therefore, interaction terms were not included in the multivariable models.

Tables 2, 3, and 4 show the multivariable adjusted effects of attending religious services on the prevalence of CHD, diabetes, and hypertension. The first model of Table 2 displays the crude odds ratio of CHD and religious service attendance. Those who attended more than once a week exhibited increased odds of prevalent CHD (OR = 1.56; 95 % CI 1.20–2.03; $p < 0.05$) compared to those who attended less than once a year. This association was not significant after adjusting for demographic (Model 2), socioeconomic (Model 3), and health behavior (Model 4) variables. Participants who attended 3–12 times a year had significantly lower odds of CHD (OR = 0.74; 95 % CI 0.55–0.99; $p < 0.05$) compared to those who attended less than once a year (Model 1). The association remained significant even after controlling for demographic variables (Model 2), but was not significant after, controlling for socioeconomic and health behavior variables.

In the initial model, there was no significant association between religious service attendance and the prevalence of diabetes (Table 3). However, after controlling for demographic variables in Model 2, participants who attended more than once a week had a significantly lower odds of prevalent diabetes (OR = 0.57; 95 CI% 0.43–0.75; $p < 0.05$) compared to those who attended less than once a year. The magnitude of this association did not alter and remained significant after controlling for socioeconomic and health behavior variables (Models 3 and 4). There was no significant association between

Table 1 Sample characteristics of final CCHS 4.1 sample for study ($n = 5{,}442$)—weighted

Variable	(%)
Age mean (SD)	48.1 (18.4)
Sex	
Male	53.0 %
Female	47.0 %
Marital status	
Married	60.1 %
Single/common law	25.9 %
Widowed/separated/divorced	14.0 %
Education	
Less than high school	18.9 %
High school	19.5 %
Post-secondary	61.6 %
Household income	
Less than $19,999	8.4 %
$20,000 to $29,999	9.4 %
$30,000 to $39,999	11.6 %
$40,000 to $49,999	10.5 %
$50,000 to $59,999	11.1 %
$60,000 to $79,999	16.5 %
Greater than $80,000	32.5 %
Immigrant status	
Canadian citizen	94.6 %
Immigrant	5.4 %
Ethnicity	
White	97.2 %
Non-white	2.8 %
Geographic area	
Urban	73.6 %
Rural	26.4 %
Health condition	
Coronary heart disease	5.9 %
Diabetes	6.8 %
Hypertension	20.3 %
Health behaviors	
Physical activity level	
Inactive	54.5 %
Moderately active	24.2 %
Active	21.3 %
Fruit and vegetable intake	
Less than 5 per day	60.1 %
5–10 per day	36.3 %
Greater than 10 per day	3.6 %
Smoking status	
Not at all	74.6 %

Table 1 continued

Variable	(%)
Occasionally	4.8 %
Daily	20.6 %
Frequency of religious service attendance	
Less than once a year	37.7 %
3–12 times a year	34.9 %
More than once a week	27.4 %

participants who attended 3–12 times a year and those who attended less than once a year across all models.

Attending religious services more than once a week was significantly positively associated with a higher prevalence of hypertension in Model 1 (Table 4). The association reversed direction and became negative after adjusting for demographic variables (OR = 0.81; 95 % CI 0.67–0.97; $p < 0.05$) in Model 2. This association remained negative and significant after further adjustment for socioeconomic and health behaviors (Model 3 and 4). There was no significant association between participants who attended 3–12 times a year and those who attended less than once a year across all models.

Discussion

Published data from other countries show that attending religious services is associated with a lower incidence or prevalence of CHD, diabetes, and hypertension (Hummer et al. 1999; Oman et al. 2002; Goldbourt et al. 1993; King et al. 2001; Koenig et al. 1998; Larson et al. 1998; Graham et al. 19781978; Gillium 2006). Since about one-third of adults in Canada attend religious services at least monthly (Statistics Canada 2009), this study was conducted to examine whether the relation between religious service attendance and these three health conditions holds in Canada. Overall, participants who attended religious services more than once a week had lower prevalent odds of CHD ($p > 0.05$), diabetes ($p < 0.05$), and hypertension ($p < 0.05$) compared to participants who attended less than once a year after adjustment for a number of demographic, socioeconomic, and health behavior factors. Previous studies showed people who attend places of worship more than once a week have a significantly lower risk of developing CHD (Hummer et al. 1999; Oman et al. 2002). Our results were consistent with these findings, but did not reach statistical significance at the 5 % level. Lack of power could be an issue because our power calculation was based on a one-tailed directional test to evaluate the hypothesis that frequent religious service attendance is associated with decreased prevalent odds of CHD.

To the best of our knowledge, no published studies exist to support our finding of a significant inverse association between religious service attendance and a lower prevalence of diabetes. However, published studies have been conducted to examine the association between religious service attendance and inflammatory markers among people with diabetes. King et al. (2002) examined the National Health and Nutrition Examination Survey III 1988–1994 and found that persons with diabetes who did not attend religious events were more likely than attendees with diabetes to have elevated C-reactive protein (CRP) after controlling for demographic variables, health status, smoking, social support,

Table 2 Odds ratio of coronary heart disease by frequency of religious service attendance—weighted

	Model 1	Model 2	Model 3	Model 4
Religious service attendance				
Less than once a year (ref)				
3–12 times a year	0.74 (0.55–0.99)*	0.72 (0.52–0.98)*	0.73 (0.53–.1.00)*	0.75 (0.55–1.03)
More than once a week	1.56 (1.20–2.03)*	0.819 (0.612–1.10)	0.80 (0.60–1.07)	0.82 (0.61–1.11)
Demographics				
Age		1.09 (1.08–1.10)*	1.08 (1.07–1.09)*	1.08 (1.07–1.09)*
Sex				
Male (ref)				
Female		1.30 (1.01–1.69)*	1.37 (1.06–1.78)*	1.35 (1.03–1.76)*
Marital status				
Married (ref)				
Single/common law		0.82 (0.52–1.30)	0.73 (0.46–1.16)	0.74 (0.46–1.18)
Separated/divorced/widowed		1.05 (0.78–1.42)	0.98 (0.72–1.34)	0.98 (0.71–1.35)
Immigrant status				
Canadian citizen (ref)				
Immigrant		0.57 (0.31–1.06)	0.569 (0.305–1.06)	0.58 (0.31–1.08)
Ethnicity				
White (ref)				
Non-white		1.51 (0.45–5.01)	1.51 (0.456–5.06)	1.52 (0.46–5.08)
Geographic area				
Urban (ref)				
Rural		0.98 (0.76–1.28)	0.97 (0.74–1.26)	0.96 (0.71–1.23)
Socioeconomic				
Education				
Less than high school (ref)				
High school			0.80 (0.53–1.20)	0.81 (0.54–1.21)
Post-secondary			1.00 (0.75–1.34)	1.03 (0.77–1.38)
Household income				
Less than $19,999 (ref)				
$20,000 to $29,999			1.05 (0.688–1.61)	1.05 (0.68–1.61)
$30,000 to $39,999			0.882 (0.566–1.37)	0.89 (0.57–1.39)
$40,000 to $49,999			0.499 (0.294–0.845)*	0.51 (0.30–0.86)*
$50,000 to $59,999			0.850 (0.517–1.40)	0.85 (0.52–1.41)
$60,000 to $79,999			0.874 (0.530–1.44)	0.90 (0.54–1.46)
Greater than $80,000			0.507 (0.300–0.858)*	0.51 (0.30–0.88)*
Health behaviors				
Physical activity				
Inactive (ref)				
Moderately active				0.85 (0.646–1.11)
Active				0.77 (0.49–0.89)*
Fruit and vegetable intake				
Less than 5 per day (ref)				
5–10 per day				1.01 (0.74–1.39)
Greater than 10 per day				0.74 (0.50–1.11)

Table 2 continued

	Model 1	Model 2	Model 3	Model 4
Smoking				
Not at all (ref)				
Occasionally				1.05 (0.89–1.09)
Daily				0.82 (0.76–1.03)

* $p < 0.05$

mobility. CRP is an acute inflammatory marker found among diabetic patients that increases their risk for cardiovascular disease (Morrow and Ridker 2000).

We found a significant negative association between attending religious services at least once a week and the prevalence of hypertension after controlling for several covariates that were not included in previous studies (e.g., physical activity and fruit and vegetable intake). Our finding is consistent with other older cross-sectional studies (Koenig et al. 1998; Larson et al. 1998; Graham et al. 1978; Gillium 2006).

Prior studies primarily dichotomize religious service attendance and focus on individuals who attend religious services more than once a week in comparison with individuals who do not attend at all. This study was able to assess the effects of attending religious services 3–12 times a year on the prevalence of CHD, and our findings show these individuals have a significantly lower prevalence of CHD compared to non-attenders, after adjusting for demographic factors. This finding highlights the importance of examining a linear trend for dose–response relations between religious service attendance and health outcomes. Health benefits may accrue to persons with moderate levels of religious service attendance. It is possible that individuals who attend religious services a few times a year do so during only stressful events. There is a growing body of literature that suggests people often turn to places of worship to cope with stressful situations (Ano and Vasconcelles 2005).

The socioecological model could explain the relation between religious service attendance and the lower prevalence of CHD and related risk factors. This model comprehensively integrates multiple levels of influence, for example, community, organizational, and institutional factors, and shows how they impact health behaviors and outcomes (Stokols 1996). Because many individuals spend a substantial amount of time in institutional settings, such as places of worship, institutional structures and processes in religious settings can have an impact on CHD, diabetes, and hypertension, as well as on health behaviors that might affect these three health conditions. While individuals are responsible for initiating and maintaining lifestyle changes necessary to reduce CHD risk and improve health, church attendance may expose individuals to organizational forces that affect their health behaviors. For example, positive health behaviors encouraged during religious services could be one mechanism through which attendance can affect CHD and related risk factors. Adherence to religious precepts can lead to indirect and formal prohibitions against specific risky behaviors (e.g., poor diet, smoking, alcohol consumption), as well as encouragement of behaviors that are conducive to health (e.g., regular physical activity, stress management). These distinctive patterns of lifestyle and health behaviors could indirectly result in lower prevalent rates of chronic and acute illness among people who attend religious institutions regularly (Chatters et al. 1998; Chatters 2000).

Table 3 Odds ratio for diabetes by frequency of religious service attendance—weighted

	Model 1	Model 2	Model 3	Model 4
Religious service attendance				
Less than once a year (ref)				
3–12 times a year	0.84 (0.66–1.08)	0.85 (0.657–1.09)	0.86 (0.66–1.11)	0.90 (0.69–1.16)
More than once a week	0.87 (0.67–1.13)	0.57 (0.431–0.752)*	0.56 (0.42–0.74)*	0.60 (0.45–0.80)*
Demographics				
Age/mean (SD)		1.05 (1.04–1.06)*	1.04 (1.03–1.05)*	1.04 (1.03–1.05)*
Sex				
Male (ref)				
Female		1.29 (1.03–1.61)*	1.33 (1.06–1.66)*	1.36 (1.08–1.72)*
Marital status				
Married (ref)				
Single/common law		0.80 (0.57–1.13)	0.69 (0.48–0.98)*	0.69 (0.48–0.99)*
Separated/divorced/widowed		0.89 (0.67–1.19)	0.79 (0.59–1.08)	0.79 (0.58–1.07)
Immigrant status				
Canadian citizen (ref)				
Immigrant		0.61 (0.34–1.09)	0.60 (0.33–1.09)	0.61 (0.33–1.11)
Ethnicity				
White (ref)				
Non-white		1.79 (0.74–4.32)	1.80 (0.74–4.37)	1.76 (0.72–4.34)
Geographic area				
Urban (ref)				
Rural		0.94 (0.74–1.19)	0.90 (0.70–1.14)	0.88 (0.69–1.12)
Socioeconomic				
Education				
Less than high school (ref)				
High school			0.77 (0.55–1.09)	0.79 (0.56–1.12)
Post-secondary			0.79 (0.60–1.04)	0.83 (0.63–1.09)
Household income				
Less than $19,999 (ref)				
$20,000 to $29,999			1.00 (0.66–1.52)	0.98 (0.65–1.49)
$30,000 to $39,999			0.77 (0.50–1.19)	0.77 (0.50–1.19)
$40,000 to $49,999			0.66 (0.41–1.06)	0.66 (0.41–1.06)
$50,000 to $59,999			0.68 (0.42–1.09)	0.68 (0.42–1.09)
$60,000 to $79,999			0.77 (0.49–1.22)	0.79 (0.50–1.25)
Greater than $80,000			0.57 (0.37–0.89)*	0.59 (0.38–0.93)*
Health behaviors				
Physical activity				
Inactive (ref)				
Moderately active				0.70 (0.52–0.93)*
Active				0.49 (0.35–0.72)*
Fruit and vegetable intake				
Less than 5 per day (ref)				0.98 (0.77–1.25)
5–10 per day				1.55 (0.86–2.77)
Greater than 10 per day				

Table 3 continued

	Model 1	Model 2	Model 3	Model 4
Smoking				
Not at all (ref)				
Occasionally				1.07 (1.04–1.12)
Daily				1.00 (0.94–1.06)

* $p < 0.05$

Physical activity was statistically significant in the multivariable models for all three health outcomes in our study, which concurs with previous studies showing active physical activity to be inversely associated with disease prevalence, controlling for religious service attendance (Oman et al. 2002; Kennedy et al. 1996; Strawbridge et al. 2001). Though we treated physical activity as a confounder in this study, Strawbridge et al. showed that over 28 years, weekly religious service attendees were more likely to start exercising, suggesting a possible mediating role for religious service attendance in improved physical activity and in reduced CHD mortality and morbidity (Strawbridge et al. 2001). Due to the cross-sectional nature of this study, we were unable to test the mediating effects of physical activity on the association between religious service attendance and health outcomes.

Two health behavior variables of interest in this study are fruit and vegetable intake and smoking status. Fruit and vegetable intake was not significant in the multivariable models of CHD, diabetes, and hypertension perhaps because of limited variation in consumption levels. Approximately 60 % of the study sample consumed less than five fruits and vegetables per day, which could be attributed to seasonal effects.

Smoking is a known risk factor for CHD, and it is surprising that smoking status remained a non-significant covariate in the multivariable models examining the relation between religious service attendance and this health outcome. A possible explanation for this result could be the presence of "healthy smoking effect" (Xu et al. 1994) in our study population (i.e., smokers who are more resistant to the effects of smoking or who have not been diagnosed with CHD). The positive association between smoking and hypertension prevalence supports this hypothesis in our study since smokers were more likely to have prevalent hypertension compared to non-smokers, a known risk factor for CHD.

The present study has some limitations. The cross-sectional nature of CCHS 4.1 prevented us from assessing the temporal exposure–outcome sequence between religious service attendance and CHD, diabetes, and hypertension (Maxwell and Cole 2007). The associations found in this study might reflect reverse causality bias, whereby attending religious services has been the consequence, rather than the antecedent, of CHD and related risk factors. Until religious service attendance and health outcomes are measured prospectively in studies such as the Canadian Longitudinal Study on Aging (Raina et al. 2009), any associations suggested by cross-sectional analyses remain hypothesis-generating.

It is crucial to differentiate between the behavioral and functional aspects of religious service attendance. Our study contains what is primarily a behavioral indicator of religion (e.g., frequency of religious service attendance), and the findings suggest what appears to be the "result" of religious attendance (e.g., lower prevalence of health outcomes). Religious service attendance is likely to be a marker for multiple factors that influence CHD-related health outcomes. It is likely factors such as mobility, good health, or other healthy behaviors (e.g., physical activity) act all to increase the frequency of religious participation

Table 4 Odds ratio for hypertension by frequency of religious service attendance—weighted

	Model 1	Model 2	Model 3	Model 4
Religious service attendance				
Less than once a year (ref)				
3–12 times a year	1.06 (0.908–1.25)	1.07 (0.90–1.27)	1.08 (0.909–1.29)	1.08 (0.907–1.30)
More than once a week	1.37 (1.16–1.61)*	0.81 (0.67–0.97)*	0.81 (0.67–0.97)*	0.82 (0.68–0.99)*
Demographics				
Age/mean (S.D)		1.06 (1.06–1.07)*	1.06 (1.05–1.06)*	1.06 (1.05–1.06)*
Sex				
Male (ref)				
Female		0.93 (0.80–1.08)	0.95 (0.82–1.11)	0.99 (0.85–1.16)
Marital status				
Married (ref)				
Single/common law		0.75 (0.60–0.95)*	0.67 (0.54–0.87)*	0.69 (0.54–0.87)*
Separated/divorced/ widowed		0.79 (0.64–0.96)*	0.72 (0.59–0.89)*	0.72 (0.59–0.90)*
Immigrant status				
Canadian citizen (ref)				
Immigrant		0.78 (0.54–1.11)	0.77 (0.53–1.11)	0.81 (0.56–1.17)
Ethnicity				
White (ref)				
Non-white		0.72 (0.36–1.45)	0.73 (0.36–1.46)	0.66 (0.33–1.33)
Geographic area				
Urban (ref)				
Rural		1.02 (0.87–1.20)	0.99 (0.84–1.16)	0.98 (0.84–1.16)
Socioeconomic				
Education				
Less than high school (ref)				
High school			1.06 (0.84–1.34)	1.07 (0.852–1.35)
Post-secondary			0.87 (0.72–1.05)	0.89 (0.74–1.08)
Household income				
Less than $19,999 (ref)				
$20,000 to $29,999			0.87 (0.65–1.22)	0.88 (0.64–1.21)
$30,000 to $39,999			1.12 (0.82–1.52)	1.09 (0.80–1.49)
$40,000 to $49,999			0.77 (0.56–.1.07)	0.78 (0.56–1.08)
$50,000 to $59,999			0.84 (0.601–1.16)	0.82 (0.59–1.15)
$60,000 to $79,999			0.87 (0.629–1.20)	0.87 (0.63–1.20)
Greater than $80,000			0.69 (0.50–0.98)	0.68 (0.50–0.93)*
Health behaviors				
Physical activity				
Inactive (ref)				
Moderately active				1,00 (0.83–1.19)
Active				0.64 (0.52–0.80)*
Fruit and vegetable intake				
Less than 5 per day (ref)				
5–10 per day				1.13 (0.96–1.33)
Greater than 10 per day				0.86 (0.55–1.35)

Table 4 continued

	Model 1	Model 2	Model 3	Model 4
Smoking				
Not at all (ref)				
Occasionally				1.04 (1.03–1.07)*
Daily				1.62 (1.60–1.67)*

* $p < 0.05$

and to promote better health. Further research is needed to clarify which interpretation is most informative.

The exclusion of social support variables in the analyses deserves special attention. CCHS 4.1 did not collect measures of social support from Saskatchewan participants, so we could not test for this variable in the regression models. Although many studies control for social support, these studies have also suggested social support to be a potential mediator as risk ratios were largely reduced once social support variables were included in models for CHD, diabetes, and hypertension (Hummer et al. 1999; Oman et al. 2002; Gillium 2006). Research has shown that people involved in religious practices enjoy increased social support, which is recognized as being an important potential mediator in physical health (Hummer et al. 1999; Oman et al. 2002; Gillium 2006).

Caution must be exercised when generalizing this study's results to the Canadian population. Our sample contains many older, white, Christian, non-immigrant individuals of higher education and income, which is similar to other samples in the published literature (Hummer et al. 1999; Oman et al. 2002), but not representative of the Saskatchewan and Canadian population as indicated by the 2006 Census. This is likely the result of selection bias considering our study sample included only participants eligible to respond to the question on religious service attendance on the premises of indicating a religious affiliation in CCHS 4.1. Lastly, our findings may not be easily generalizable to populations outside of Canada or to smaller ethnic subgroups or populations within Canada.

The exploration of religious factors in relation to CHD, diabetes, and hypertension remains a promising and important pursuit in Canada. This study is valuable in identifying possible associations, raising further questions, and guiding subsequent research. Prospective studies are needed to understand the temporal ordering of the relationship between exposure to religious factors and the incidence of CHD and related risk factors. Further, these studies will enable the understanding of pathways for the effect of religious factors on CHD mortality and morbidity, such as the availability of social support and promotion of health behaviors. Conceptual models such as the socioecological model should be tested to determine the relation between religious service attendance and health outcomes at the individual and institutional level. Finally, the effect of ethnicity deserves further inquiry since Canada's ethnic population is growing much faster than its total population.

The findings have clinical implications (Matthews et al. 1998). Religion is important to many Canadians, particularly older adults, and health-care providers should be aware of how religious factors can affect CHD and related risk factors. Providers might adopt practices that will help them assess the health-relevant aspects of patients' religious commitment. For example, health-care providers can encourage patients to make use of potentially health-promoting religious resources from patients' own religious institutions and traditions to help reduce the risk of CHD, diabetes, and hypertension.

Conclusion

The findings of this study are the first to suggest religious service attendance may be associated with the prevalence of CHD, diabetes, and hypertension in Canada. This study supports further investigation of religious factors influencing these health outcomes in longitudinal studies and investigation of pathways. Such findings will add to our understanding of how religious factors might contribute to the prevention of CHD and related risk factors.

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APPENDIX B

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APPENDIX C

MCMASTER RESEARCH ETHICS BOARD APPROVAL FOR QUALITATIVE STUDY

RESEARCH ETHICS BOARD

Hamilton Health Sciences

McMaster University

REB Office, 293 Wellington St. N., Suite 102, Hamilton, ON L8L 8E7
Telephone: 905-521-2100, Ext. 42013
Fax: 905-577-8378

November 1, 2011

PROJECT NUMBER: **11-505**

PROJECT TITLE: The Association between Attending Religious Services and Lower Prevalence of Coronary Heart Disease, Diabetes and High Blood Pressure in Canada: A Qualitative Study

PRINCIPAL INVESTIGATOR: **Ananya Tina Banerjee**
LOCAL PI: **Dr. Mark Oremus**

This will acknowledge receipt of your letter dated October 25, 2011 which enclosed revised copies of the Information/Consent Forms and the Application Form for the above-named study. These issues were raised by the Research Ethics Board at their meeting held on October 18, 2011. Based on this additional information, we wish to advise your study has been given ***final*** approval from the full REB. The submission, Study Protocol version dated September 26, 2011 including the Information/Consent Form for Semi-Structured Interviews with Church Members and Information/Consent Form for Focus Group Discussion with Church Members, both version dated September 26, 2011 together with Appendix A: Demographic Questionnaire; Appendix B: Verbal Invitation to Participate in the Study; Appendix D: Appointment to Participate in the Interview and Focus Group and Appendix E: Religious Service Attendance & CHD Health: Qualitative Research Study - Church Leader Interview Guide, all version dated September 26, 2011 were found to be acceptable on both ethical and scientific grounds. ***Please note*** attached you will find the Information/Consent Forms with the REB approval affixed; all consent forms used in this study must be copies of the attached materials.

We are pleased to issue final approval for the above-named study for a period of 12 months from the date of the REB meeting on October 18, 2011. Continuation beyond that date will require further review and renewal of REB approval. Any changes or revisions to the original submission must be submitted on an REB amendment form for review and approval by the Research Ethics Board.

The Hamilton Health Sciences/McMaster Health Sciences Research Ethics Board operates in compliance with and is constituted in accordance with the requirements of: The Tri-Council Policy Statement on Ethical Conduct of Research Involving Humans; The International Conference on Harmonization of Good Clinical Practices; Part C Division 5 of the Food and Drug Regulations of Health Canada; and the provisions of the Ontario Personal Health Information Protection Act 2004 and its applicable Regulations.

PLEASE QUOTE THE ABOVE-REFERENCE PROJECT NUMBER ON ALL FUTURE CORRESPONDENCE

Sincerely,

S. Salama

Suzette Salama PhD.,
Interim Chair, Research Ethics Board

McMaster University

Inspiring Innovation and Discovery

A Qualitative Study: How Does Attending Religious Services Influence a Lower Prevalence of Coronary Heart Disease, Diabetes and High Blood Pressure in Canada?

Semi-structured Interviews with Church Ministers

Information Sheet and Consent Form

Principal Investigator: Ananya Tina Banerjee, CK, MSc **Co-Investigators:** Dr. Mark Oremus, PhD
Dr. Mike Boyle, PhD
Dr. Pat Strachan, RN, PhD
Dr. Sonia Anand, MD, PhD

You are invited to participate in a research project. It is important that you read this description of the study and your role in it should you decide to participate. Your decision to participate is completely voluntary.

Purpose: A recent study of Canadian Community Health Survey (CCHS) 4.1 data showed Canadians who attend religious services more than once a week compared to those who do not attend at all have a lower occurrence of diabetes and high blood pressure. However, it is not clearly understood how attending religious services influence lower occurrences of these diseases. Therefore, the purpose of this study is to help explain the relationship between attending religious services and the occurrence of CHD and related risk factors found in the CCHS 4.1 study.

Procedure: You have been recruited to participate in this study because you have been identified as a church minister for the past 12 months and have no reported medical diagnosis of coronary heart disease, diabetes and high blood pressure. If you agree, you will be asked to participate in a semi-structured interview (approximately 45 to 60 minutes). Participation in the interview would be voluntary and confidential. With permission, the interview will be audio-recorded and typed and stored on a computer file.

Confidentiality: All information collected during the study will be held in strict confidence. No names or identifying information will be used in any publication or presentations. All data from the de-identified interviews will be stored in a locked filing cabinet, and no one except the principle investigator and co-investigators will see your answers and/or study results. The data will be stored for 25 years after which it will be shredded to ensure confidentiality.

Participation: Your participation is VOLUNTARY and you may leave the study at any time or refuse to answer questions that make you feel uncomfortable. You will not be paid for your participation in this study. Your participation in the study will last for an hour maximum.

Risks: You will be revealing information about the church community; however this information will remain private.

Benefits: There is no direct benefit to you participating in the study. The results of this study will help us understand how attending religious services influence lower rates of coronary heart disease and related risk factors.

Contact: If you have any questions, you may telephone Ananya Tina Banerjee at 416-624-9927 or Dr. Mark Oremus at (905) 525-9140 ext. 22437.

CONSENT FORM

I understand the procedures of this study as described in the information sheet. I will be asked to participate in one focus group at my church. I understand that my participation as a church attendee in this study is entirely voluntary.

I understand that all information gathered is strictly confidential and will only be used for research purposes with the permission of the study investigators. This information will not be used to generate a profit. I will not be identified in any published report. I am free to refuse to participate or withdraw from the study at any time. If I have any questions, I may telephone Ananya Tina Banerjee at 416-624-9927 or Dr. Mark Oremus at (905) 525-9140 ext. 22437. I agree to participate in the project and I will be given a signed copy of this form.

_____	_____	_____
(Subject's Name)	(Subject's Signature)	(Date)
_____	_____	_____
(Person Obtaining Consent Name)	(Person Obtaining Consent Signature)	(Date)
_____	_____	_____
(Investigator Name)	(Investigator Signature)	(Date)

If you have any questions regarding your rights as a research participant you may contact the Office of the Chair of the Hamilton Health Sciences/Faculty of Health Sciences Research Ethics Board at 905-521-2100, Ext 42013

McMaster University

Inspiring Innovation and Discovery

A Qualitative Study: How Does Attending Religious Services Influence a Lower Prevalence of Coronary Heart Disease, Diabetes and High Blood Pressure in Canada?

Focus Group Discussion with Church Members

Information Sheet and Consent Form

Principal Investigator: Ananya Tina Banerjee, CK, MSc **Co-Investigators:** Dr. Mark Oremus, PhD
Dr. Mike Boyle, PhD
Dr. Pat Strachan, RN, PhD
Dr. Sonia Anand, MD, PhD

You are invited to participate in a research project. It is important that you read this description of the study and your role in it should you decide to participate. Your decision to participate is completely voluntary.

Purpose: A recent study of Canadian Community Health Survey (CCHS) 4.1 data showed Canadians who attend religious services more than once a week compared to those who do not attend at all have a lower occurrence of diabetes and high blood pressure. However, it is not clearly understood how attending religious services influence lower occurrences of these diseases. Therefore, the purpose of this study is to explain the relationship between attending religious services and the occurrence of CHD and related risk factors found in the CCHS 4.1 study.

Procedure: You have been identified to participate in this study because you are a person who has attended church once a week for the past 12 months and have no medical diagnosis of coronary heart disease, diabetes and high blood pressure. If you agree, you will be asked to participate in a group discussion (focus group) with six to eight other church attendees (approximately 120 minutes). Participation in the focus group would be voluntary and confidential. With permission, the focus group will be audio-recorded and typed and stored on a secure computer file.

Confidentiality: All information collected during the study will be held in strict confidence. No names or identifying information will be used in any publication or presentations. All data from the de-identified focus group will be stored in a locked filing cabinet, and no one except the principle investigator and co-investigators will see your answers and/or study results. The data will be stored for 25 years after which it will be shredded to ensure confidentiality.

Participation: Your participation is VOLUNTARY and you may leave the study at any time or refuse to answer questions that you feel uncomfortable. You will not be paid for your participation in this study. Your participation in the study will last for one day.

Risks: You will be revealing information about the church community; however this information will remain private.

Benefits: There is no direct benefit to you participating in the study. The results of this study will help us understand how attending religious services influence lower rates of coronary heart disease and related risk factors.

Contact: If you have any questions, you may telephone Ananya Tina Banerjee at 416-624-9927 or Dr. Mark Oremus at (905) 525-9140 ext. 22437.

CONSENT FORM

I understand the procedures of this study as described in the information sheet. I will be asked to participate in one focus group at my church. I understand that my participation as a church attendee in this study is entirely voluntary.

I understand that all information gathered is strictly confidential and will only be used for research purposes with the permission of the study investigators. This information will not be used to generate a profit. I will not be identified in any published report. I am free to refuse to participate or withdraw from the study at any time. If I have any questions, I may telephone Ananya Tina Banerjee at 416-624-9927 or Dr. Mark Oremus at (905) 525-9140 ext. 22437. I agree to participate in the project and I will be given a signed copy of this form.

(Subject's Name)	(Subject's Signature)	(Date)
(Person Obtaining Consent Name)	(Person Obtaining Consent Signature)	(Date)
(Investigator Name)	(Investigator Signature)	(Date)

If you have any questions regarding your rights as a research participant you may contact the Office of the Chair of the Hamilton Health Sciences/Faculty of Health Sciences Research Ethics Board at 905-521-2100, Ext 42013

APPENDIX D

INTERVIEW AND FOCUS GROUP GUIDE FOR QUALITATIVE STUDY

Qualitative Research Study on Understanding the Relationship Between Religious Service Attendance and Coronary Heart Disease and Related Risk Factors

Interview and Focus Group Guide

Introductory Script

Thank you for agreeing to participate in our study. I am a PhD student at McMaster University and my thesis is focusing on understanding the relationship between religious service attendance and the prevalence of coronary heart disease, diabetes and high blood pressure in Canadian churches. As part of this study, we are interviewing church ministers to help explain why attending religious services influences a lower occurrence of heart disease, diabetes high blood pressure. All your answers are completely confidential and your name will not be shared with other institutions. All participants will be assigned a pseudonym. The information will be used to better understand how religious service attendance influences better cardiovascular health.

If you agree to participate, do we have permission to digitally record our interview? We are asking participants to record interviews so we can accurately capture your explanations in your own words. All interviews will be transcribed and all proper names and places will be coded to protect your identity and privacy.

1. I recently conducted a study using the Canadian Community Health Survey Data and found that persons who attend religious services once a week had a lower occurrence of coronary heart disease, diabetes and high blood pressure compared to persons who do not attend at all. How would you explain this finding?
    a. In your opinion, what aspects of attending church every week influences better cardiovascular health?
        i. Promotion of healthy behaviors
            1. Physical activity
            2. Healthy eating
            3. Smoking cessation
            4. Stress management
        ii. Social support

2. Apart from the religious service, are there other activities within the church that you think may influence a lower occurrence of coronary heart disease, diabetes and high blood pressure?

3. How would you describe your overall health? How, if at all, do you view that attending church has affected your health?

4. Are there any other factors other than attending church regularly that have influenced your current health status?

5. Considering the rise in CHD, diabetes and high blood pressure in Canada, do you think religious institutions could be an important channel through which to inform high-risk communities (e.g., older adults) about preventive care to reduce CHD risk?

a. What sort of health promotion activities do you think would be practical and feasible in your church setting related to the following:
    i. Physical activity
    ii. Healthy eating
    iii. Smoking cessation
    iv. Stress management

b. How likely are church members in your church to participate in these type of activities?

c. How conducive is the environment of the church to physical activity, healthy eating, smoking cessation and stress management?

6. Is there anything you would like to add?

APPENDIX E

NATIONAL POST ARTICLE ON STUDY I

National Post /
HOLY POST

Attending religious services linked to better health

Tom Blackwell, National Post Staff May 22, 2012 – 9:39 PM ET | **Last Updated: May 22, 2012 9:41 PM ET**

The study's authors theorize that Christian and other religious gatherings help stave off disease by offering a stress-reducing social-support network. Aaron Lynett / National Post files

People who attend religious services regularly are less likely than others in this country to develop diabetes or high blood pressure, a new study suggests, adding a Canadian dimension to the growing but contentious body of research linking faith and good health.

The authors, from McMaster University in Hamilton, Ont., theorize that Christian and other religious gatherings help stave off disease by offering a stress-reducing social-support network, frowning on risky behaviour like smoking and drinking and encouraging good diet and exercise.

They suggest that doctors take advantage of the findings by urging religious patients to tap into the health-promoting traditions of their faith.

‘It is the religious belief system that is driving people to care for one another and love one another’

In interviews that were part of a related study, parishioners and clergy said they always felt that going to church was therapeutic, said Ananya Banerjee, the epidemiologist who headed the research.

“They [priests] felt people were in a meditative state, it was a place where they felt at peace,” she said. “It was a time they could actually reflect on their lives and absorb everything that was being said ... about how to live life to the fullest according to God’s will.”

Based on data from the federal government’s Canadian Community Health Survey, the McMaster research is the first of its kind in

Canada to link heart-related health and religious observance, the authors say.

The study used results from the 2007 edition of the survey, which included for the first time an optional query about religious attendance. Ms. Banerjee and colleagues looked at the 5,400 people surveyed in Saskatchewan, one of two jurisdictions where the question was actually asked.

They found that those who went to church or attended other religious services more than once a week were almost 20% less likely to suffer from hypertension and had 40% less chance of being diabetic. Fewer of the frequent churchgoers reported coronary-heart disease, as well, but the difference was deemed not statistically significant.

Ms. Banerjee said she met initial skepticism when she proposed the study as part of her work for a doctorate, and rejection from high-impact Canadian medical journals when she tried to publish the results. It ended up appearing in the U.S.-based Journal of Religion and Health.

The medical science world in the United States, however, has for years been delving heavily into the link between faith and health, with several medical schools offering courses on spirituality for doctors-in-training, and more than 3,000 studies on the issue published.

Critics dismiss much of that research, though, arguing partly that something other than religion likely explains the positive results.

The Canadian paper seems “reasonably well” conducted but suffers from a shortcoming shared by many of the U.S. studies: the source data made it impossible to filter out the general health effects of “social support,” said Richard Sloan, who critiqued the field in his 2006 book, Blind Faith: The Unholy Alliance of Religion and Medicine.

Any disease-fighting benefits of attending church, synagogue or mosque probably stem from the support and comfort those institutions offer, said the behavioural medicine professor at Columbia University. And many other types of social activities — from bowling leagues to theatre groups — deliver similar rewards, he said.

“I don’t think there’s any problem with physicians saying ‘You ought to engage in activities with other people,’ ” said Prof. Sloan. “The problem is when you single out religion … You confront the possibility of religious coercion, of invading religious privacy.”

Some studies, though, have teased out the general effects of social support, and found them to represent only about 15% of the positive health impact of religious attendance, countered Dr. Harold Koenig, a psychiatrist and head of Duke University’s Center for Spirituality, Theology and Health.

“It’s kind of like a super-charged social support,” he said. “In a religious community, that social contract is going on, but it’s not the only thing. It is the religious belief system that is driving people to care for one another and love one another.”

Most of the Canadian study’s respondents were Christians, but Ms. Banerjee, who is Hindu, said she suspects the results would apply to other faiths, too.

“When I go to temple, I feel a lot better,” she said. “I’m ready to go on for the rest of the week, and face any challenges that come by.”

National Post
• *Email: tblackwell@nationalpost.com*

Posted in: **Holy Post** Tags: **Ananya Banerjee, Canadian Community Health Survey, McMaster University**