8-21-2014 12:00 AM

A Health Promotion Perspective On Transitioning Into Retirement

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A thesis submitted in partial fulfillment of the requirements for the Master of Science degree in Health and Rehabilitation Sciences

A HEALTH PROMOTION PERSPECTIVE ON TRANSITIONING INTO RETIREMENT

(Thesis Format: Integrated-Article)

by

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Graduate Program in Health and Rehabilitation Sciences

A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science
Health & Rehabilitation ~ Health Promotion

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Abstract

The transitional stages towards retirement of those with chronic disorder(s) often present a diversity of additional challenges and people look at the measurement of their anticipated quality of life as a meaningful way of determining this successful adjustment. The overall objective of this research study was to understand transition into retirement considering the impact of comorbidity and associated socio-demographic factors have on the (physical and mental) health status. Quantitative data analysis of people (aged 50-65) with chronic upper extremity musculoskeletal disorders was used to inform health impacts in the group transitioning towards retirement; or who have selected or required early retirement.

This work is comprised of two integrated manuscripts that of a scoping literature review reporting on the nature and extent of the literature on retirement transition, followed by a retrospective cohort analysis of secondary data that fills a gap in the literature by examining the relationship and impact that comorbidity, pain, and function have on the physical and mental health outcomes of women and men, aged 50 – 65.

Keywords: middle-aged (50 – 65) adults, co/multi morbidity, upper extremity musculoskeletal disorder(s), pain, function, occupational status, and physical and mental health outcomes.

Co-Authorship Statement

The two manuscripts contained within this thesis were based on research that was designed and analyzed by Catherine P. Gelinas as a component of her master's work. Data used in this thesis were obtained by ethic approvals from Western University Research and Lawson Health Research Institute to use the St. Joseph's Health Care, London, Roth | McFarlane Upper Hand and Limb Clinic, London, Ontario, Canada self-report measures master file. The analyses are the sole responsibility of the author. While the research and analysis are based on data from Roth | McFarlane Upper Hand and Limb Clinic, the opinions expressed do not represent the views of Roth | McFarlane Upper Hand and Limb Clinic.

The advisory committee provided regular feedback throughout the research process. Catherine P. Gelinas was the primary author of all the manuscripts, with the following co-authors:

Chapter 2: A Scoping Review: Transitioning into Retirement with Chronic Health Disorders

Authors: Catherine P. Gelinas, Joy C. MacDermid, and Sheila T. Moodie
Published by: Sociology Study, March 2014; Volume 4, Number 3, Serial Number 34
http://davidpublishing.org/journals_info.asp?jId=645

Chapter 3: Evaluating the Impact of Comorbidity Upper Extremity Musculoskeletal Disorders on the Lives of Those Transitioning Towards Retirement

Authors: Catherine P. Gelinas, Joy C. MacDermid, and Andrew M. Johnson

Table of Contents

List of Tables

CHAPTER TWO

CHAPTER THREE

List of Figures

CHAPTER TWO

CHAPTER THREE

LIST OF APPENDICES

Chapter 1

A Health Promotion Perspective On Transitioning Into Retirement

Introduction

Many adults, aged 50 – 65, are current experiencing a state of change, both physically and with respect to life circumstances; changes in employment conditions and/or in a transition to retirement. Retirement is a time of transition from paid employment and is usually associated with a variety of changes in "occupation" and income. The Canadian working-age population is aging and the number of persons aged 45 to 64 years as a percentage of the 15 to 64 age group is an indicator of the aging of the working-age population. Since the first baby-boomers reached age 45, the proportion of persons aged 45 to 64 years has begun to increase rapidly. In the late 1980s they comprised approximately 28% of the working-age population, 38% by 2006, and over 40% by 2010 (Statistics Canada, 2012). Recent trends in population aging and early work exit have led to claims that future pension costs will be unsustainable (National Institute on Aging, 2011).

Government policy changes have been to encourage older workers to stay in employment for a longer period. Changes have seen health care transfer payments to provinces cut back, elimination of mandatory retirement at 65, the onset of the Old Age Security payments to age 67, and restricting access to early retirement plans and/or reducing benefits (Galarneau & Carrière, 2011; Rice, Lang, Henley, & Melzer, 2011).

Transition to retirement is also a time where individuals are planning on how to spend their time, personal, and social resources. While it often provides more time for interests and new activities, it can also be an anxious time with a loss of identity, fear of illness, financial problems, and changes in social and community relationships (National Institute on Aging, 2012). The characteristics of a healthy retirement is, in essence, healthy aging, that of developing and sustaining optimal mental, social and physical well-being, and function in older adults (WHO, 2002). This can be achieved through safe communities,

health promotion, and use of health services and community programs. Barriers to the loss of health can include a lack of knowledge in personal health promotion, financial barriers in accessing non-funded provincial health care medical assistive devices and treatments, connection with community and personal social support, along with psychological support (Goldman & Smith, 2011; Tay, Tan, Diener, & Gonzalez, 2013). An effective patient oriented self-health care management plan can be enacted through informed and enabled consumers within a supportive environment (including social policy and health system) and can, in turn, have a tremendous impact on the quality of life of those living with chronic diseases (Bozo & Guarnaccia, 2010).

The research conducted throughout this master's thesis looks to examine and understand what establishes healthy aging for those transitioning from peri to post retirement and living with chronic diseases, specific to upper limb musculoskeletal disorders. Health promotion initiatives for this group, who tend to not consider themselves as seniors, will be a variety of different kinds of services and approaches through which aging and living with chronic diseases can be enhanced during this transitional stage. Key factors that can be used to advance healthy aging are supportive environments in creating policies, services, programs and surroundings that enable health aging in the setting where older Canadians live, work, and recreate their environment (World Health Organization, 2008). There needs to be mutual aid where people support each other emotionally and physically by sharing ideas, information, resources, and experiences. Also, self-care as to the choices and actions individuals taken in the interest of their own health and many of these changes can make health promotion messages more receptive (World Health Organization, 2008).

Good health in retirement can be affected by chronic/serious illnesses and it is important that people take steps to manage illness and maintain and improve overall health and well-being. Understanding how the physical, emotional, and social well-being manifests itself differently is the first step to wellness (Moussavi et al., 2007). Being aware of physical and emotional strengths and weaknesses can help improve overall health and well-being as lifestyle factors can put people at risk of a range of chronic illnesses that

include cardiovascular conditions, cancer, respiratory conditions, diabetes and, musculoskeletal disorders (Moussavi et al., 2007).

Health promotion is a broad concept that includes the physical, mental, and social well-being whereby individuals must have the necessary level of power in order to identify and realize a positive insight that focuses on the dimensions of social and personal health (WHO, 1986). The process of enabling, and what is seen as enabling, is shaped by the paradigm and construct of health used in research and/or practice. Major health promotion paradigms are identified as interpersonal, social, and behavioural and each model is associated with particular definitions and theories, which in turn, guide the values and goals that are incorporated into a research process (Goetzel et al., 2011).

In the 2010 an evidence-informed framework was developed on the implementation of patient-centred health risk assessment (HRA) tools for providers, policymakers, health plans, payers, researchers, and consumers (Goetzel et al., 2011). These improved health outcome measures identified patients' variable health risks and provided follow-up behavior changes and interventions that could be implemented over time. As well, research has considered subjective assessment tools such as self-report health surveys to be a significant link between disease severity and quality of life health outcomes (Bayliss, Ellis, & Steiner, 2005).

The 2010 Health Risk Assessment Framework also developed a personalized prevention plan customized to wellness and personal health. It has been reported that among adults aged 65 years and older, only 33% of women and 40% of men are up to date with all age-specific recommended preventive services, and fewer adults, aged 50 to 64 years, are up to date in receiving these services (Keehan, 2011). This self-report information was furnished through interactive communication tools during encounters with healthcare providers, health promotion vendors, and community-based prevention programs (Koh & Sebelius, 2010). The information included the identification of chronic diseases, injury risks, modifiable risk factors, and urgent health needs of the individual (Koh & Sebelius, 2010).

Health care is not just the responsibility of the health care sector but most importantly, the ability to enable people to increase control over and positively advance their quality of health status (WHO, 1986). The ultimate goal is the ability to improve health and well-being in conjunction with follow-up counseling, coaching, and behavioral change interventions in order to facilitate personalized prevention planning and improved health outcomes for individuals (Goetzel et al., 2011). The long-term research objective of this work is to better understand and promote a healthy transition into retirement for people with chronic diseases. Given the complexity of this topic, the research focus of this Master's thesis will be to understand the current state of the literature in forming this topic and factors that contribute to physical and mental health in the presence of chronic diseases with an emphasis on musculoskeletal disorder(s). There will be an emphasis on what the impact of comorbidity and associated socio-demographic factors (i.e. age, gender, and occupational status) is on the (physical and mental) health status in people with upper extremity chronic musculoskeletal disorder(s) in the age range where they are transitioning towards retirement (50 – 65).

Health Related Quality of Life (HRQOL)

Recent attention has focused on determining the relative impact of age and chronic disease burden on the health care system. Investigating the disability process has become a major focus on functional limitations, the state between physical impairment and disability (Simonsick, Montgomery, Newman, Bauer, & Harris, 2001). The prevalence of multiple chronic diseases (MCD) among individuals increases with age and is substantial among seniors, even though many people are under the age of 65 (Boyd & Fortin, 2010). The number of individuals with MCD will increase dramatically in coming years. Comorbidity is increasingly recognized as a critical clinical issue in medical care, in part because it is an independent predictor of adverse outcomes, including health related quality of life (HRQOL), mortality, healthcare, disability, and complications of treatment beyond the effects of the individual conditions (Boyd & Fortin, 2010).

Given that multi-morbidity is a challenge facing Canadians, both health care providers and those affected, need to systematically begin answering important practical issues in supporting people transitioning towards retirement. Socio-demographics, socio-economic status, social relationships, and components of the physical and built environments, have all been implicated in the development of chronic diseases. Risk factors can include: a lack of knowledge in promoting personal health, financial barriers in accessing non-funded provincial health care medical assistive devices and treatments, needed community and personal social support, along with psychological support (Haydon, Roerecke, Giesbrecht, Rehm, & Kobus-Matthews, 2006).

People are living longer with chronic diseases and sedentary lifestyles can put people at risk of a range of disorders that include, but not limited to, the musculoskeletal system. A person's overall level of physical and mental health, with effective patient oriented self-health care management plans, can inform and enable those living with chronic diseases to experience a good quality of life in retirement. In its 2005 report, "*Preparing a health care workforce for the 21st century: the challenge of chronic conditions*" the World Health Organization (WHO) has identified patient-centred care as one of five core competencies, and it has set out eight characteristics for it (WHO, 2005). The intent of patient-centred care is to recognize and support the role of the informed patient in managing their health conditions. More generally, population/system level patient-centred care means focusing on population health needs from a demand-side rather than a supply-side perspective (WHO, 2005).

The contributions that individuals make towards enhancing their health are an essential component in transitioning towards retirement and a good quality of life. The value of self-help and peer-support in health care management will offer an understanding of how to influence an individual's behavior. To lessen the burden of chronic disease, it is imperative to educate, support, and persuade individuals to make healthy choices for future quality of life.

Self-Report Health Outcome Measures

Increasingly, health status is measured using health-related quality of life instruments (HRQOL). This is a multi-domain concept that refers to those aspects of human life and activities that are generally affected by health conditions or health services, although, in the case of disease, almost all aspects of life can become health related (Franchignoni & Salaffi, 2004). Specific examples of HRQOL domains include pain, functional status, psychological distress, fatigue, and other key symptoms (Franchignoni & Salaffi, 2004).

Over the past 20 years, there has been an increased recognition of the patient's point of view as an important component in the assessment of health care outcomes. Health-related quality of life has been identified as a goal for all people across all life stages. It is the relative quality of life for one's health or disease state that is a concern for policymakers, researchers, health care professionals, and patients (Subramanian, Huijts, & Avendano, 2010).

Notwithstanding, there are limitations inherent in self-report of health and health risks but there are distinct advantages with the use of Health Risk Assessments (HRA) tools for health promotion purposes. Evidence-based HRA provide feedback designed to correct patients' inaccurate perceptions of their own risk (Skinner, Kreuter, Kobrin, & Strecher, 1998). Providing this feedback to patients allows them to more accurately assess the likelihood of future health problems, which most individuals underestimate, particularly intrinsic or self-imposed risks (e.g., cigarette smoking) as opposed to extrinsic threats (e.g., environmental health hazards) (Skinner et al., 1998).

HRA also need to provide feedback on behavior change priorities established across the following five dimensions: self-efficacy, quality-adjusted life years (QALY), epidemiologic risk, readiness to make behavioral changes, and gateways to behavioral change (Bodenheimer, Lorig, Holman, & Grumbach, 2002). Self-efficacy refers to the extent to which one feels confident that he or she can successfully modify a behavior or habit. Researchers have shown that self-efficacy is associated with a person's motivation in making lifestyle or behavior changes and his or her ability to manage disease states (Bodenheimer et al., 2002).

Questionnaires that address health are termed patient-reported outcome measures and in clinical disciplines they are commonly used to evaluate change in a patient's health status over time. However, self-reported health measures are a better terminology in terms of health promotion where the person of interest is not viewed as a "patient" (Bayliss et al., 2005). These measures can be an efficient and personally centred method of data collection on the impact surrounding health problems on symptoms, function, health related quality of life (HRQOL), and health service's needs or barriers optimizing any of these (Bayliss et al., 2005).

There have been doubts about the validity of using self-reports in assessing the relative quality of life for one's health and is directly contingent on social experience (Bayliss et al., 2005). Accurate and reliable data are essential in demonstrating an uncertainty on whether the application of the information collected and provided are communicated effectively to clients and health care providers or identifying a gap in distribution. Optimal coverage can help program planners design effective and targeted health-promotion strategies in supporting a practice of education focused on addressing common risk and protection factors for those moving towards retirement (Bayliss et al., 2005).

Life course perspectives of development and mental health suggest that progression within streams of development, such as retirement, may affect individuals differently depending on the timing of the transitions and, in turn limiting quality of life. Difficulties performing activities of daily living tend to increase in later life (Himes & Shannon, 2000). Loss of these abilities can be psychologically distressing by posing a threat to one's ability to participate in social roles and to live safely and independently (Bierman & Statland, 2010).

Limitations to activities of daily living constitute an important life course transition for older adults preparing for retirement as it requires a fundamental reorientation to daily functioning and a rethinking of their place and participation in the social world, both professional and leisure, as well as, changes in how individuals see themselves (Brown & Warner, 2008). The current literature indicates that musculoskeletal disorders and other chronic diseases are highly prevalent and become more common in older workers causing

substantial disability (Abasolo et al., 2012; Schofield, Shrestha, Passey, Earnest, & Fletcher, 2008). The healthcare needs of those living with chronic diseases are higher than their healthy counterparts. The impact of these health conditions can impair work capacity and affect the ability to maintain work status with aging and/or worsening health conditions.

The impact of chronic diseases during the transition to retirement is an important issue since it can affect the process and outcome. Individuals with a chronic disease may be more at risk of adverse outcomes particularly if their health supports and resources are lost during the transition into retirement. Therefore research focusing on this transition process is critical for future health promotion efforts in enhancing this stage of life.

Chronic Diseases

The definition of chronic disease is not entirely straightforward. The World Health Organization defines chronic diseases as of long duration and generally slow progression. The four main types are cardiovascular diseases (like heart attacks and stroke), cancers, chronic respiratory diseases (such as chronic obstructed pulmonary disease and asthma) and diabetes (2014). A complex collection of social, economic, and behavioral factors are behind the rise in chronic diseases including the aging demographic, the decline in physical activity, and changes in diet. These factors contribute to adverse trends in health and are carried into retirement with the need for health supports during and after transition (Haydon et al., 2006). For all of these reasons, change needs to happen. Advocating and educating with personalized prevention planning can improve health outcomes for individuals living with chronic diseases.

Globally, chronic disease is the most significant cause of premature death under age 60 and has a profound economic impact on the functioning of healthcare systems and in people's day-to-day lives (Muggah, Graves, Bennett, & Manuel, 2012). When poorly managed, they have a harmful impact on quality of life and have led to reduced productivity of those living with the conditions and their caregivers. Many people with chronic diseases experience varying socio-economic factors and disabilities that make it harder to get assistance (Wagner, 2001). It is a significant and increasing burden on the

health of Canadians. Chronic disease rates are increasing faster among Canadians aged 35-64 years than Canadians aged 65 years and over. An estimated 16 million Canadians—roughly half the population—live with a chronic diseases (Health Canada, 2005). The role of health status as a predictor of retirement has long been studied with findings that health-related work limitations are highly predictive of early retirement and self-rated health has been cited as a significant predictor of early retirement (Okunribido & Wynn, 2010; Rice et al., 2011).

Chronic Disease
Musculoskeletal Disorders (MSKD)

Chronic diseases that include musculoskeletal disorders (MSKD) have become commonplace in people over 50 years of age and approaching retirement and consideration of the question of chronic diseases in terms of the goals for people's care is paramount as these conditions are with people for the remainder of their lives. The goals of chronic care are generally not to cure, but to enhance quality of life and to understand the aspects of physical, cognitive, and social functionality with prevention of secondary conditions in order to minimize distressing symptoms (Boyd & Fortin, 2010; Wagner, 2001).

MSKD are prevalent and their impact is all-encompassing. They are the most common cause of severe long-term pain and physical disability, and affect hundreds of millions of people around the world (Salaffi, De Angelis, et al., 2005). They are a widespread problem and account for the second largest economic burden for health conditions in Canada (National Advisory Council on Aging, 2005; Public Health Agency of Canada, 2010). It is a highly prevalent condition associated with poor health and high psychological distress and is disproportionately high among women and individuals from lower socioeconomic backgrounds (Public Health Agency of Canada, 2010). The prevalence of MSKD is predicted to increase along side the aging population, therefore, careful consideration of causal factors and barriers treatment and prevention of arthritis are required.

Chronic MSKD have a large impact on pain with health outcomes (physical activity, activity limitations, poor/fair self-rated health, and poor/ fair self-rated mental health) and with health care use (visits to primary care physicians, specialists, physiotherapists, and chiropractors, and inpatient stays). Degenerative and inflammatory arthritis affects multiple joints and the most common musculoskeletal conditions occur in upper extremity (UED) regions of the shoulder with rotator cuff tendinitis, tear, sub-acromial bursitis, bicipital tendinitis, adhesive capsulitis, and osteoarthritis; the elbow with olecranon bursitis, lateral epicondylitis, medial epicondyltis, and ulnar neuropathy; and the hand and wrist with rheumatoid arthritis, carpal tunnel syndrome, and dupuytren's contracture (Karnath, 2003). They are the cause of approximately 40% of all chronic conditions, 54% of all long-term disability, and 24% of all restricted activity days (Woolf & Pfleger, 2003).

In surveys carried out in Canada, the USA, and Western Europe, the prevalence of physical disabilities caused by musculoskeletal disorders has been estimated at 4–5% of the adult population (Woolf & Pfleger, 2003). The prevalence of MSKD increases indefinitely with age as the condition is not reversible and although perceived as a disease of the elderly, nearly 3 in 5 people (58%) were younger than 65 years of age years (Public Health Agency of Canada, 2010). The proportion of total number of Canadians with MSKD indicates that 44% are 45-64 years of age ~ with women affected more frequently among those aged 55 plus years (Public Health Agency of Canada, 2010). This number is predicted to increase with the aging baby boomer population, from 11 million in 2007 to 15 million by 2031 (Government of Ontario, 2007; Public Health Agency of Canada, 2004).

Previous studies have established the significant impact that MSKD plays on activity limitations, reporting of fair to poor self-rated overall physical and mental health, and the increased health services used (Busija, Hollingsworth, Buchbinder, & Osborne, 2007). Quality of life is an important indicator of the burden of musculoskeletal disorders as the physical domain is predominantly affected, but mental and social functions are vital to an overall sense of well-being. To describe the burden of musculoskeletal disorders now and in the future is vital and a central goal of researchers is to increase the awareness of

the impact of these conditions on the individual, the health care system, and society (Salaffi, Carotti, & Grassi, 2005).

Chronic Disease
Upper Extremity Musculoskeletal Disorders (UED)

The burden of musculoskeletal disorders, particularly with the upper extremity, can be measured in terms of the problems associated with the pain and impaired functioning (disability). This can encompass a spectrum of conditions, from those of acute onset and short duration to lifelong disorders (Woolf & Pfleger, 2003). Over 40% of Canadian adults reported that they had at least one of seven common chronic diseases inclusive of osteoarthritis, rheumatoid arthritis, and osteoporosis (Canadian Institute for Health Information, 2009).

Upper extremity musculoskeletal disorders (UED) are generally used as a generic term to cover specific diagnoses and non-specific complaints of the upper limb extremity (shoulder, elbow, wrist, and hand) (Coggon, Martyn, Palmer, & Evanoff, 2005; Coggon, Palmer, & Walker-Bone, 2000) with a prevalence that increases markedly with age and lifestyle factors (Woolf, 2003; Woolf, Erwin, & March, 2012). Since the upper extremity is fundamental to the completion of many activities of daily living, musculoskeletal disorders that might affect this functioning are of particular concern in a healthy transition into retirement.

UED cause more pain and functional limitations in the adult population than any other group of disorders and have been associated with increasing disability and poorer overall physical and mental health (Woolf et al., 2012). As most tasks of daily life require upper extremity use, maintaining independent living over time requires use of the upper limb. Based on the International Classification of Functioning, Disability and Health (ICF), limitations experienced can be classified into five daily life domains: mobility; transportation; self-care; domestic life; participation in the labour force; and community, social, and civic life (Public Health Agency of Canada, 2010).

Functional limitation constitutes a restriction or lack of ability to perform an action or activity such as lifting and carrying whereas disability is the inability or limitations in performing socially defined activities and roles such as shopping for groceries (Simonsick et al., 2001). For example a person with limited lower extremity function can use mobility aids that range from canes to powered wheelchairs but still require upper limb use for dressing, feeding, and access to space and objects within their home and externally (Simonsick et al., 2001). Leisure and social activities, close relationships, community mobility, employment and heavy housework are the most frequently mentioned roles affected by the UED (Simonsick et al., 2001). Health promotion initiatives are considered an important component of the treatment of musculoskeletal disorders with the aims of reducing pain, improving joint stability, functional ability, and quality of life (Goetzel et al., 2011).

Chronic Diseases
Economic Costs

Although poor health is a contributor to early work exit, relatively little attention has been paid to defining the potentially preventable or treatable symptoms of health-related conditions involved in early work exit at the national population level (Schofield et al., 2008). Work exit and retirement decision-making are influenced by a wide range of factors besides individual health as individual finance—in particular, pension wealth—is an important factor in early retirement. Many studies have linked individual work factors such as personal attitudes to retirement, job satisfaction, poor working conditions, and job demands with early work exit and retirement planning (Abasolo et al., 2012). The dynamics within families are important, such that a partners' financial and pension wealth, along with their own future retirement decisions, can significantly influence individuals' decisions (Latif, 2012).

Different chronic diseases have varying individual and social impacts. The high economic burden of chronic diseases, and in particular musculoskeletal disorders, is related both to the high prevalence and their impact on health requirements and the loss of work productivity. The true cost of each chronic disease – taking into account both

direct and indirect costs to the community will assist in determining allocation of health and social support funds.

The Ontario government is projecting an annual fiscal deficit of $16 billion in 2011–12, and it expects to remain in a fiscal deficit for a number of years to come. Health care spending currently consumes 44 cents of every dollar in provincial revenue and is therefore considered to be a fundamental aspect of the current and future economic restraint (The Conference Board of Canada, 2012). When presented, the 2012-13 fiscal budget, the provincial government called for the expected annual growth in public health care spending to slow down sharply. The Conference Board of Canada's (CBoC) report "Challenging Times Ahead" indicated that achieving such a different growth path for health care spending will be extremely challenging, given the increasing demand for health care from the province's aging population and the internal cost-drivers of the health care system (The Conference Board of Canada, 2012).

Socio-economic status is often a major factor influencing the accessibility of health, heart, and home. Statistics Canada reports 6.8% of all seniors are living below the after-tax Low Income Cut Off (LICO), Canada's unofficial poverty line, while over 17% of unattached seniors currently live below the LICO (National Advisory Council on Aging, 2005). The LICO is an income threshold below which a family will devote 20% more of its income to the necessities of food, shelter, and clothing than the average Canadian family living in a similar-sized community (National Advisory Council on Aging, 2005). The rate of poverty among some groups of Canadian seniors is alarming as income and social status have been identified and significant social determinants of health across all populations (Public Health Agency of Canada, 2004).

When the 2008 economic crisis hit it was with full force throughout Ontario and a significant loss of manufacturing jobs and the long-term social effects were devastating. Where Ontario's manufacturing has been the principal industry, musculoskeletal disorders have also represented a significant portion of worker's compensation claims with an ever-increasing share of the total health care spending (Mehra, 2012). Many are

experiencing an insecure future with joblessness, use of current savings and, in particular, retirement savings, high debt, and a delay in retirement (Mehra, 2012).

The Ontario Federation of Labour (OFL) in their August 29, 2012 "Falling Behind: A Report of the Ontario Common Front" report pulled together national research demonstrating that Ontario is at the lowermost level when it comes to equality of social programs and that a growing number of Ontarians are falling behind in the economy as poverty rates have experienced the second highest increase and intensity (Mehra, 2012). Ontario funds all of its social programs – including health care and education but Ontarians pay the highest school fees, out-of-pocket health care fees, and tuition fees in the country (Mehra, 2012).

Epidemiological risk encompasses the probability of morbidity and mortality risk measures via human body characteristics, behaviors, demographic information, and family history. Readiness to change evaluates the individual's willingness to commit to certain actions aimed at improving health within a given time span (Bodenheimer et al., 2002). Ultimately, a gateway to behavior change refers to the likelihood that committing to a certain behavior change will "open the gate" to trying out other behaviors that can improve health (Bodenheimer et al., 2002).

Research Questions

To better understand a healthy transition into retirement for people with chronic diseases, this Master's thesis will focus on research questions that will inform on the present state of the literature and the factors that may contribute to physical and mental health during peri-retirement. Given the context of future health promotion, the focus will be on the impact of comorbidity and associated socio-demographic factors will have on the physical, mental, social, and financial health status in people with upper extremity musculoskeletal disorders in the age range where they are transitioning towards retirement (50 – 65).

Specific research questions include:

1. What is the current state of the literature addressing the transition into retirement for people living with chronic health diseases
    a. This question was addressed by conducting a scoping review that constitutes the first manuscript and second chapter of this thesis.
2. What are the associations and pathways by which demographic factors, upper extremity pain and function impact on physical and mental health status during the peri-retirement period?
    a. This question was addressed by conducting a secondary analysis from cohort data collected on patients with upper extremity musculoskeletal disorders. A pathway analysis approach was used to define demographic (age, gender), occupational status, pain and upper extremity function, and affected physical and mental health status (SF-36) of individuals aged 50 to 65 years old. This study constitutes the second manuscript and third chapter of this thesis.

Given the impact of musculoskeletal disorders and the rising level of chronic diseases in Canada, there is a need to systematically begin answering important practical issues in supporting people with multi-morbidity disorders and moving towards retirement. Understanding the interrelationships between individuals and their environments will add a new level of complexity to the ideal retirement. Approaches that examine physical, emotional, and social aspects of health and well-being along with the economic and collective aspects of community and living environments can result in alleviating barriers and enhancing supports that are needed to promote positive quality of life in retirement (Golden and Earp 2012).

Reference List

Abasolo, L., Lajas, C., Leon, L., Carmona, L., Macarron, P., Candelas, G., . . . Jover, J. A. (2012). Prognostic factors for long-term work disability due to musculoskeletal disorders. *Rheumatol Int, 32*(12), 3831-3839. doi: 10.1007/s00296-011-2264-5

Bayliss, A., Ellis, Jennifer, & Steiner, John F. (2005). Subjective assessments of comorbidity correlate with quality of life health outcomes: Initial validation of a comorbidity assessment instrument. *Health and Quality of Life Outcomes, 3*(51).

Bierman, A., & Statland, D. (2010). Timing, social support, and the effects of physical limitations on psychological distress in late life. *J Gerontol B Psychol Sci Soc Sci, 65*(5), 631-639. doi: 10.1093/geronb/gbp128

Bodenheimer, T., Lorig, K., Holman, H., & Grumbach, K. (2002). Patient self management of chronic disease in primary care. *JAMA, 288*(19), 2469-2475.

Boyd, C. M. , & Fortin, M. (2010). Future of multimorbidity research: How should understanding of multimorbidity inform health system design. *Public Health Review, 32(2):451–474*.

Bozo, O., & Guarnaccia, C. A. (2010). Activities of daily living, social support, and future healthof older Americans. *J Psychol, 144*(1), 1-14.

Brown, T. H., & Warner, D. F. (2008). Divergent pathways? Racial/ethnic differences in older women's labor force withdrawal. *J Gerontol B Psychol Sci Soc Sci, 63*(3), S122 134.

Busija, L., Hollingsworth, B., Buchbinder, R., & Osborne, R. H. (2007). Role of age, sex, and obesity in the higher prevalence of arthritis among lower socioeconomic groups a population-based survey. *Arthritis Rheum, 57*(4), 553-561. doi: 10.1002/art.22686

Canadian Institute for Health Information. (2009). *Health Care in Canada 2009: A Decade in Review*. Ottawa, ON.

Carriere, Y., & Galarneau, D. (2011). Delayed retirement: A new trend? Perspectives on Labour and Income. *Statistics Canada, Component of Statistics Canada Catalogue no. 75-001-X*.

Coggon, D., Martyn, C., Palmer, K. T., & Evanoff, B. (2005). Assessing case definitions in the absence of a diagnostic gold standard. *International Journal of Epidemiology,\ 34*(4), 949952. doi: 10.1093/ije/dyi012

Coggon, D., Palmer, K. T., & Walker-Bone, K. (2000). Occupation and upper limb disorders. *Rheumatology (Oxford), 39*(10), 1057-1059.

Franchignoni, F., & Salaffi, F. (2004). Generic and specific measures for outcome assessment in orthopaedic and rheumatologic rehabilitation. *Assessment in Physical Medicine and Rehabilitation - Advances in Rehabilitation, 16:*, 45-77.

Galarneau, D. , & Carrière, Y. . (2011). Delayed retirement: A new trend? Perspectives on Labour and Income. *Statistics Canada, 23*(4).

Goetzel, R., Staley, P., Ogden, L., Stange, P., Fox, J., Spangler, J.B., . . . Taylor, M. (2011). A framework for patient-centered health risk assessments – providing health promotion and disease prevention services to Medicare beneficiaries. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention.

Goldman, D., & Smith, J. P. (2011). The increasing value of education to health. *Soc Sci Med, 72*(10), 1728-1737. doi: 10.1016/j.socscimed.2011.02.047

Government of Ontario. (2007). *Preventing and Managing Chronic Diseases: Ontario's Framework*.

Haydon, E, Roerecke, M, Giesbrecht, N, Rehm, J, & Kobus-Matthews, M. (2006). Chronic disease in Ontario and Canada: determinant, risk factors, and prevention priorities. *Ontario Public Health Association*.

Health Canada. (2005). *The Integrated Pan-Canadian Healthy Living Strategy*.

Himes, S. R., & Shannon, M. F. (2000). Assays for transcriptional activity based on the luciferase reporter gene. *Methods Mol Biol, 130*, 165-174.

Karnath, Bernard. (2003). Common Musculoskeletal Problems of the Upper Extremity. *Hospital Physician Journal,* http://www.turner-white.com.

Keehan, C. (2011). A foundation to build on. Though changes are likely, health reform law fills a niche, fulfills promises. *Mod Healthc, Suppl*, 50.

Koh, H. K., & Sebelius, K. G. (2010). Promoting prevention through the Affordable Care Act. *N Engl J Med, 363*(14), 1296-1299. doi: 10.1056/NEJMp1008560

Latif, E. (2012). The impact of retirement on health in Canada. *Can Public Policy, 38*(1), 15-29.

Mehra, N. (2012). Falling Behind: A report of the Ontario common front. Toronto, Ontario, Canada: Ontario Common Front.

Moussavi, S., Chatterji, S., Verdes, E., Tandon, A., Patel, V., & Ustun, B. (2007). Depression, chronic diseases, and decrements in health: results from the World Health Surveys. *Lancet, 370*(9590), 851-858. doi: 10.1016/S0140-6736(07)61415-9

Muggah, E., Graves, E., Bennett, C., & Manuel, D. G. (2012). The impact of multiple chronic diseases on ambulatory care use; a population based study in Ontario, Canada. *BMC Health Serv Res, 12*, 452. doi: 10.1186/1472-6963-12-452

National Advisory Council on Aging. (2003). Interim report card: Seniors in Canada Ottawa, Ontario, Canada: Minister of Government Works and Government Services Canada.

National Advisory Council on Aging. (2005). Seniors on the margins: Aging in poverty in Canada. . Ottawa, Ontario, Canada: Minister of Public Works and Government Service Canada.

National Institute on Aging, National Institutes of Health, US Department of Health & Human Resources. (2011). Global Health and Aging: World Health Organization (WHO).

National Institute on Aging, National Institutes of Health, US Department of Health & Human Resources. (2012). The Health & Retirement Study. http://hrsonline.isr.umich.edu/.

Okunribido, O., & Wynn, T. (2010). Aging and work-related musculoskeletal disorders: A review of the recent literature. In H. S. Executive (Ed.). Norwich, UK: Health and Safety Laboratory.

Public Health Agency of Canada. (2004). What determines Health? Ottawa, Ontario,\ Canada: Government of Canada. http://www.phac-aspc.gc.ca/ph sp/determinants/index-eng.php.

Public Health Agency of Canada. (2010). *Life With Arthritis in Canada: A personal and public health challenge. Canadian Community Health Survey; 2007-2008*. Ottawa, Ontario, Canada.

Rice, N. E., Lang, I. A., Henley, W., & Melzer, D. (2011). Common health predictors of

early retirement: findings from the English Longitudinal Study of Aging. *Age Aging, 40*(1), 5461. doi: 10.1093/aging/afq153

Salaffi, F., Carotti, M., & Grassi, W. (2005). Health-related quality of life in patients with hip or knee osteoarthritis: comparison of generic and disease-specific instruments. *Clin Rheumatol, 24*(1), 29-37. doi: 10.1007/s10067-004-0965-9

Salaffi, F., De Angelis, R., Stancati, A., Grassi, W., Pain, M. Arche, & Prevalence, Investigation Group study. (2005). Health-related quality of life in multiple musculoskeletal conditions: a cross-sectional population based epidemiological study. II. The MAPPING study. *Clin Exp Rheumatol, 23*(6), 829-839.

Schofield, D. J., Shrestha, R. N., Passey, M. E., Earnest, A., & Fletcher, S. L. (2008). Chronic disease and labour force participation among older Australians. *Med J Aust, 189*(8), 447-450.

Simonsick, E. M., Montgomery, P. S., Newman, A. B., Bauer, D. C., & Harris, T. (2001). Measuring fitness in healthy older adults: the Health ABC Long Distance Corridor Walk. *Journal of the American Geriatrics Society, 49*(11), 1544-1548.

Skinner, C. S., Kreuter, M. W., Kobrin, S., & Strecher, V. J. (1998). Perceived and actual breast cancer risk: optimistic and pessimistic biases. *J Health Psychol, 3*(2), 181-193. doi:10.1177/135910539800300203

Statistics Canada. (2012). The Canadian Population in 2011: Age and Sex, 2011 Census (Vol. Catalogue no.98-311-X2011001). Ottawa, Ontario, Canada.

Subramanian, S. V., Huijts, T., & Avendano, M. (2010). Self-reported health assessments in the 2002 World Health Survey: how do they correlate with education? *Bull World Health Organ, 88*(2), 131-138. doi: 10.2471/BLT.09.067058

Tay, L., Tan, K., Diener, E., & Gonzalez, E. (2013). Social relations, health behaviors, and health outcomes: a survey and synthesis. *Appl Psychol Health Well Being, 5*(1), 28-78. doi: 10.1111/aphw.12000

The Conference Board of Canada. (2012). Ontario's Economic and Fiscal Prospects: Challenging Times Ahead. Ontario, Canada. February; http://www.e-library.ca.

Torrance, N., Smith, B. H., Lee, A. J., Aucott, L., Cardy, A., & Bennett, M. I. (2009). Analysing the SF-36 in population-based research. A comparison of methods of statistical approaches using chronic pain as an example. *J Eval Clin Pract, 15*(2), 328-334. doi: 10.1111/j.13652753.2008.01006.x

Wagner, E. H. (2001). Meeting the needs of chronically ill people. *BMJ, 323*(7319), 945 946.

WHO. (1986). *The Ottawa Charter for Health Promotion.* http://www.who.int/healthpromotion/conferences/previous/ottawa/en/index.html.

WHO. (2005). Preparing a health care workforce for the 21st century: the challenge of chronic conditions. France: Noncommunicable Diseases and Mental Health Cluster Chronic Diseases and Health Promotion Department.

Woolf, A. D. (2003). The bone and joint decade. strategies to reduce the burden of disease: the Bone and Joint Monitor Project. *J Rheumatol Suppl, 67*, 6-9.

Woolf, A. D., Erwin, J., & March, L. (2012). The need to address the burden of musculoskeletal conditions. *Best Pract Res Clin Rheumatol, 26*(2), 183-224. doi: 10.1016/j.berh.2012.03.005

Woolf, A. D., & Pfleger, B. (2003). Burden of major musculoskeletal conditions. *Bull World Health Organ, 81*(9), 646-656.

Chapter 2

A Scoping Review: Transitioning into Retirement With Chronic Health Diseases

Introduction

In 2012, one in two Canadians were at least 40 years of age and over (Public Works Government Services Canada, 2005). The transitional stages into retirement of those with chronic diseases often present a diversity of additional challenges and people look at the measurement of their anticipated quality of life as a meaningful way of determining this successful adjustment. Canada is rapidly moving towards a more elderly profile and retirement, those 65 years and older, are becoming the fastest-growing age demographic (Public Works Government Services Canada, 2005; Statistics Canada, 2011). Census data (2011) has indicated that the working-age population (those aged 15 to 64) represents 68.5% of the Canadian population (Statistics Canada, 2011) and among this cohort, 42.4% are in the age group, 50 to 65, with a future of high proportional growth (Statistics Canada, 2011).

Existing research indicates that co/multi morbidity is become the new normal with an estimated 16 million Canadians—roughly half the population—living with some type of chronic disease (Health Canada, 2005). This suggests that measuring the health impact of a single disease is inadequate as the nature of the disease and the variable impact on an individual's health outcome is complex (Kelley-Moore & Ferraro, 2005; Kelley-Moore, Schumacher, Kahana, & Kahana, 2006; van Weel & Hartman, 28 Jul 2009). Over 40% of Canadian adults reported that they had at least one of seven common chronic diseases—cancer, musculoskeletal, diabetes, heart disease, high blood pressure, emphysema or chronic obstructive pulmonary disease, and mood disorders, not including depression (Public Health Agency of Canada, 2010; Statistics Canada, 2008). Musculoskeletal disorders (MSKD) are among the most frequent causes of disability and can influence changes in employment status during the peri-retirement period, suggesting differences between forced and unforced retirement (Leclerc, Pascal, Chastang, &

Descatha, 2013; Mäntyniemi et al., 2012; Public Health Agency of Canada, 2010). In a 2008 Ontario Health Survey (Statistics Canada, 2008), MSKD were the cause of 40% of all chronic diseases, 54% of all long-term disability, and 24% of all restricted activity days. Employment status, community mobility, leisure activities, social activities, and close relationships are the most frequently mentioned roles affected by these disorders (Fredman et al., 2008).

The prevalence of MSKD with an aging demographic has been called a "Silver Tsunami" ("Preparing for the Silver Tsunami," 2006). The potential of a proportionately large retired population to be supported by a relatively small working population is a serious concern. This concern is heightened when considering the increasing burden of multiple health conditions (Muggah et al., 2012) and the impact of gender changes in the workforce over the past decades. Research models are starting to illustrate and measure the impact of diverse physical and socio-environmental factors and how this differs between females and males in the rates of decline in health and quality of life outcomes (Golden & Earp, 2012). With gender as an important factor in shaping the experience of aging, it is commonly recognized that, on average, women will live longer and on their own compared to men and will experience greater levels of chronic disease (Hayden, Roerecke, Giesbrecht, Rehm, & Kobus-Matthews, 2006; Kelley-Moore & Ferraro, 2005; Kelley-Moore et al., 2006).

Multi-purpose socio-ecological models are growing in recognition as they take a comprehensive approach in the understanding of the interrelationships between the individual and their environment (Golden & Earp, 2012; Maller, Townsend, Pryor, Brown, & St Leger, 2006). These approaches can be effective as they have the potential of producing healthy behaviours and suggest that a combination of efforts on various levels are needed to address the physical, emotional, and social aspects of health and well-being along with the economic and collective aspects of community and living environments, all of which can influence a given person's aging health outcome (Maller et al., 2006). These differences will affect both sexes at middle age to young senior, aged 50-65, in ways of adapting to chronic health issues, social roles, employment status, and retirement (Golden & Earp, 2012). In a very important sense, this transitional stage will

add a new level of complexity to the ideal retirement resulting in different approaches in alleviating barriers and enhancing supports that are needed to promote positive quality of life and health outcomes.

There appears to be few research studies that synthesize measures of co/multi morbidity, physical functionality, mental and psychological well-being, social and financial health in reference to the aging population (50-65) and moving from peri to post retirement. Moreover, this scoping review will determine if there are gaps in the literature that might support a systematic review leading to a greater focus on the complexity of this issue. Therefore, the purpose of this scoping study will be to chart published evidence specific to the understanding of the transition into retirement while living with co/multi morbidity and whether the impact of these stages factor differently for females and males, aged 50 – 65.

Methods

A scoping review of the literature was chosen, as this approach is ideal for an interpretation of a complex transition that not only incorporates the path dynamics of retirement but also in living with co/multi morbidity and, in turn, to support the refinement of subsequent research inquiries. This review followed the framework set out by Arksey and O'Malley (2005), from the Centre for Reviews and Dissemination at the University of York, that recommends defining the research question, identifying relevant studies, selecting studies, charting the data, and then collating and summarizing the results (Levac, Colquhoun, & O'Brien, 2010).

Refining The Research Question

What is the nature and extent of the published literature addressing the stages of transition through peri to post retirement that have a tangible influence on the quality of life for those living with chronic diseases? Further, to what extent are gender issues and the transition age (50-65) specifically addressed in the current research?

The rationale behind this broad question was to determine whether research adequately addressed multiple domains of transition into retirement. If so, did it specifically address

co/multi morbidity that exists concurrently with other chronic health diseases such as MSKD for those preparing their exit from the labour force. How do people feel about their own health may be a good indicator in measuring the burden of disease and its effect. Presently, among the most common measures used to assess health status and quality of life outcomes are self-report surveys such as the Medical Outcomes Study 36 (SF-36). This self-report survey has defined key domains of health, which cross multiple aspects of physical functioning, emotional, and social health and well-being (Lix et al., 2012). Based on a preliminary review of the literature, although extensive, the existing literature on adults who experience co/multi morbidity is heterogeneous in nature, therefore expanding on the aspects of the SF36, this scoping review will focus on the following health domains:

- Physical health – chronic co/multi-morbidity and musculoskeletal (e.g., physical health symptoms/impairments, physical functioning, physical well-being, quality of life);
- Mental health, psychological well-being, lifestyle risk-factors (e.g., depression, anxiety, psychological well-being, substance use, adjustment to aging, coping, life-stressor burden, mental self-care, mental well-being, resilience, stress);
- Social health (e.g., social networks, social supports);
- Financial health (e.g., debt burden, retirement investment and planning).

Search Strategy

The framework set out by Arksey and O'Malley (2005) recommends searching several literature sources, including electronic databases, reference lists of relevant literature, hand-searching key journals, and existing networks, relevant organizations, and conferences (Levac et al., 2010). For this scoping review, it was approached in multiple steps, first developing a broad list of terms in order to locate articles relevant to the primary research question surrounding the transitional stages of retirement for those living with chronic diseases.

This was followed with a list of terms related to the subsequent research question with a focus on possible differences found by gender and age (50-65) ultimately leading to a

combined list of keywords that could be used to search the literature. These key words related to health status, co/multi morbidity, chronic disease and musculoskeletal disorders, gender (female and/or male), age (50-65), middle-aged, young senior, education level, occupational and employment status, retirement pension and debt burden, transitional stages of retirement, and quality of life outcomes. Also, incorporated were the domains of physical health (co/multi morbidity and musculoskeletal), mental and social health, and financial health. The next step was to identify key databases to access pertinent research taking multiple steps to ensure a board expanse of the literature was investigated. After carrying out searches on varying databases with the use of key words and finding of a large number of multiple articles, the researcher consulted with an academic librarian and a checklist of key sources was developed that were believed to contain relevant academic literature. These included PubMed, Social Science Abstracts, Social Service Abstracts, and Web of Science. Once material was selected from these sources, further search of grey literature using conference papers index @ Scholars Portal, Health Canada Online, Public Health Agency of Canada, relevant governmental websites, and reference lists of key studies, a selective search was carried out.

Study Selection

The first search, based on the keywords, was used to develop a preliminary pool of papers and, in turn, reduced by filtering for English language and limited by date of publication (2000 to 2013). With the use of the inclusion/exclusion criteria, these abstracts were further screened to ensure articles contained approaches towards the paradigms of co/multi morbidity, musculoskeletal disorders, mental health, psychological well-being, and lifestyle risk factors, along with social health, and financial health while controlling for age (50-65) and gender (female and/or male).

Charting

According to the methodology of scoping reviews (Levac et al., 2010), the charting process was multi-staged, involving extraction of information from individual articles. Collected information were descriptive characteristics such as general citation information, article title and authors, date of publication, country of origin, study design

and focus, and health domains in order to create a detailed spreadsheet database (*Table 1*). Due to the broad scope of the literature a narrative synthesis was organized based on the health domains specified in the research problem. Creation of these a priori sub-categories provided a structure to the findings and a clearer way of describing the literature.

Results ~ Overview

A total of 75,335 articles were initially identified as potentially relevant from the search of the peer-reviewed and grey literature electronic databases. Using the abstract screening tool of language and date of publication, 5,234 were read in more detail. Further screening, controlling for age and gender, found 3,256 articles and after reading in detail, 111 were found to address the complexity of health, social, and financial factors that have a perceivable influence on women and men, aged 50 to 65, and living with chronic diseases. Each of the selected articles were then categorized and identified through the charting process and related to the health domains: physical health – chronic co/multi morbidity and musculoskeletal, mental health, psychological well-being, lifestyle risk-factors, social health, and financial health (*Figure 1*).

Table 1. Characteristics of Studies (n = 111)
Divided into health domains and sorted by major topic areas

Author(s) and years	Objectives	Countries	Study Type	Study focus (i.e. age, gender)	Health Domains
Chronic diseases (multi/co morbidity) (29)					
In sickness and in work					
Black, C. and D. Frost (2012)	To review the loss of work resulting from ill health and to find ways of reducing the burdens and costs	United Kingdom	Retrospective	Gender, age	Sickness absence, incentives, balance of costs
Patient self-management of chronic disease in primary care					
Bodenheimer, T., K. Lorig, H. Holman, and K. Grumbach (2002)	To continue discussion of chronic illness management initiated in the article "Improving Primary Care for Patients with Chronic Illness: The Chronic Care Model"	United States	Descriptive	Age	Chronic illness management, self-management
Future of multimorbidity research: How should understanding of multimorbidity inform health system design?					
Boyd, M. Cynthia, and M. Fortin (2010)	To review the implications of multi-morbidity for the design of health system and to understand the research needs for this population	Canada	Descriptive	Age	Multi-morbidity, aging, chronic conditions, healthcare system, and comorbidity
Divergent pathways? Racial/ethnic differences in older women's labor force withdrawal					

Brown, T. H. and D. F. Warner (2008)	The purpose of this study was to investigate how women's labor force withdrawal behavior varies across race/ethnicity and to identify life course factors that generate these differences	United States	Cross-sectional	Gender, race/ethnicity	Retirement, life course, work disability
The cost of chronic disease in Nova Scotia					
Colman, Ronald, K. Hayward, A. Monette, C. Dodds, and L. Landon (2002)	Compared to other Canadians, Nova Scotians have particularly high rates of chronic illness. This report indicates that high rates in chronic illness can be reduced through health promotion initiatives	Nova Scotia, Canada	Descriptive	Age, gender, education, occupation, etc.	Chronic disease, risk factors, health care costs, social determinants of chronic disease, impact of aging, physical activity
Caregiving, mortality, and mobility decline: the health, aging, and body composition (Health ABC) study					
Fredman, L. et al. (2008)	To evaluate total, and race- and gender-specific risk of mortality and functional decline in elderly caregivers versus non-caregivers, and whether these associations were mediated by total physical activity (including daily routine, leisure-time exercise, and caregiving activity)	U.S.A.	Retrospective case-control secondary	Age, gender	Health, mortality and functional decline in care-givers
Chronic diseases in elderly men: underreporting and underdiagnosis					
Frost, Morten, K. Wrae, C. Budex, T. Nielsen, K. Brixen, C. Hagen, M. Andersen (2012)	Prevalence estimates from chronic diseases and associated risk factors are needed for priority setting and disease prevention strategies	Denmark	Cross-sectional population-based Primary (Survey)	Gender, age	Physical activity, smoking and alcohol intake, and chronic diseases
Chronic disease in Ontario and Canada: determinants, risk factors, and prevention priorities					
Haydon, Emma, M. Roerecke, N. G. Jürgen Rehm, and M. Kobus-Matthews (2006)	The purpose of the report is multi-dimensional: a primary goal is to draw links between evidence, determinants, and risk factors of chronic disease in Canada, and consider options for health messages and action steps	Canada	Descriptive	Aging population inclusive of 40 years and over, gender	Epidemiology of selected chronic conditions; the socio behavioural risks and determinants of chronic disease
The integrated Pan-Canadian healthy living strategy					
Health Canada (2005)	Discussion on 10 core principles and associated strategic directions that might underpin such an approach in Canada under the themes of patient-centred care, planning and career life cycle	Canada	Descriptive	Gender, age	Patient-centred care, pan-Canadian planning, career lifecycle
The disabling effect of diseases: a study on trends in diseases, activity limitations, and their interrelationships					
Hoeymans, Nancy, A.Wong, C. Van Gool, D. J. H. Deeg, W. J. Musselder, M. M. Y. de Kierk, M.P. J. Van Boxtel, and H. S. J. Picavet (2012)	To investigate time trends in the disability impact of chronic diseases in the Netherlands	Netherlands	Retrospective longitudinal	Age (55-84)	Chronic diseases and activity limitations
59 important health problems: a selection of diseases for public health monitoring					
Hoeymans, Nancy, R. Gijsen,	To listing the top diseases is important for an overview of	Netherlands	Retrospective	Gender, age	Chronic illness

and L. C. Slobbe (2013)	population health				
A 3-D model of health decline: disease, disability, and depression among Black and White older adults					
Kelley-Moore, J. A. et al. (2005)	To examine the temporal ordering of general health decline and the pathways of influence across three health domains (disease, disability, and depression)	United States	Retrospective	Age (64-105), gender, race, marital status	Disease, disability, and depression among Black and White older adults
When do older adults become "disabled" Social and health antecedents of perceived disability in a panel study of the oldest old					
Kelly-Moore, J. A. et al. (2006)	To examine the social and health criteria that older adults use to subjectively rate their own disability status	United States	Retrospective longitudinal	Gender, age	Perceived disability, health status and social networks, anxiety
Can populations age better, not just live longer?					
Kinsella, Kevin, J. Beard, and R. Suzman (2013)	Study how many developing countries has seen the rise of chronic and degenerative diseases examining the changes in rates of disability, one measure of health and function	United States	Descriptive	Age	Chronic disorders
Perception or real illness? How chronic conditions contribute to gender inequalities in self-rated health					
Malmusi, D., L. Artacoz, J. Benach, and C. Borrell (2011)	To examine whether Spanish women report poorer general health and more daily activity limitations compared to men are due to a great prevalence of health problems and to identify the types of problems that contribute most to gender inequalities	Spain	Cross-sectional	Gender, age (16-44 years, 45-64, 65 >)	Self-rated chronic conditions representing respectively the younger active age, adults in active age but who experience increasing health limitations, and the legal inactive age in Spain
Multimorbidity in primary care: developing the research agenda					
Mercer, S. W. et al (2009)	To gather views from the academic primary care community on the research agenda in multi-morbidity	United Kingdom	Descriptive	Age	Multi-morbidity, chronic diseases
The impact of multiple chronic diseases on ambulatory care use; a population based study in Ontario, Canada					
Muggah, Elizabeth, E. Graves, C. Bennett, and D. G. Manuel (2012)	Sought to determine the patient and health system burden of multiple chronic diseases among adults in Ontario, Canada	Ontario, Canada	Population-based retrospective	Age (> 20)	Multiple chronic disease, primary health care, burden of care
Health behaviour change following chronic illness in middle and later life					
Newsom, Jason T., N. Huguet, M. J. McCarthy, P. Ramage-Morin,	Understanding lifestyle improvements among individuals with chronic illness is vital for targeting	United States	Prospective, Longitudinal	Age, education	Chronic disease, disease manage, health behavior, rehabilitation,

M. S. Kaplan, J. Bernier, B. H. McFarland, and J. Odekirk (2011)	interventions that can increase longevity and improve quality of life				and secondary prevention
Respective contribution of chronic conditions to disability in France: results from the national disability-health survey					
Palazzo, C., J. F. Ravaud, L. Trinquart, M. Dalichampt, P. Ravaud, S. Poiraudeau (2012)	Assessed the respective contribution of chronic health conditions to disability	France	Retrospective	Age (18-40, 40-65, > 65)	Chronic conditions (neurological, musculoskeletal, and cardiovascular)
Health correlates of overweight and obesity in adults aged 50 years and over: results from the Survey of Health, Aging and Retirement in Europe (SHARE)					
Peytremann-Bridevaux, Isabelle and B. Santos-Eggimann (2008)	To examine the association between overweight/obesity and several self-reported chronic diseases, symptoms, and disabilities	Switzerland	Retrospective	Age (> 50), gender, education, marital status, income	Health outcomes, obesity, overweight, chronic diseases, lifestyle risks
Physical disability in the Netherlands: prevalence, risk groups, and time trends					
Picavet, H. S. & N. Hoeymans (2002)	Reported is the prevalence of physical disabilities in the Netherlands for four domains of disability-visual, hearing, mobility and activities of daily living (ADL) disability-with a focus on risk groups and time trends	Netherlands	Cross-sectional	Age, education, gender, martial status	Disability visual, hearing, mobility, and activities of daily living
Health problems and retirement due to ill-health among Australian retirees aged 45-64 years					
Pit, Sabrina W., R. Shrestha, D. Schofield, and M. Passey (2010)	To examine which health problems are associated with retirement due to ill-health among Australian retirees aged 45-64 years	Australia	Cross-sectional	Age (45-64), gender	Retirement, middle aged, chronic disease
Changes in the prevalence of chronic disease and the association with disability in the older Dutch population between 1987 and 2001					
Puts, M. T., D. J. H. Deeg, N. Hoeymans, W. J. Nusselder, and F. G. Schellevis (2008)	Aims at comparing changes in the prevalence, as well as the association between chronic diseases and disability between 1987 and 2001 in the older Dutch population using data representative of the general population	Netherlands	Cross-sectional	Age (55-97), gender	Chronic diseases and disabilities
Chronic diseases related to aging and health promotion and disease prevision (Report on the Standing Committee on Health)					
Smith, Joy M. P. (2012)	Government report: chronic diseases related to aging and health promotion and disease prevention	Canada	Government report	Gender, age	Chronic diseases, health promotion, disease prevention
Which chronic conditions are associated with better or poorer quality of life?					
Sprangers, M. A.,	To compare the quality of life	Netherlands	Comparative	Age, gender	Chronic

E. B. deRegt, F. Andries, H. M. E. Van Agt, R. V. B. Josien B. de Boer, M. Foets, N. Hoeymans, A. E. Jacobs, G. I. J. M. Kempen, M. S. Miedema, M. A. R. Tijhuis, and Hanneke C. J. M. de Haes (2000)	of a wide range of chronic disease patients		analysis based on systematic literature review		disorders (.ie., cardiovascular, cancer, and respiratory diseases, and musculoskeletal conditions
Chronic diseases and functional limitations among older construction workers in the United States: a 10-year follow-up study					
Sue Dong, Xiuwen, X. Wang, C. Daw, and K. Ringen (2011)	To examine the health status of older construction workers in the United States and how occupation and the aging process affect health in workers' later years	United States	Retrospective longitudinal	Male, age (51-54; 55-64; 65+), occupation	Arthritis, back problems, chronic lung disease, functional limitations, work disability, and work-related injuries
Growing old with fibromyalgia: factors that predict physical function					
Torma, L. M., G. M. Houck, G.M. Wagnild, D. Messecar, and K. Dupree Jones (2013)	To identify predictors of physical function in older adults with fibromyalgia and to examine the influence of resilience on the relationship between fibromyalgia pain and physical function	United States	Cross-sectional primary (surveys)	Gender, race, age, marital status, income, education, social support	Fibromyalgia, emotion, and physical function
Effect of retirement on major chronic conditions and fatigue: French GAZEL occupational cohort study					
Westerlund, Hugo, J. Vahtera, JE. Ferrie, A. Singh-Manoux, J. Pentti, M. Melchior, C. Leineweber, M. Jokela, J. Siegrist, M. Goldberg, M. Zins, and M. Kivmäki (2010)	To determine, using longitudinal analyses, if retirement is followed by a change in the risk of incident chronic diseases, depressive symptoms, and fatigue	France	Retrospective longitudinal cohort	Gender, age (35-50)	Chronic diseases, depressive symptoms, and fatigue
The impact of chronic illness on workforce participation and the need for assistance with household tasks and personal care by older Australians					
Yen, Laurann, I. McRae, Yun-Hee Jeon, B. Essue, and Pushpani. 2011)	To examine the consequences of life with a chronic illness that relate to a person's capacity to maintain independent living in their home and community: workforce participation and the need for assistance with household tasks and personal care	Australia	Retrospective	Age (50-64; 65-74; 75+), gender, residence	Careers, chronic illness, older adults, workforce

Cormorbidities-musculoskeletal (29)					
Prognostic factors for long-term work disability due to musculoskeletal disorders					
Abásolo, Lydia, C. Lajas, L. León, L. Carmona, P. Macarrón, G. Candelas, M. Blanco, and J. A. Jover (2011)	To identify risk factors for permanent work disability related to musculoskeletal disorders	Spain	Retrospective	Gender, age, marital status, education, occupational status	Permanent work disability, musculoskeletal disorders, risk factors, diagnoses
Prevalence of musculoskeletal disorders among Iranian steel workers					
Aghilinejad, M. et al. (2012)	To determine the prevalence of musculoskeletal disorders and associated risk factors among Iranian steel workers	Iran	Cross-sectional	Gender (male), age 37.23±8.74	Musculoskeletal disorder, prevalence, steel worker, Nordic questionnaire, ergonomic program
Limitations of activities in patients with musculoskeletal disorders					
Banerjee, A., S. L. Jadhav, and J. S. Bhawalkar (2012)	To study the prevalence of musculoskeletal disorders and their impact on quality of life as ascertained by limitations of activities of daily living, impact on family and social relationships, and sleep disturbances	India	Cross-sectional	Age (30+), gender, location (urban/rural)	Activities, disorders, limitations, musculoskeletal
Self-management strategies in overweight and obese Canadians with arthritis					
Bernatsky, S., C. Rusu, S. O'Donnell, C. MacKay, G. Hawker, M. Canizares, & E. Badley (2012)	To estimate the prevalence of overweight and obese Canadians with arthritis and to describe their use of arthritis self-management strategies, as well as explore the factors associated with not engaging in any self-management strategies	Canada	Retrospective	Gender, age (50-70) years, education	Body mass index, arthritis
Health care in Canada 2009: A decade in review					
Canadian Institute for Health Information (2009)	Analysis of health care over the past 10 years	Canada	Retrospective	Gender, age, etc.	Health care
Comparison of health-related outcomes for arthritis, chronic joint symptoms, and sporadic joint symptoms: A population-based study					
Canizares, Mayilee and E.M. Badley (2012)	To examine predictors and health outcomes for individuals reporting arthritis, chronic joint symptoms (CJS), or sporadic joint symptoms (SJS) compared to those without arthritis or joint symptoms	Canada	Population-based retrospective	Age (15-44, 45-64, ≥ 65), female, ethnicity, income	Comorbidity, lifestyle factors, arthritis, chronic joint symptoms, sporadic joint symptoms
Do patients with elderly-onset rheumatoid arthritis have severe functional disability?					
Cho, Soo-Kyung et al. (2012)	To identify the clinical features of elderly onset	South Korea	Prospective	Age (< 40. 40-59. ≥ 60),	Rheumatoid arthritis,

	rheumatoid arthritis and their impact on disease outcome			female	functional disability, disease duration
Effect of arthritis in middle age on older-age functioning					
Covinsky, Kenneth E., K. Lindquist, D. D. Dunlop, T. M. Gill, and E. Yelin (2008)	To examine whether symptomatic arthritis in middle age predicts the earlier onset of functional difficulties (difficulty with activities of daily living and walking) that are associated with loss of independence in older person	United States	Prospective longitudinal	Age (50-61), gender, race, socio-economic status	Arthritis, activities of daily living, mobility, comorbid conditions, body mass index
Self-reported work ability and work performance in workers with chronic nonspecific musculoskeletal pain					
De Vries, Haitze J., Michiel F. Reneman, J. W. Groothoff, J. H. B. Geertzen, and S. Brouwer (2013)	To assess self-reported work ability and work performance of workers who stay at work despite chronic nonspecific musculoskeletal pain and to explore which variables were associated with these outcomes	Netherlands	Cross-sectional	Age, gender, marital status, education, employment	Work ability, work performance, chronic pain, musculoskeletal disorders, staying at work
Upper extremity function in stroke subjects: relationships between the international classification of functioning, disability, and health domains					
Faria-Fortini, Iza, S. M. Michaelsen, J. G. Cassiano, and L. F. Teixeira-Salmela (2011)	To evaluate the relationships between upper limb impairments related to body functions/structures, activity, and participation domains	Brazil	Prospective	Age, gender	Muscular weakness, pain, sensory loss, body functions/structures, activity, and participation
A population-based profile of adult Canadians living with participation and activity limitations					
Goodridge, Donna, J. Lawson, D. Marciniuk, and D. Rennie (2011)	To describe the self-reported main causes of limitations to participation and activity in a national sample	Canada	Cross-sectional	Age, gender, marital, employment, educ, income, residence, place of birth	Musculoskeletal, cardio/cerebrovascular, mental health, neural, endocrine, respiratory, activity and participation
Health-related quality of life, patient satisfaction, and physical activity 8-11 years after arthroscopic subacromial decompression					
Hultenheim Klintberg, Ingrid, J. Karlsson, and U. Svantesson (2011)	To report health-related quality of life, patient satisfaction with present shoulder function and physical activity	Sweden	Prospective	Age, gender	WOOS, EQ-5D, shoulder pain, constant score, physiotherapy, impingement
Relation between fractures and mortality: results from the Canadian multicentre osteoporosis study					
Ioannidis, George et al (2009)	To evaluate the relation between fractures and mortality	Canada	Observational cohort prospective	Age (50+), gender, education,	Fractures, health-related habits, quality of life, comorbidy(s)
Association between hypertension and musculoskeletal complaints: a population-based study					
Kerkhoff,	To investigate the association	Southern	Population-	Age (18-49;	Blood pressure,

Alessandra Cristina, L. B. Moreira, Flávio D. Fuchs, and S. Costa Fuchs (2012)	between hypertensions and musculoskeletal complaints among men and women	Brazil	based cross-sectional	50-64; 65-90), gender, educ	hypertension, musculoskeletal complaint, physical, body mass index
Factors that affect functional capacity in patients with musculoskeletal pain: a Delphi study among scientists, clinicians, and patients					
Lakke, Sandra E., H. Wittink, J. H. Geertzen, C. P. Van der Schans, and M. F. Reneman (2012)	To reach consensus on the most important bio-psych-social factors that influence functional capacity results in patients with chronic nonspecific musculoskeletal pain	Netherlands	Purposive quantitative survey	Age, country	Delphi technique, lifting, rehabilitation, work capacity evaluation
A prospective study of the impact of musculoskeletal pain and radiographic osteoarthritis on health related quality of life in community dwelling older people					
Laslett, Laura, S. J. Quinn, T. M. Winzenberg, K. Sanderson, F. Cicuttini, and G. Jones (2012)	To describe the association between osteoarthritis and quality of life in a community dwelling population-based sample of older people over five years	Australia	Prospective cohort study	Age (50-80), gender	Quality of life, osteoarthritis, knee, osteoarthritis, radiographic, musculoskeletal pain (neck, shoulders, back, hops, hands, knees, feet)
Consequences of musculoskeletal disorders on occupational events: a life-long perspective from a national survey					
Leclerc, Annette, P. Pascal, J. Chastang, and A. Descatha (2013)	To investigate from a lifelong perspective the factors associated with these consequences, including permanent withdrawal from the workforces, focusing especially on factors at the start of working life	France	Retrospective	Age (30-74), gender, education, economic activity	Musculoskeletal disorders, lifelong, work consequences, employment, population study
Gender differences in functional status in middle and older age: Are there any age variations					
Liang, Jersey, J. M. Bennett, B. A. Shaw, A. R. Quiñones, W. Ye, Xiao Xu, and M. B. Ofstedal (2008)	To examine gender differences in changes in functional status after age 5-0 and how such difference vary across age groups	United States	Retrospective longitudinal	Age (50+), gender, educ, marital status	Functional status, chronic diseases
Job strain and the risk of disability pension due to musculoskeletal disorders, depression or coronary heart disease: a prospective cohort study of 69,842 employees					
Mäntyniemi, Anne, O. P. Tuula, M. Virtanen, N. Sjösten, J. Pentti, M. Kivimäki, and J. Vahtera (2013)	To investigate the relationship between job strain and the subsequent all-cause and diagnosis-specific disability pensions in a large cohort of public sector employees	Finland	Retrospective	Gender, age, occupational status, socio-economic status,	Physical illness, mental disorder, musculoskeletal disease, coronary heart disease
Can individual health differences be explained by workplace characteristics? A multilevel analysis					
Marklund, Staffan,	To explore the role of	Sweden	Prospective	Age (18-66),	Organizational

M. Bolin, & J. Von Essen (2008)	organizational characteristics of workplaces for different individual health outcomes			gender, work place characteristics	characteristics, working conditions, sickness absence, musculoskeletal disorders, work ability, general health
Disease impact of hand OA compared with hip, knee and generalized disease in specialist rheumatology health care					
Moe, Rikke H., M. Grotle, I. Kjeken, K. G. Hagen, T. K. Kvien, and T. Uhlig (2013)	To describe and compare disease impact in patients with hand OA with those with hip, knee and generalized disease	Norway	Cross-sectional	Age (40-80), gender (86% female), education, marital status	OA, hand, disease impact, comorbidity, health status, symptom, function, localization
Physical activity and its association with quality of life in patients with osteoarthritis					
Monteiro de Figueiredo Neto, Esmeraldino, Thais Thomaz Queluz, and Beatriz Funayama Alvarenga Freire (2011)	To evaluate the quality of life and its association with daily physical activity in different contexts of life in osteoarthritis patients	Brazil	Cross-sectional case-series	Age (> 40), gender (92% female), education	Osteoarthritis (hips, knees, hands, and/or vertebral column), motor activity, quality of life
Prevalence of musculoskeletal disorders, levels of physical activity and perceived quality of life amongst construction site managers in Mumbai: a case study					
Pandey, V., T. Chakraborty, and S. Muklopadhyay (2012)	To explicate the levels of physical activity, the prevalence of musculoskeletal disorders and the perceived quality of life in construction site managers	India	Case study prospective	Age, gender	Well-being, work related musculoskeletal disorders, body mass index, physical activity
Risk factors for low BMD in health men age 50 years or older: a systematic review					
Papaioannou, A. et al. (2009)	Systematic review, summarize risk factors for low bone mineral density and bone loss in healthy men age 50 years or older	Canada	Systematic review	Gender (male), age (50+)	Age, smoking, low weight, physical/functional limitations, and previous fracture
The relationship between functional disability and health-related quality of life in patients with a rotator cuff tear					
Pitulainen, Kirsi, J. Ylinen, H. Kautiainen, and A. Häkkinen (2012)	To determine the relationship between functional disability and health-related quality of life in rotator cuff tear patients	Finland	Prospective	Age (< 54), males, education, work status	Should pain, rotator cuff tear, functional disability, health-related quality of life
Life with arthritis in Canada: a personal and public health challenge					
Public Health of Canada, Centre for Chronic Disease Prevention and	To provide an overview of the magnitude of the impact of arthritis on the Canadian population, including health	Canada	Government report	Age, gender, etc.	Arthritis

Control, Chronic Disease Surveillance Division Resource Team (2010)	and social outcomes and the use of health care services; describe approaches to reduce the risk of developing some forms of arthritis and to reduce adverse consequences of arthritis				
Burden of non-hip, non-vertebral fractures on quality of life in postmenopausal women					
Roux, C. et al. (2012)	To assess the effect of NHNV fractures on quality of life	Global	Prospective, multinational observational cohort	Age (< 65, 65-74, 75-84, 85+), female	Non-hip, non-vertebral fractures, postmenopausal women, quality of life
Hand dominance in upper extremity musculoskeletal disorders					
Shiri, Rahman, H. Varonen, M. Heliövarra, and E. Viikari-Juntura (2007)	To investigate the role of hand dominance in common upper extremity musculoskeletal disorders	Finland	Prospective	Age (30+), gender	Carpal tunnel syndrome, tendinitis, prevalence, rotator cuff tennis elbow
Growing old with fibromyalgia: factors that predict physical function					
Torma L. M., G. M. Houck, G.M. Wagnild, D. Messecar, and K. Dupress Jones (2013)	The aim of the study was to identify predictors of physical function in older adults living with fibromyalgia and to examine the influence of resilience on the relationship between fibromyalgia pain and physical function	United States	Cross-sectional	Age (50-54; 55-59; 60-64; 65-69; 70+), gender, education, race	Fibromyalgia, physical function
Mental health/psychological well-being/lifestyle risk-factors (15)					
Influence of multimorbidity on cognition in a normal aging population: a 12-year follow-up in the Maastricht aging study					
Aarts, S., M. Van den Akker, F. E. S. Tan, F. R. J. Verhey, J. F. M. Metsemakers, and M. P. J. Van Boxtel (2010)	To investigate the effect of multi-morbidity on cognition over a 12-year period in an adult population	Netherlands	Prospective	Age (20-40; 41-60; 61-81), gender, educ., living arrangement	Multimorbidity, cognition, memory, sensorimotor speed
Timing, social support, and the effects of physical limitations on psychological distress in late life					
Bierman, Alex, and D. Statland (2010)	To examine how social support resources and the timing of limitations intersect to shape the relationship between activities of daily living (ADLs) limitations and changes in psychological distress	United States	Prospective	Age (65+), gender, race, educ., marital, occup status	Activities of daily living, ADLs, depression, life course perspective, mental health, physical limitations, psychological distress, stress process

					perspective, social support, timing
Quality of life and depression in a cohort of female patients with chronic disease					
Cardin, F., F. Ambrosio, P. Amodio, L. Minazzato, G. Bombonato, S. Schiff, K. Finotti, D. Guiliani, T. Bianco, C. Terranova, C. Nukutekkim, and C. Ori (2012)	To investigate a cohort of female patients with chronic diseases and the relationship between the quality of life perception and the potential presence of depressive symptoms	Italy	Prospective	Age, gender (female)	Chronic diseases, physical and psychological health
The impact of coping strategies on mental and physical well-being in patients with rheumatoid arthritis					
Englbrecht, Matthias, L. Gossec, A. DeLongis, M. Scholte-Voshaar Sokka, T.K. Kvien, and G. Schett (2012)	To investigate the relation of coping strategies to coping effectiveness, helplessness, and mental as well as physical well-being as indicators of quality of life	Europe (12 countries)	Cross-sectional	Age, gender (77% female)	Rheumatoid arthritis, coping, helplessness, quality of life
To what degree do shoulder outcome instruments reflect patients' psychological distress					
Hak Roh, Young, Jung Ho Noh, Joo Han Oh, Goo Hyun Baek, and Hyun Sik Gong (2012)	To examine to what degree shoulder outcome instruments reflect patients' psychological distress and whether patients who are strongly affected by psychological distress can be identified	Korea	Prospective	Gender, age (32-75), BMI	Shoulder diagnosis and disease duration
Conscientiousness and longevity: an examination of possible mediators					
Hill, Patrick L., N. A. Turiano, M.D. Hurd, and D. K. Mroczek (2011)	To examine possible underlying mechanisms, by evaluating the mediational roles of physical health and cognitive functioning	United States	Retrospective	Age, gender, education	Health condition (high blood, diabetes, cancer, lung and heart disease, stroke, psychiatric, and arthritis, cognitive functioning, personality inventory)
Depression, chronic diseases, and decrements in health: results from the World Health Surveys					
Moussavi, Saba, S. Chatterji, E. Verdes, A. Tandon, V. Patel, and B. Ustun (2007)	Depression is comorbid with other chronic diseases and can worsen their associated health outcomes. Study was to obtain data for health, health-related outcomes, and their determinants-depression	Global (60 countries)	Retrospective	Culture, age, gender, income education, employment status	Prevalence values for four chronic physical diseases: angina, arthritis, asthma, and diabetes
Long-term associations of stress and chronic diseases in aging and retired employees					
Salonen, P. H., H.	To examine long-term	Finland	Retrospective	Age (55-74)	Chronic disease,

Arola, C. Kan, Nyga Rd, and H. Huhtala (2007)	associations of prolonged stress symptoms and work-related stressors with chronic diseases				stress
How depression and other mental health problems can affect future living standards of those out of the labour force					
Schofield, D. J., R. N. Shrestha, R. Percival, S. J. Kelly, M. E. Passey, and E. J. Callander (2011)	To estimate the extent to which those who exit the workforce early due to mental health problems have less savings by the time they reach retirement age	Australia	Cross-sectional	Age (45-64), gender	Depression, mental health, labour force
Quantifying the effect of early retirement on the wealth of individuals with depression or other mental illness					
Schofield, D. J., R. N. Shrestha, R. Percival, S.J. Kelly, M. E. Passey, and E. J. Callander (2011)	To quantify the cost of lost savings and wealth to Australians aged 45-64 who retire from the labour force early because of depression or other mental illness	Australia	Retrospective	Age (45-64), gender	Depression, mental illness, retirement
The effects of lifetime cumulative adversity on change and chronicity in depressive symptoms and quality of life in order adults					
Shrira, Amit (2012)	To examine whether lifetime cumulated adversity is related to deterioration and to continuous vulnerability in depressive symptoms and quality of life	Israel	Retrospective	Age (50+), gender, education	Potentially traumatic life events, mental health, decline, chronicity
For better and for worse: the relationship between future expectations and functioning in the second half of life					
Shrira, Amit, Y. Palgi, M. Ben-Ezra, T. Spalter, G. Kavé, and D. Shmotkin (2012)	To examine age group differences in the relationship between future expectations about standards of living and physical, mental, and cognitive functioning in the second half of life	Europe	Retrospective	Age, gender, education, marital status, household income	Medical conditions, depressive symptoms, cognitive functioning
Depressive symptoms as an independent risk factor for mortality in elderly persons: results of a national longitudinal study					
Teng, P. R., Chih-Jung Yeh, Ment-Chih Lee, Hui-Sheng Lin, and Te-Jen Lai (2013)	To investigate the depression-mortality link and symptoms that have been associated with increased mortality risk in previous cohort studies, but there is a paucity of research on Asian elderly in recent years	Taiwan	Retrospective	Gender, Age (65+)	Depression, chronic disorders, mortality
Impact of self-reported comorbidity on physical and mental health status in early symptomatic osteoarthritis: the CHECK (Cohort Hip and Cohort Knee) study					
Wesseling, J, P. M. Welsing, S.Bierma-Zeinstra, J. Dekker, K. J. Gorter, M. Kloppenburg, L. D. Roorda, and J.	To describe the relationship between comorbidity (absolute number as well as the presence of specific comorbidities) and pain, physical functioning and mental health status of	Netherlands	Retrospective	Age (45-65), gender, social status	Early symptomatic osteoarthritis, comorbidity, pain, physical functioning, mental health

W. J. Bijlsmal (2013)	participants with early symptomatic OA of the hip or knee				status
Self-compassion in patients with persistent musculoskeletal pain: relationship of self-compassion to adjustment to persistent pain					
Wren, Anava A., T.J. Somers, M.A. Wright, M.C. Goetz, M.R. Leary, A.M. Fras, B.K. Huh, L.L. Rogers, and F.J. Keefe (2013)	To examine the relationship of self-compassion to pain, psychological functioning, pain coping, and disability among patients who have persistent musculoskeletal pain and who are obese	United States	Prospective	Age, gender, ethnicity, education, partner status, income status	Self-compassion, pain, obese, persistent musculoskeletal pain, pain adjustment, pain catastrophizing, self-efficacy
Social health (12)					
Activities of daily living, social support, and future health of older Americans					
Bozo, Özlem and C. A. Guarnaccia (2010)	To investigate the relation of active daily living and social support satisfaction to illness 10 years later among married older adults	United States	Retrospective	Age (52-62), all married, gender	Activities of daily living, health, older adults, social support
Neighbourhoods and chronic disease onset in later life					
Freedman, Vicki A., I. B. Grafova, & J. Rogowski (2011)	To strengthen existing evidence on the role of neighbourhoods in chronic disease onset in later life	United States	Retrospective	Age (50+), marital status, social and economic data	Chronic conditions, neighbourhoods
Social role participation and the life course in healthy adults and individuals with osteoarthritis: Are we overlooking the impact on the middle-aged?					
Gignac, Monique A. M., C. L. Backman, A.M. Davis, D. Lacaille, X. Cao, and E. M. Badley (2013)	Examined role salience (i.e., importance), role limitations, and role satisfaction among middle-aged and older-aged adults with and without osteoarthritis (OA) and its relationship to depression, stress, role conflict, health care utilization and coping behaviours	Canada	Telephone (qualitative) survey (quantitative)	Age (40+), education, marital status, household income	Chronic disease, arthritis, depression, pain, life course, social role
Social ecological approaches to individuals and their contexts: twenty years of health education & behavior health promotion interventions					
Golden, S. D. and J. L. Earp (2012)	Literature review examining social ecological models that describe the interactive characteristics of individuals and environments that underlie health outcomes have long been recommended to guide public health practice	United States	Literature Review	Intrapersonal, interpersonal, institution, community, policy	Behavioral theories, health policy, health promotion, social ecological model, training health professionals
Effects of reduction in shoulder pain on quality of life and community activities among people living long-term with SCI paraplegia: a randomized control trial					

Kemp, Bryan J., A. L. Bateham, S.J. Mulroy, L. Thompson, R.H. Adkins, and J. S. Kahan (2011)	To examine changes in social interaction and quality of life after an exercise treatment for shoulder pain in people with SCI paraplegia	United States	Prospective	Age (22-70), gender	Quality of life, interpersonal relations, should pain, exercise therapy, spinal cord injuries, activities of daily living, paraplegia
The significance of health anxiety and somatization in care-seeking for back and upper extremity pain					
Jensen, J. C., et al. (2012)	To examine if health anxiety, somatization and fear-avoidance beliefs were of importance for care-seeking with either back pain or upper extremity pain and to look at possible differences between the two groups	Denmark	Prospective	Gender, age (17-65)	Back and upper extremity pain, health anxiety
Aging issues: unanswered questions in marital and family therapy literature					
Lambert-Shute, Jennifer and C. A. Fruhauf (2011)	The purpose of this study was to conduct a content analysis of the marital and family therapy literature from 1997 to 2006. Articles focused on conflicts of the caregiving family, empowering older adults, and understanding geriatric care management	United States	Content analysis retrospective	Age, gender, marital status	Aging, older adults, aging issues and addressing issues during this life cycle stage
The texture of neighborhoods and disability among older adults					
Pruchno, Rachel A., M. Wilson-Genderson, and F.P. Cartwright (2012)	To present and test an ecological multidimensional model of neighborhood characteristics and examine its relationship to older disability among older adults	United States	Retrospective	Income, age	Environment, models, neighborhood, psychometrics, residence characteristics, theoretical
What work means to people with work disability: a scoping review					
Saunders, S. L., and B. Nedelec (2013)	To explore what was known in the existing literature on what work means to those with work disability	Canada	Scoping review	Gender, age	Disability included work being a source of identity, feelings of normality, financial support, and socialization
Aging and family life: a decade review					
Silverstein, Merrill and R. Giarrusso (2010)	Summarize and critically evaluate the major empirical, conceptual, and theoretical directions that social scientific studies of aging families have taken during the first decade of the twenty-first century	United States	Descriptive	Marital status, gender, age	Aging families, caregiving, intergenerational relations, marriage, siblings, widowhood

Chronic disease management and the home-care alternative in Ontario, Canada					
Tsasis, P. (2009)	This article lays out the challenges, highlights the impending issues and suggests a framework for moving forward in updating the Canada Health Act to reflect the realities of our health-care system, and developing policies to support the areas of interdisciplinary teamwork and system integration are needed to facilitate chronic disease management and home care in Canada	Canada	Descriptive		Health care system
Work-related musculoskeletal health and social support					
Woods, Valerie (2005)	This review concerns the relationship between inequalities experienced at work with respect to social support and work-related musculoskeletal ill-health	United Kingdom	Literature Review	Gender, age	Musculoskeletal disability, retirement, emotional and social support, inequality, restricted activity, sickness absence,
Financial health (26)					
Unemployment and retirement and ill-health: a cross-sectional analysis across European countries					
Alavinia, Seyed Mohammad and A. Burdorf (2008)	To determine the associations between different across ten European countries	Europe	Retrospective	Gender, age (50+), employment status, education	Self-perceived health, unemployment, retirement, lifestyle, chronic disease
Retiring in debt? Differences between the 1995 and 2004 near-retiree cohorts (2009)					
Anguelov, C. E. and C. R. Tamborini (2009)	To examine the debt holdings of near-retirees (aged 50-61) in 1995 -2004	United States	Descriptive	Gender, age (50-61)	Debt
Long-term associations of stress and chronic diseases in aging and retired employees					
Anguelov, C. E. and C. R. Tamborini (2010)	To examine the debt holdings of near-retirees (aged 50-61)	United States	Descriptive	Gender, age (50-61)	Debt, chronic diseases
Gender differences in how retirees perceive factors influencing unretirement					
Armstrong-Stassen, Marjorie and S. Staats (2012)	To compare how women and men who had retired from a managerial or professional career occupation perceive factors associated with un-retirement	United States	Retrospective	Gender, age (+50), retirement status	Health status
Delayed retirement: A new trend?					
Carriére, Yves and D. Galarneau (2011)	Examining trends in retirement	Canada	Descriptive	Age (55+)	Major labour market trends by industry, occupation,

					employment and unemployment rate
The comparative economic burden of mild, moderate, and severe fibromyalgia: results from a retrospective chart review and cross-sectional survey of working-age U.S. adults					
Chandran, Arthi, C. Schaefer, K. Ryan, R. Baik, M. McNett, and G. Zlateva (2012)	To assess (a) health resource use, direct and indirect costs associated with fibromyalgia	United States	Cross-sectional	Age (18-65), gender, employment status	Fibromyalgia, chronic disorder, pain, fatigue, mean cost of absenteeism, comorbid conditions
The impact of health changes on labor supply: evidence from merged data on individual objective medical diagnosis codes and early retirement behavior					
Christensen, Bent Jesper and M. Kallestrup-Lamb (2012)	To estimate the impact of health shocks on retirement is mitigated by using objective health measures from a large, register-based longitudinal data set including medical diagnosis codes, along with labor market status, financial, and socio-economic variables	Denmark	Retrospective	Age (50+), gender, marital status, education, occupation, income	Nervous system and sensory organs, musculoskeletal system and connective tissue, endocrine, nutritional, and metabolic diseases, as well as mental and behavioral disorders
Impact of self-rated osteoarthritis severity in an employed population: cross-sectional analysis of data from the national health and wellness					
DiBonaventura, Marco daCosta, S. Gupta, M. McDonald, A. Sadosky, D. Pettitt, and S. Silverman (2012)	To evaluate the impact of self-rated OA severity on quality of life, healthcare resource utilization, productivity and costs in an employed population relative to employed individuals without OA	United States	Cross sectional	Age (20+), gender, race, ethnicity, education, employment, income, health insurance	Osteoarthritis, burden, workforce, productivity, quality of life, body mass index
We cannot afford my chronic illness! The out-of-pocket burden associated with managing chronic obstructive pulmonary disease in western Sydney, Australia					
Essue, Beverley, P. Kelly, M. Roberts, S. Leeder, and S. Jan (2011)	To examine the household economic consequences that are associated with out-of-pocket spending for the care and management of chronic obstructive pulmonary disease (COPD).	Australia	Cross-sectional	Age (65+), gender	Economic household hardship, out-of-pocket spending, chronic condition
The economic burden of disabling hip and knee osteoarthritis (OA) from the perspective of individuals living with this condition					
Gupta, S, G. A. Hawker, A. Laporte, R. Croxford, and P. C. Coyte (2005)	To estimate the direct and indirect arthritis-attributable costs to individuals with disabling hip and/or knee osteoarthritis	Ontario, Canada	Population Cohort	Age (59–100)	Population cohort with disabling hip and/or knee
A New Pension Plan for Canadians – Assessing the Options					

Horner, Keith (2011)	To examine proposed new pension plan designs compared to Canada's current retirement income system due to the growing number of retirees and the lack of savings for modest and middle-income workers, etc.	Canada	Comparative Analysis	Age (65+), income, gender	Health status and financial health
The impact of retirement on health in Canada					
Latif, Ehsan (2012)	To estimate the impact of retirement on subsequent health outcomes as measured by self-reported health status	Canada	Retrospective	Age, income, gender, marital, education, urban/rural	Retirement, health status
Association between forgone care and household income among the elderly in five Western European countries—analyses based on survey data from the SHARE-study					
Mielck, Andreas, R. Kiess, O. Von dem Knesebeck, I. Stirbu, and A. E. Junst (2009)	Studies the association between access to health care and household income which includes an assessment of "forgone care"	Europe	Retrospective	Age (50+), gender	Self-assessed health and chronic disease
Economic and fiscal implications of Canada's aging population					
Ministry of Finance (2010)	Report on the economic and fiscal implications of Canada's aging populations	Canada	Government report		Economic and fiscal implications
Seniors on the margins: aging in poverty in Canada					
Ministry of Public Works and Government Services Canada (2005)	Report on aging in poverty in Canada	Canada	Government report		Aging and poverty
Low income in Canada: a multi-line and multi-index perspective					
Murphy, Brian, X. Zhang, and C. Dionne (2012)	The report examines the incidence (rate), gap ration (depth), severity and persistence of low income for Canada as a whole and across different provinces, cities, family types, as well as for specific groups with a high risk of persistent low income	Canada	Statistics Canada income statistics division		Poverty in Canada, characteristics and region, and how long they stay poor
The health & retirement study					
National Institute on Aging, National Institutes of Health, US Department of Health & Human Resources (2012)	To explain the antecedents and consequences of retirement, examine the relationships among health, income, and wealth over time, examine life cycle patterns of wealth accumulation and consumption, monitor work disability, and examine how the mix and distribution of economic, family, and program resources affect key	United States	Government report	Age, gender, race, marital, occupational status	Health status

	outcomes, including retirement, “dissaving”, health declines				
Do men and women differ in their retirement planning? Testing a Theoretical model of gendered pathways to retirement preparation					
Jack Noone, F. Alpass, and C. Stephens (2010)	Examines the effects of socioeconomic status, work involvement, and retirement perceptions on retirement planning. Also explores gender differences assessing the extent to which women are disadvantaged in terms of their retirement planning and the factors that may affect retirement plans	New Zealand	Prospective quantitative survey longtitudinal	Age (55-70), gender	Retirement planning, attitudes, marital status, socioeconomic status
Health conditions sensitive to retirement and job loss among Korean middle-aged and older adults					
Park, S. et al. (2012)	To examine the association between health condition and leaving the labor market among middle-aged and older adults in South Korea	South Korea	Cross-sectional and longitudinal analysis	Age (45+), employment status, marital status, education, income, gender	Chronic disease, disability, depression, wounds and injuries, retirement, job loss
Pain and disability retirement: a prospective cohort study					
Saastamoinen, M. L., Sanna-Mari Kääriä, P. Leino-Arjas, O. Rahkonen, and E. Lahelma (2012)	To examine the association of pain with subsequent disability retirement due to all causes as well as musculoskeletal diseases, mental disorders, and a heterogeneous group of other diseases	Finland	Retrospective	Gender, age (40-60), social support, job strain, occupation	Chronic pain, disability retirement, long-standing illness, working conditions
Chronic disease and labour force participation among older Australians					
Schofieeld, Deborah J., R.N. Shrestha, M.E. Passey, A. Earnest, and S.L. Fletcher (2008)	To examine the association between long-term health conditions and being out of the labour force among older Australians	Australia	Retrospective	Age (45-64), labour force, gender	Chronic disease
Early retirement and the financial assets of individuals with back problems					
Schofieeld, D.J., R.N. Shrestha, R. Percival, E.J. Callander, S.J. Kelly, and M. E. Passey (2011)	Quantifies the relationship between early retirement due to back problems and wealth	Australia	Retrospective	Age (45-64), labour force participation, income	Economic impact, early retirement, aging, labour force participation
Perspective on Labour and Income					
Statistics Canada (2011)	A more representative indicator of the retirement decisions of Canadians and	Canada	Government report	Age	Delayed retirement

	the recent trends to delayed retirement				
Gender wage gaps and earnings ratios in Ontario					
Tam, Sandra (2011)	Gender wage gaps and earnings ratios in Ontario	Ontario	Government report	Gender, age (60+)	Wage gaps and earnings ratios of different groups of workers
Lifecourse socioeconomic circumstances and multimorbidity among older adults					
Tucker-Seely, Reginald D., Yi Li, G. Sorensen, and S. V. Subramanian (2011)	To investigate the association among childhood financial hardship, lifetime earnings, and multimorbidity	United States	Cross-sectional	Gender, race, age (50+), education	Economic and financial conditions, multi-morbidity
The impact of ill health on exit from paid employment in Europe among older workers					
Van den Berg, Tilja, M. Schuring, M. Avendano, J. Mackenback, and A. Burdorf (2010)	To determine the impact of ill health on exit from paid employment in Europe among older workers	Europe	Retrospective	Age (50-63), gender, education	Perceived health, lifestyle factors, work-related factors, chronic disease, mobility problems

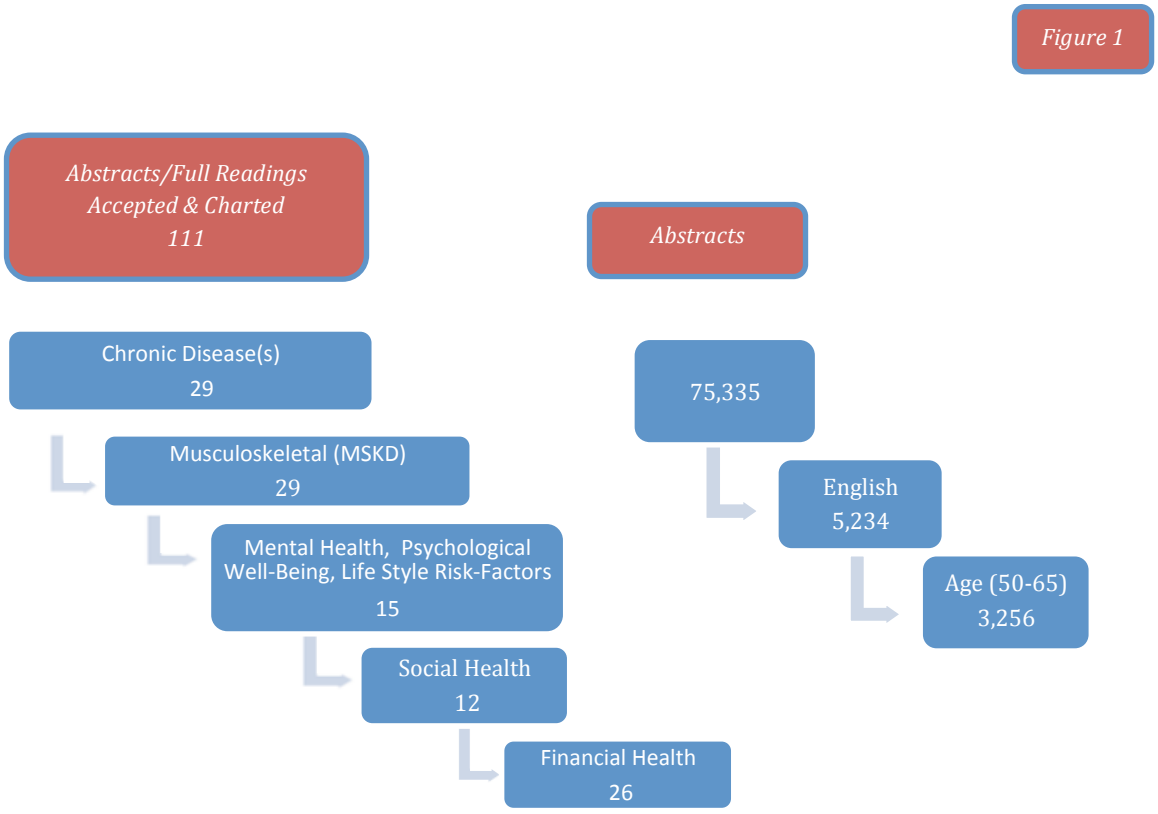


Figure 1. Charting

Countries of Origin

The majority of material uncovered, indicated the global burden of chronic diseases across multiple countries and experiencing prolific growth in the projections of cardiovascular disease, cancer, respiratory disease, diabetes, and MSKD (Morabia & Abel, 2006). The material charted extended from Canada, United States, United Kingdom, Australia, France, Italy, Netherlands, Norway, Sweden, New Zealand, Denmark, Continental Europe, Iran, United Arab Emirates, Turkey, Brazil, Israel, Northern Estonia, South Korea, and on multi-national sources (Europe, U.S., and Canada).

Findings Within Focus Domains

Outlined below is the framework for the existing literature creating descriptions of the health domains with references to the overall dynamics of those transitioning into retirement, living and functioning with chronic diseases, and the overall impact on health and quality of life outcomes. Readers can refer to the corresponding topic headings in the literature chart for a detailed record of these domains (*Table 2*).

Methodology Used

There was a diverse mix of study designs that included primary qualitative and quantitative studies, secondary analysis within retrospective, cross-sectional, and prospective research, systematic reviews, and grey literature. These studies were charted from a variety of health and social science fields that included public health, psychology, health sciences, medicine, sociology, and governmental reports.

Table 2. Literature Chart

Literature (n = 111)				
Health domains	**Study designs**	**Data**	**# Articles**	**Field of discipline**
Chronic disorder(s) (n = 29)	Retrospective	Secondary	13	Health sciences Social sciences Public health
	Prospective	Primary	1	Public health

	Cross-sectional	Primary	1	Social sciences Health sciences Public health
		Secondary	5	Public health Health sciences
	Descriptive		7	Health sciences Public health Multi-disciplinary
	Government report		1	Health policy
	Systematic literature review		1	Health sciences
Chronic disorder(s) musculoskeletal (n = 29)	**Designs**	**Data**	**# Articles**	**Field of disciplines**
	Retrospective	Secondary	7	Health sciences
	Prospective	Primary	10	Health sciences Social sciences Multi-disciplinary
		Secondary	1	Health sciences
	Cross-sectional	Primary	8	Health sciences
	Purposive	Primary	1	Health sciences
	Longitudinal	Secondary		Health sciences
	Government report		1	Health policy
	Systematic literature review		1	Health sciences
Mental health, psychological well-being/lifestyle risks (n = 15)	**Designs**	**Data**	**#**	**Field of disciplines**
	Retrospective	Secondary	7	Psychiatry
	Prospective	Primary	6	Health sciences
		Secondary	1	Social sciences
	Cross-sectional	Primary	1	Health sciences
Social health (n = 12)	**Designs**	**Data**	**# Articles**	**Field of disciplines**
	Retrospective	Secondary	4	Public health Social sciences
	Prospective	Primary	3	Social sciences Health sciences
	Descriptive		2	Health sciences Social sciences
	Systematic literature review		2	Health sciences
	Scoping literature review		1	Health sciences

	Designs	Data	# Articles	Field of disciplines
Financial health (n = 26)	Retrospective	Secondary	10	Health economics Health & aging
	Cross-sectional	Primary	2	Health sciences
		Secondary	3	Health sciences
	Cohort	Primary	1	Health sciences
	Descriptive		2	Governmental
	Comparative analysis		1	Governmental
	Government reports		7	Governmental

Chronic Diseases (Co/Multi Morbidity)

A total of 29 identified articles explored the changing face of living with the burden of chronic co/multi morbidity and the lasting implications on quality of life. The majority of the literature (n=23) related to the broad levels within the chronic disease domain: aging, gender (women and/or men), co/multi morbidity, functional/occupational disability and the unprecedented impact on individual health care needs and outcomes. The information used was derived from a variety of national longitudinal health surveys and administrative secondary data, with one primary survey study focused on the age group (50-65) with participants retrieved from secondary health survey data. The indication from these studies were that the overall increase in deaths and illness due to chronic diseases have been attributed to an aging global population and its changing patterns, causes, and effects on health and disease (Government of Ontario, 2007). The remaining studies (n = 6) provided information indicating that those traditionally transitioning or who are retiring early due to health concerns differed by gender and age (50 – 65) (Yen, McRae, Jeon, Essue, & Herath, 2011). Poor health was shown to be a strong predictor of retirement for women compared to men (Pit, Shrestha, Schofield, & Passey, 2010), and early retirees often self-report their own health as poorer compared to those who retire voluntarily (Pit et al., 2010).

Musculoskeletal Disorders

A total of 29 identified articles explored MSKD with much of the literature (n=13) concentrating on research that was descriptive in nature demonstrating MSKD as an

important contributor to the burden of disability in the aging population (Cho et al., 2012). The information indicated a spectrum of health concerns that are likely to be present and the importance in identifying factors that impact physical function and health status, in turn, influencing quality of life outcomes. The remainder of the literature (n=16) comprised of cross-sectional or prospective designs utilizing primary data. The research examined the evidence that MSKD is a primary predictor of functional disability and frequently develops in mid-life (Abasolo et al., 2012), long before the disabilities of later life present themselves. Studies often examined differences based on gender and socio-demographics, i.e. men (Aghilinejad, Choobineh, Sadeghi, Nouri, & Bahrami Ahmadi, 2012; Pitulainen, J, Kautiainen, & Hakkinen, 2012) and/or women (Canizares & Badley, 2012), educational level, and mid-life ages of 40 through to 65 (Covinsky, Lindquist, Dunlop, Gill, & Yelin, 2008) (Abasolo et al., 2012; Pandey, Chakraborty, & Mukhopadhyay, 2012) demonstrating that groups experiencing MSKD are more likely to experience work disability (Liang et al., 2008). A theme across studies was the impact of co/multi morbidity on physical functioning with added stress symptoms, which are contributors to the probability of early forced or voluntary retirement.

Mental Health Well-Being/Lifestyle Risk Factors

A total of 15 studies were comprised of primary prospective and cross-sectional study designs (n=7) with retrospective designs (n=8) that utilized secondary administrative data and longitudinal surveys. These research studies addressed the complex issues of mental health, psychological well-being, and life risk factors that affect the transition into retirement. Overall, the literature linked multiple associations with early retirement due to mental health problems and the potential financial disadvantage experienced (Schofield, Kelly, et al., 2011; Shrira, 2012; Shrira et al., 2011). Factors such as age focused on varying mean age groups (45–70) but gender group differences were generalized along with mediating factors of marital status, level of education, and work status (Englbrecht et al., 2012; Hill, Turiano, Hurd, Mroczek, & Roberts, 2011; Moussavi et al., 2007).

The studies reported on the association between mental health and chronic diseases and the relationship between future expectations surrounding standards of living and physical, mental, and cognitive functioning in the second half of life (Cardin et al., 2012; Shrira et al., 2011). These major predictors pointed to interruption and early departures from working life in aging employees (Moussavi et al., 2007) and a potential financial disadvantage compared to people who are able to remain employed (Schofield, Kelly, et al., 2011; Shrira, 2012; Shrira et al., 2011).

Social Health

A review of the literature found research (n=11) articles exploring the meaning of social health as a collective of social networks encircling community, social, and familial supports for those who live with co/multi morbidity (Bozo & Guarnaccia, 2010; Lambert-Shute & Fruhauf, 2011). Study designs comprised of prospective (n=3) with primary and longitudinal data, descriptive articles (n=2), retrospective (n=4), and literature reviews (n=2), utilizing secondary and administrative information.

Throughout the literature there appeared to be little research on the impact that gender role differentiation and distinctive age groups would have to the importance of social role participation with the exception of a few retrospective (n=2) and prospective (n=2) studies that reported on middle-and older-aged adults. These studies indicated that relationships within aging families have become more fluid and less predictable due to the growing rates of single, divorced, and widow populations (Gignac et al., 2013; Silverstein & Giarrusso, 2010). Throughout the literature, results indicated that poor social role participation and support are associated with chronic health absence from work and subsequently, the effects of good social support and the importance of developing coping skills can assist in choices of remaining in the work force compared to forced retirement (Saunders & Nedelec, 2013).

Also expanding on this evidence is research supporting the importance of social role participation and the interaction between personal and community support. Two studies (n=2) considered the concept of factors and features within communities and the significant impact that these social and built environments have to health outcomes in

later life (Gignac et al., 2013; Kemp et al., 2011). The authors indicated research has been predominately in the context of community and socio-economic status and its impact on chronic diseases (Pruchno, Wilson-Genderson, & Cartwright, 2012) but pointed to the need for sustained research addressing the non-economic factors that impact health outcomes. These studies maintain that factors such as neighbourhood connections between places where people live, shop, and work will maintain and enhance levels of social cohesion and, in turn, will have a positive influence on chronic diseases, health outcomes, and ultimately quality of life (Gignac et al., 2013).

Financial Health

The literature examined a total of 26 studies that addressed aspects of financial health within the peri and post stages of retirement for those living with co/multi morbidity. With the use of the inclusion criteria of age (50 – 65) and gender (women and/or men), this scoping review found a mix of research designs where primary data was employed for prospective cross-sectional and cohort studies (n=3). This was followed by studies utilizing an abundance of secondary data sources in retrospective (n=11), descriptive (n=2), comparative analysis (n=1), government reports (n=6), and cross-sectional (n=3).

Prospectively (Essue, Kelly, Roberts, Leeder, & Jan, 2011; Gupta, Hawker, Laporte, Croxford, & Coyte, 2005), the authors examined the differences between women and men in their perceptions of the reasons that will influence the decision to retire. The studies indicated that major predictors in decisions regarding un-retirement (return to the workforce after retirement) or retirement include the socio-economic consequences that are associated with labour market status, financial and debt burden, health resource use, direct and indirect health costs, and social support from family, friends, and community (Essue et al., 2011; Gupta et al., 2005).

Governmental reports strengthened these differences by examining proposed new pension plan designs compared to Canada's current retirement income system due to the growing number of retirees and the potential of a proportionately large retired population to be supported by a relatively small working population (Government of Canada, 2010; Lee, 2005). These reports indicated that a number of barriers related to the probability of

entering retirement are dependent on health status, public pensions, and employer-provided pensions which leave many to face difficult choices based on their financial circumstances (Alavinia & Burdorf, 2008; Armstrong-Stassen & Staats, 2012; Schoeni, Buchmueller, & Freedman, 2011).

As well, studies retrospectively examined the extent of the burden of multiple health conditions and the impact of gender wage gaps and earnings along with the lack of savings for modest and middle-income workers, all factors indicative of the recent trends to delayed retirement (Murphy, Zhang, & Dionne, 2012; Statistics Canada, 2011). A common focus in many of the studies continue to be the increasing imbalance between different levels of socioeconomic status, and the impact that government social programs will have on those who are financially disadvantaged (Government of Ontario, 2007). This imbalance is a strong predictor of the conflict between women and men in their decision to retire as women most often self-report their own health as poorer compared to those who retired voluntarily (Pit et al., 2010).

The literature typically presented retirement as a "couple" experience but the reality is, very often, lived alone, whether by choice or as the result of divorce or the death of a spouse (Noone, Stephens, & Alpass, 2010). For women, there are the additional challenges in preparing for retirement as a result of lower earnings, state of financial retirement savings, personal debt, caregiving responsibilities, relative longevity, and on average they experience greater levels of chronic illness compared to men (Hayden et al., 2006; Kelley-Moore et al., 2006; Noone et al., 2010; Wagner, 2001). The authors indicate that the multifaceted costs of being disabled from a chronic diseases are complex as issues around the ability to afford adequate housing, healthy food, transportation, and other basic needs pose frequent challenges for positive health and quality of life outcomes (Furneri et al., 2012; Schofield, Shrestha, et al., 2011).

Discussion

This scoping review reported on the identified health domains of physical health: chronic co/multi morbidity and musculoskeletal, mental health, psychological well-being, lifestyle risk-factors, social health, and financial health and their influence on the impact

of living with chronic diseases and transitioning toward retirement. Examining age group and gender differences in regards to standards of living, physical, mental, and cognitive functionality within the second half of life, particular emphasis was given to chronic diseases such as MSKD, developing stress symptoms, and the implications of contributing socio-economic factors. These physical, social, and financial factors have appeared as major predictors to interruption and early departures from employment (Moussavi et al., 2007) and are among the leading causes of early retirement (Salonen, Arola, Nygård, & Huhtala, 2007). Also revealed were gaps in the literature, in terms of the studied population, as the majority of the studies concentrated on those that are either < 65 and > 65 indicating that more research is needed for middle-aged to young senior adults (50–65) who are transitional and will need support to achieve "healthy retirement". For this population, there is less knowledge on capturing the divergent impact of multiple health and environmental factors impacting women and men and the decisional conflicts that arise as they move towards retirement.

The results also indicated that the most common facilitators to a positive transition included quality development programs contributing social support of family, friends, and community (Wesseling et al., 2013), and opportunities for increased physical activity (Shrira et al., 2011) (Shrira, 2012). Maintaining and building new social networks is perceived as strengthening social cohesion, having a positive influence on health outcomes for those with chronic diseases, and ultimately quality of life (Freedman, Grafova, & Rogowski, 2011; Gignac et al., 2013). In contrast, barriers included access to timely health care and education along with ensuring adequate income through occupation and potential retirement pensions (Shrira, 2012).

Challenges and Limitations

Scoping reviews are intended to define the nature of the literature. This was particularly challenging in areas where the literature can cross multiple disciplines, research paradigms, and relevant types of evidence. The volume of literature originally amassed (75,335) for this scoping review was great and the process of obtaining potentially relevant material was daunting. This review focused on peri and post retirement as a

specific subset of the population and based on a broad conceptual framework that included the physical, social and economic aspects of health outcomes. Despite screening over 3,000 papers, the key literature may not have been fully accessed in this area or representative of it, contributing to an inability in finding a cohesive body of literature. This scoping review may have benefited from other databases, as wee assumed a health perspective and related databases but transition into retirement with chronic disease may be addressed in other fields including business/labour, gender studies and other literature A further limitation could be that no assessment on the quality of the literature was conducted, and therefore the relative value or usefulness of the literature identified is unknown. Given the range of designs, conducting such assessments during a systematic review could be problematic.

Conclusion

There is an increasing amount of research evidence that addressed the topic of transitioning towards retirement with co/multi morbidity. However, much of the evidence was indirect indicating a need for primary qualitative and quantitative studies that specifically address this issue. There were few prospective studies that focused primarily on the process of retirement and it's predictors. There are multiple retrospective and descriptive studies utilizing secondary data obtained from public health and governmental national surveys. This limited the definition of peri and post retirement subsamples and prevented a more comprehensive analysis of the data regarding the impact of co/multi morbidity and the significant and increasing burden this has on the health of many Canadians.

Few studies directly addressed the complex interaction of chronic health outcomes, mental and psychological well-being, social and financial health as a significant paradigm in determining a successful transition into retirement. Given the substantial differential impact between women and men in respect to retirement risk factors and opportunities and how these may vary by age cohort and gender effects there must be consideration in design and analysis of future research. Gender segregation in analysis is insufficient, since it is critical to understand how gender role and gender role expectations are

affecting health, social engagement, occupational role opportunities, and subsequent financial security. Knowledge from this scoping review indicated that a systematic review would be difficult given the state of the evidence and propose that further high quality research on the peri and post retirement population is needed. Health problems have an enormous influence on the decision to retire for men and especially for women, who will be the greater of those living alone and on less income.

Given the changing social and economic environments with an aging population there is need for future research generating a more comprehensive synthesis surrounding the nature of retirement, chronic health and quality of life outcomes in order to better understand this transition and to mitigate the burden on retirees and society. Canada has identified the aging population as a key policy challenge (Government of Canada, 2010) wherein a necessary investment in research is paramount in order to improve quality of life into old age, and to reduce pressure on the health care system. Overall multiple chronic diseases will continue to pose a significant and increasing burden on the health of Canadians.

Reference List

Abasolo, L., Lajas, C., Leon, L., Carmona, L., Macarron, P., Candelas, G., . . . Jover, J. A. (2012). Prognostic factors for long-term work disability due to musculoskeletal disorders. *Rheumatol Int, 32*(12), 3831-3839. doi: 10.1007/s00296-011-2264-5

Aghilinejad, M., Choobineh, A. R., Sadeghi, Z., Nouri, M. K., & Bahrami Ahmadi, A. (2012). Prevalence of Musculoskeletal Disorders among Iranian Steel Workers. *Iran Red Crescent Med J, 14*(4), 198-203.

Alavinia, S. M., & Burdorf, A. (2008). Unemployment and retirement and ill-health: a cross-sectional analysis across European countries. *Int Arch Occup Environ Health, 82*(1), 39-45. doi: 10.1007/s00420-008-0304-6

Anguelov, C. E., & Tamborini, C. R. (2010). Retiring in debt? An update on the 2007 near-retiree cohort. *Soc Secur Bull, 70*(4), 69-76.

Armstrong-Stassen, M., & Staats, S. (2012). Gender differences in how retirees perceive factors influencing unretirement. *Int J Aging Hum Dev, 75*(1), 45-69.

Bayliss, A., Ellis, Jennifer, & Steiner, John F. (2005). Subjective assessments of comorbidity correlate with quality of life health outcomes: Initial validation of a comorbidity assessment instrument. *Health and Quality of Life Outcomes, 3*(51).

Beaton, D. E., & Schemitsch, E. (2003). Measures of health-related quality of life and physical function. *Clinical Orthopaedics and Related Research*®(413), 90-105. doi: 10.1097/01.blo.0000079772.06654.c8

Bergman, S., Jacobbson, LTH, & Herrstom, H. (2003). Health status as measured by SF-36 reflects changes and predicts outcome in chronic musculoskeletal pain: A 3-year follow up study in the general population. *Pain, 108*, 115-123.

Bergman, S., Jacobsson, L. T., Herrstrom, P., & Petersson, I. F. (2004). Health status as measured by SF-36 reflects changes and predicts outcome in chronic musculoskeletal pain: a 3-year follow up study in the general population. *Pain, 108*(1-2), 115-123. doi: 10.1016/j.pain.2003.12.013

Bierman, A., & Statland, D. (2010). Timing, social support, and the effects of physical limitations on psychological distress in late life. *J Gerontol B Psychol Sci Soc Sci, 65*(5), 631-639. doi: 10.1093/geronb/gbp128

Bodenheimer, T., Lorig, K., Holman, H., & Grumbach, K. (2002). Patient self-management of chronic disease in primary care. *JAMA, 288*(19), 2469-2475.

Boyd, C. M. , & Fortin, M. (2010). Future of multimorbidity research: How should understanding of multimorbidity inform health system design. *Public Health Review, 32(2):451–474*.

Bozo, O., & Guarnaccia, C. A. (2010). Activities of daily living, social support, and future health of older Americans. *J Psychol, 144*(1), 1-14.

Breckenridge, J. D., & McAuley, J. H. (2011). Shoulder Pain and Disability Index (SPADI). *J Physiother, 57*(3), 197. doi: 10.1016/S1836-9553(11)70045-5

Brown, T. H., & Warner, D. F. (2008). Divergent pathways? Racial/ethnic differences in older women's labor force withdrawal. *J Gerontol B Psychol Sci Soc Sci, 63*(3), S122-134.

Busija, L., Hollingsworth, B., Buchbinder, R., & Osborne, R. H. (2007). Role of age, sex, and obesity in the higher prevalence of arthritis among lower socioeconomic groups: a population-based survey. *Arthritis Rheum, 57*(4), 553-561. doi: 10.1002/art.22686

Canadian Institute for Health Information. (2009). *Health Care in Canada 2009: A Decade in Review*. Ottawa, ON.

Canizares, M., & Badley, E. M. (2012). Comparison of health-related outcomes for arthritis, chronic joint symptoms, and sporadic joint symptoms: a population-based study. *Arthritis Care Res (Hoboken), 64*(11), 1708-1714. doi: 10.1002/acr.21735

Caporali, R., Cimmino, M. A., Sarzi-Puttini, P., Scarpa, R., Parazzini, F., Zaninelli, A., . . . Montecucco, C. (2005). Comorbid conditions in the AMICA study patients: effects on the quality of life and drug prescriptions by general practitioners and specialists. *Semin Arthritis Rheum, 35*(1 Suppl 1), 31-37. doi: 10.1016/j.semarthrit.2005.02.004

Cardin, F., Ambrosio, F., Amodio, P., Minazzato, L., Bombonato, G., Schiff, S., . . . Ori, C. (2012). Quality of life and depression in a cohort of female patients with chronic disease. *BMC Surg, 12 Suppl 1*, S10. doi: 10.1186/1471-2482-12-S1-S10

Cho, Soo-Kyung, Sung, Yoon-Kyoung, Choi, Chan-Bum, Cha, Hoon-Suk, Choe, Jung-Yoon, Chung, Won Tae, . . . Bae, Sang-Cheol. (2012). Do Patients with Elderly-Onset Rheumatoid Arthritis Have Severe Functional Disability? *Semin Arthritis Rheum, 42*(1), 23-31. doi: http://dx.doi.org/10.1016/j.semarthrit.2012.02.004

Coggon, D., Martyn, C., Palmer, K. T., & Evanoff, B. (2005). Assessing case definitions in the absence of a diagnostic gold standard. *International Journal of Epidemiology, 34*(4), 949-952. doi: 10.1093/ije/dyi012

Coggon, D., Palmer, K. T., & Walker-Bone, K. (2000). Occupation and upper limb disorders. *Rheumatology (Oxford), 39*(10), 1057-1059.

Covinsky, K. E., Lindquist, K., Dunlop, D. D., Gill, T. M., & Yelin, E. (2008). Effect of arthritis in middle age on older-age functioning. *Journal of the American Geriatrics Society, 56*(1), 23-28. doi: 10.1111/j.1532-5415.2007.01511.x

de Witte, P. B., Henseler, J. F., Nagels, J., Vliet Vlieland, T. P., & Nelissen, R. G. (2012). The Western Ontario rotator cuff index in rotator cuff disease patients: a comprehensive reliability and responsiveness validation study. *Am J Sports Med, 40*(7), 1611-1619. doi: 10.1177/0363546512446591

Englbrecht, M., Gossec, L., DeLongis, A., Scholte-Voshaar, M., Sokka, T., Kvien, T. K., & Schett, G. (2012). The impact of coping strategies on mental and physical well-being in patients with rheumatoid arthritis. *Semin Arthritis Rheum, 41*(4), 545-555. doi: 10.1016/j.semarthrit.2011.07.009

Essue, B., Kelly, P., Roberts, M., Leeder, S., & Jan, S. (2011). We can't afford my chronic illness! The out-of-pocket burden associated with managing chronic obstructive pulmonary disease in western Sydney, Australia. *J Health Serv Res Policy, 16*(4), 226-231. doi: 10.1258/jhsrp.2011.010159

Field, A. (2013). *Discovering Statistics Using Ibm Spss Statistics*. Los Angeles, London, New Delhi: Sage Publications Ltd., 2nd edition, 293-324.

Franchignoni, F., & Salaffi, F. (2004). Generic and specific measures for outcome assessment in orthopaedic and rheumatologic rehabilitation. *Assessment in Physical Medicine and Rehabilitation - Advances in Rehabilitation, 16:*, 45-77.

Fredman, L., Cauley, J. A., Satterfield, S., Simonsick, E., Spencer, S. M., Ayonayon, H. N., . . . Health, A. B. C. Study Group. (2008). Caregiving, mortality, and mobility decline: the Health, Aging, and Body Composition (Health ABC) Study. *Archives of Internal Medicine, 168*(19), 2154-2162. doi: 10.1001/archinte.168.19.2154

Freedman, V. A., Grafova, I. B., & Rogowski, J. (2011). Neighborhoods and chronic disease onset in later life. *Am J Public Health, 101*(1), 79-86. doi: 10.2105/AJPH.2009.178640

Furneri, G., Mantovani, L. G., Belisari, A., Mosca, M., Cristiani, M., Bellelli, S., . . . Turchetti, G. (2012). Systematic literature review on economic implications and pharmacoeconomic issues of rheumatoid arthritis. *Clin Exp Rheumatol, 30*(4 Suppl 73), S72-84.

Galarneau, D. , & Carrière, Y. . (2011). Delayed retirement: A new trend? Perspectives on Labour and Income. *Statistics Canada, 23*(4).

Garcia, P. P., & McCarthy, M. I. (1994). Measuring Health: A STEP IN THE DEVELOPMENT OF CITY HEALTH PROFILES. Copenhagen: World Health Organization, Regional Office For Europe.

Gelinas, Catherine, MacDermid, J., & Moodie, Sheila. (2014). A Scoping Review: Transitioning into Retirement with Chronic Health Disorders. *Sociology Study, Volume 6*(March).

Gignac, M. A., Backman, C. L., Davis, A. M., Lacaille, D., Cao, X., & Badley, E. M. (2013). Social role participation and the life course in healthy adults and individuals with osteoarthritis: are we overlooking the impact on the middle-aged? *Soc Sci Med, 81*, 87-93. doi: 10.1016/j.socscimed.2012.12.013

Goetzel, R., Staley, P., Ogden, L., Stange, P., Fox, J., Spangler, J.B., . . . Taylor, M. (2011). A framework for patient-centered health risk assessments – providing health promotion and disease prevention services to Medicare beneficiaries. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention.

Golden, S. D., & Earp, J. A. (2012). Social ecological approaches to individuals and their contexts: twenty years of health education & behavior health promotion interventions. *Health Educ Behav, 39*(3), 364-372. doi: 10.1177/1090198111418634

Goldman, D., & Smith, J. P. (2011). The increasing value of education to health. *Soc Sci Med, 72*(10), 1728-1737. doi: 10.1016/j.socscimed.2011.02.047

Government of Canada. (2010). *Economic and Fiscal Implications of Canada's Aging Population*.

Government of Ontario. (2007). *Preventing and Managing Chronic Diseases: Ontario's Framework*.

Gupta, S., Hawker, G. A., Laporte, A., Croxford, R., & Coyte, P. C. (2005). The economic burden of disabling hip and knee osteoarthritis (OA) from the perspective of individuals living with this condition. *Rheumatology (Oxford), 44*(12), 1531-1537. doi: 10.1093/rheumatology/kei049

Haukenes, I., Farbu, E. H., Riise, T., & Tell, G. S. (2014). Physical health-related quality of life predicts disability pension due to musculoskeletal disorders: seven years follow-up of the Hordaland Health Study Cohort. *BMC Public Health, 14*, 167. doi: 10.1186/1471-2458-14-167

Hayden, E., Roerecke, M., Giesbrecht, N., Rehm, J., & Kobus-Matthews, M. (2006). Chronic Diseases in Ontario and Canada: Determinants, Risk Factors and Prevention Priorities. *Ontario Chronic Disease Prevention Alliance and the Ontario Public Health Association*.

Haydon, E, Roerecke, M, Giesbrecht, N, Rehm, J, & Kobus-Matthews, M. (2006). Chronic disease in Ontario and Canada: determinant, risk factors, and prevention priorities. *Ontario Public Health Association*.

Health Canada. (2005). *The Integrated Pan-Canadian Healthy Living Strategy*.

Hill, P. L., Turiano, N. A., Hurd, M. D., Mroczek, D. K., & Roberts, B. W. (2011). Conscientiousness and longevity: an examination of possible mediators. *Health Psychol, 30*(5), 536-541. doi: 10.1037/a0023859

Himes, S. R., & Shannon, M. F. (2000). Assays for transcriptional activity based on the luciferase reporter gene. *Methods Mol Biol, 130*, 165-174.

IBM Corp. (Released 2011). *IBM SPSS Statistics for Windows*.

Jensen, J. C., Haahr, J. P., Frost, P., & Andersen, J. H. (2012). Do work-related factors affect care-seeking in general practice for back pain or upper extremity pain? *Int Arch Occup Environ Health*. doi: 10.1007/s00420-012-0815-z

Karnath, Bernard. (2003). Common Musculoskeletal Problems of the Upper Extremity. *Hospital Physician Journal,* http://www.turner-white.com.

Keehan, C. (2011). A foundation to build on. Though changes are likely, health reform law fills a niche, fulfills promises. *Mod Healthc, Suppl*, 50.

Keith, T.Z. (2006). *Multiple Regression and Beyond*. Boston, MA: Pearson Education, Inc.

Kelley-Moore, J. A., & Ferraro, K. F. (2005). A 3-D model of health decline: disease, disability, and depression among Black and White older adults. *J Health Soc Behav, 46*(4), 376-391.

Kelley-Moore, J. A., Schumacher, J. G., Kahana, E., & Kahana, B. (2006). When do older adults become "disabled"? Social and health antecedents of perceived disability in a panel study of the oldest old. *J Health Soc Behav, 47*(2), 126-141.

Kemp, B. J., Bateham, A. L., Mulroy, S. J., Thompson, L., Adkins, R. H., & Kahan, J. S. (2011). Effects of reduction in shoulder pain on quality of life and community activities among people living long-term with SCI paraplegia: a randomized control trial. *J Spinal Cord Med, 34*(3), 278-284. doi: 10.1179/107902611X12972448729486

Koh, H. K., & Sebelius, K. G. (2010). Promoting prevention through the Affordable Care Act. *N Engl J Med, 363*(14), 1296-1299. doi: 10.1056/NEJMp1008560

Krahn, G. L. (2011). WHO World Report on Disability: a review. *Disabil Health J, 4*(3), 141-142. doi: 10.1016/j.dhjo.2011.05.001

Lambert-Shute, J., & Fruhauf, C. A. (2011). Aging issues: unanswered questions in marital and family therapy literature. *J Marital Fam Ther, 37*(1), 27-36. doi: 10.1111/j.1752-0606.2009.00152.x

Latif, E. (2012). The impact of retirement on health in Canada. *Can Public Policy, 38*(1), 15-29.

Leclerc, A., Pascal, P., Chastang, J. F., & Descatha, A. (2013). Consequences of Musculoskeletal Disorders on Occupational Events: A Life-long Perspective from a National Survey. *J Occup Rehabil*. doi: 10.1007/s10926-013-9457-6

Lee, S. J. (2005). New approaches for preventing and treating chronic graft-versus-host disease. *Blood, 105*(11), 4200-4206. doi: 10.1182/blood-2004-10-4023

Levac, D., Colquhoun, H., & O'Brien, K.K. (2010). Scoping studies: advancing the methodology. *Implement Sci, 5*, 69. doi: 10.1186/1748-5908-5-69

Leveille, S. G., Jones, R. N., Kiely, D. K., Hausdorff, J. M., Shmerling, R. H., Guralnik, J. M., . . . Bean, J. F. (2009). Chronic musculoskeletal pain and the occurrence of falls in an older population. *JAMA, 302*(20), 2214-2221. doi: 10.1001/jama.2009.1738

Liang, J., Bennett, J. M., Shaw, B. A., Quinones, A. R., Ye, W., Xu, X., & Ofstedal, M. B. (2008). Gender differences in functional status in middle and older age: are there any age variations? *J Gerontol B Psychol Sci Soc Sci, 63*(5), S282-292.

Lix, L. M., Acan Osman, B., Adachi, J. D., Towheed, T., Hopman, W., Davison, K. S., & Leslie, W. D. (2012). Measurement equivalence of the SF-36 in the Canadian Multicentre Osteoporosis Study. *Health Qual Life Outcomes, 10*, 29. doi: 10.1186/1477-7525-10-29

MacDermid, J. C. (2001). Outcome evaluation in patients with elbow pathology: issues in instrument development and evaluation. *J Hand Ther, 14*(2), 105-114.

MacDermid, J. C., Solomon, P., & Prkachin, K. (2006). The Shoulder Pain and Disability Index demonstrates factor, construct and longitudinal validity. *BMC Musculoskelet Disord, 7*, 12. doi: 10.1186/1471-2474-7-12

MacDermid, J. C., Turgeon, T., Richards, R. S., Beadle, M., & Roth, J. H. (1998). Patient rating of wrist pain and disability: a reliable and valid measurement tool. *J Orthop Trauma, 12*(8), 577-586.

MacDermid, J.C. (2010). *The Patient-Rated Elbow Evaluation (PREE) User Manual*: School of Rehabilitation Science, McMaster University, Hamilton, Ontario; Clinical Research Lab, Hand and Upper Limb Centre, St. Joseph's Health Centre, London, Ontario, Canada.

MacDermid, J.C. (2007). *The Patient-Rated Wrist Evaluation (PRWE) User Manual*: School of Rehabilitation Science, McMaster University, Hamilton, Ontario; Clinical Research Lab, Hand and Upper Limb Centre, St. Joseph's Health Centre, London, Ontario, Canada.

Maller, C., Townsend, M., Pryor, A., Brown, P., & St Leger, L. (2006). Healthy nature healthy people: 'contact with nature' as an upstream health promotion intervention for populations. *Health Promot Int, 21*(1), 45-54. doi: 10.1093/heapro/dai032

Mäntyniemi, Anne, Oksanen, Tuula, Salo, Paula, Virtanen, Marianna, Sjösten, Noora, Pentti, Jaana, . . . Vahtera, Jussi. (2012). Job strain and the risk of disability pension due to musculoskeletal disorders, depression or coronary heart disease: a prospective cohort study of 69 842 employees. *Occupational and Environmental Medicine, 69*(8), 574-581. doi: 10.1136/oemed-2011-100411

McClure, P., & Michener, L. A. (October 2003). Measures of Adult Shoulder Function: The American Shoulder and Elbow Surgeons Standardized Shoulder Form Patient Self-Report Section (ASES), Disabilities of the Arm, Shoulder, and Hand (DASH), Shoulder Disability Questionnaire, Shoulder Pain and Disability Index (SPADI), and Simple Shoulder Test. *Arthritis & Rheumatism (Arthritis Care & Research), 49, No. 5S*, S50–S58.

Mehra, N. (2012). Falling Behind: A report of the Ontario common front. Toronto, Ontario, Canada: Ontario Common Front.

Michener, L. A., McClure, P. W., & Sennett, B. J. (2002). American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form, patient self-report section: reliability, validity, and responsiveness. *J Shoulder Elbow Surg, 11*(6), 587-594. doi: 10.1067/mse.2002.127096

Miranda, H., Kaila-Kangas, L., Heliovaara, M., Leino-Arjas, P., Haukka, E., Liira, J., & Viikari-Juntura, E. (2010). Musculoskeletal pain at multiple sites and its effects on work ability in a general working population. *Occupational and Environmental Medicine, 67*(7), 449-455. doi: 10.1136/oem.2009.048249

Morabia, A., & Abel, Thomas. (2006). The WHO report: Preventing Chrinic Disease: A vital investment. *International Journal of Public Health, 51*(2), 74.

Moussavi, S., Chatterji, S., Verdes, E., Tandon, A., Patel, V., & Ustun, B. (2007). Depression, chronic diseases, and decrements in health: results from the World Health Surveys. *Lancet, 370*(9590), 851-858. doi: 10.1016/S0140-6736(07)61415-9

Muggah, E., Graves, E., Bennett, C., & Manuel, D. G. (2012). The impact of multiple chronic diseases on ambulatory care use; a population based study in Ontario, Canada. *BMC Health Serv Res, 12*, 452. doi: 10.1186/1472-6963-12-452

Murphy, Brian, Zhang, Xuelin, & Dionne, Claude. (2012). Low Income in Canada: A Multi-line and Multi-index Perspective. *Statistics Canada Income Statistics Division*.

National Advisory Council on Aging. (2005). Seniors on the margins: Aging in poverty in Canada. . Ottawa, Ontario, Canada: Minister of Public Works and Government Services Canada.

National Institute on Aging, National Institutes of Health, US Department of Health & Human Resources. (2011). Global Health and Aging: World Health Organization (WHO).

National Institute on Aging, National Institutes of Health, US Department of Health & Human Resources. (2012). The Health & Retirement Study. http://hrsonline.isr.umich.edu/.

Nicholl, B. I., Macfarlane, G. J., Davies, K. A., Morriss, R., Dickens, C., & McBeth, J. (2009). Premorbid psychosocial factors are associated with poor health-related quality of life in subjects with new onset of chronic widespread pain - results from the EPIFUND study. *Pain, 141*(1-2), 119-126. doi: 10.1016/j.pain.2008.10.022

Noone, J. H., Stephens, C., & Alpass, F. (2010). The Process of Retirement Planning Scale (PRePS): development and validation. *Psychol Assess, 22*(3), 520-531. doi: 10.1037/a0019512

Okunribido, O., & Wynn, T. (2010). Ageing and work-related musculoskeletal disorders: A review of the recent literature. In H. S. Executive (Ed.). Norwich, UK: Health and Safety Laboratory.

Pandey, Vasundhara, Chakraborty, Tania, & Mukhopadhyay, Suman. (2012). Prevalence of musculoskeletal disorders, levels of physical activity and perceived quality of life amongst construction site managers in Mumbai – A case study. *Work: A Journal of Prevention, Assessment and Rehabilitation*. doi: 10.3233/DMA-2012-1461

Pignal, J, Arrowsmith, C, & Ness, A. (2008). *First Results from the Survey of Older Workers, 2008*. Ottawa, Canada: Statistics Canada.

Pit, S. W., Shrestha, R., Schofield, D., & Passey, M. (2010). Health problems and retirement due to ill-health among Australian retirees aged 45-64 years. *Health Policy, 94*(2), 175-181. doi: 10.1016/j.healthpol.2009.09.003

Pitulainen, Kirsi, J, Ylinen, Kautiainen, H., & Hakkinen, A. (2012). The relationship between functional disability and health-related quality of life in patients with a rotator cuff tear. *Disability and Rehabilitation, 34*(24), 2071-2075. doi: doi:10.3109/09638288.2012.670363

Preparing for the Silver Tsunami. (2006). *Alliance for Aging Research, Alliance Views,* http://www.agingresearch.org/content/article/detail/826.

Pruchno, R. A., Wilson-Genderson, M., & Cartwright, F. P. (2012). The texture of neighborhoods and disability among older adults. *J Gerontol B Psychol Sci Soc Sci, 67*(1), 89-98. doi: 10.1093/geronb/gbr131

Public Health Agency of Canada. (2004). What determines Health? Ottawa, Ontario, Canada: Government of Canada. http://www.phac-aspc.gc.ca/ph-sp/determinants/index-eng.php.

Public Health Agency of Canada. (2010). *Life With Arthritis in Canada: A personal and public health challenge. Canadian Community Health Survey; 2007-2008*. Ottawa, Ontario, Canada.

Public Works Government Services Canada. (2005). Seniors on the margins: Aging in poverty in Canada. *National Advisory Council on Aging*.

Reginster, J. Y., & Khaltaev, N. G. (2002). Introduction and WHO perspective on the global burden of musculoskeletal conditions. *Rheumatology (Oxford), 41 Supp 1*, 1-2.

Rice, N. E., Lang, I. A., Henley, W., & Melzer, D. (2011). Common health predictors of early retirement: findings from the English Longitudinal Study of Ageing. *Age Ageing, 40*(1), 54-61. doi: 10.1093/ageing/afq153

Roux, C. H., Guillemin, F., Boini, S., Longuetaud, F., Arnault, N., Hercberg, S., & Briancon, S. (2005). Impact of musculoskeletal disorders on quality of life: an inception cohort study. *Annals of the Rheumatic Diseases, 64*(4), 606-611. doi: 10.1136/ard.2004.020784

Salaffi, F., Carotti, M., & Grassi, W. (2005). Health-related quality of life in patients with hip or knee osteoarthritis: comparison of generic and disease-specific instruments. *Clin Rheumatol, 24*(1), 29-37. doi: 10.1007/s10067-004-0965-9

Salaffi, F., De Angelis, R., Stancati, A., Grassi, W., Pain, M. Arche, & Prevalence, INvestigation Group study. (2005). Health-related quality of life in multiple musculoskeletal conditions: a cross-sectional population based epidemiological study. II. The MAPPING study. *Clin Exp Rheumatol, 23*(6), 829-839.

Salonen, Paula Hannele, Arola, Heikki, Nygård, Clas-Håkan, & Huhtala, Heini. (2007). Long-term associations of stress and chronic diseases in ageing and retired employees. *Psychol Health Med, 13*(1), 55-62. doi: 10.1080/13548500701335680

Sangha, O., Stucki, G., Liang, M. H., Fossel, A. H., & Katz, J. N. (2003). The Self-Administered Comorbidity Questionnaire: a new method to assess comorbidity for clinical and health services research. *Arthritis Rheum, 49*(2), 156-163. doi: 10.1002/art.10993

Saunders, S. L., & Nedelec, B. (2013). What Work Means to People with Work Disability: A Scoping Review. *J Occup Rehabil*. doi: 10.1007/s10926-013-9436-y

Schoeni, R. F., Buchmueller, T. C., & Freedman, V. A. (2011). Socioeconomic Status and Health Over the Life Course and Across Generations: Introduction to a Special Issue and Overview of a Unique Data Resource. *B E J Econom Anal Policy, 11*(3). doi: 10.1515/1935-1682.3444

Schofield, D. J., Kelly, S. J., Shrestha, R. N., Callander, E. J., Percival, R., & Passey, M. E. (2011). How depression and other mental health problems can affect future living standards of those out of the labour force. *Aging Ment Health, 15*(5), 654-662. doi: 10.1080/13607863.2011.556599

Schofield, D. J., Shrestha, R. N., Passey, M. E., Earnest, A., & Fletcher, S. L. (2008). Chronic disease and labour force participation among older Australians. *Med J Aust, 189*(8), 447-450.

Schofield, D. J., Shrestha, R. N., Percival, R., Kelly, S. J., Passey, M. E., & Callander, E. J. (2011). Quantifying the effect of early retirement on the wealth of individuals with depression or other mental illness. *Br J Psychiatry, 198*(2), 123-128.

Shrira, A. (2012). The effect of lifetime cumulative adversity on change and chronicity in depressive symptoms and quality of life in older adults. *Int Psychogeriatr, 24*(12), 1988-1997. doi: 10.1017/S1041610212001123

Shrira, A., Palgi, Y., Ben-Ezra, M., Spalter, T., Kave, G., & Shmotkin, D. (2011). For better and for worse: the relationship between future expectations and functioning in the second half of life. *J Gerontol B Psychol Sci Soc Sci, 66*(2), 195-203. doi: 10.1093/geronb/gbq103

Silverstein, M., & Giarrusso, R. (2010). Aging and Family Life: A Decade Review. *J Marriage Fam, 72*(5), 1039-1058. doi: 10.1111/j.1741-3737.2010.00749.x

Simonsick, E. M., Montgomery, P. S., Newman, A. B., Bauer, D. C., & Harris, T. (2001). Measuring fitness in healthy older adults: the Health ABC Long Distance Corridor Walk. *Journal of the American Geriatrics Society, 49*(11), 1544-1548.

Skinner, C. S., Kreuter, M. W., Kobrin, S., & Strecher, V. J. (1998). Perceived and actual breast cancer risk: optimistic and pessimistic biases. *J Health Psychol, 3*(2), 181-193. doi: 10.1177/135910539800300203

Statistics Canada. (2008). *Canadian Community Health Survey*. Ottawa, ON.

Statistics Canada. (2011). *Perspective on Labour and Income*.

Statistics Canada. (2012). The Canadian Population in 2011: Age and Sex, 2011 Census (Vol. Catalogue no.98-311-X2011001). Ottawa, Ontario, Canada.

Subramanian, S. V., Huijts, T., & Avendano, M. (2010). Self-reported health assessments in the 2002 World Health Survey: how do they correlate with education? *Bull World Health Organ, 88*(2), 131-138. doi: 10.2471/BLT.09.067058

Tay, L., Tan, K., Diener, E., & Gonzalez, E. (2013). Social relations, health behaviors, and health outcomes: a survey and synthesis. *Appl Psychol Health Well Being, 5*(1), 28-78. doi: 10.1111/aphw.12000

The Conference Board of Canada. (2012). Ontario's Economic and Fiscal Prospects: Challenging Times Ahead. Ontario, Canada. February; http://www.e-library.ca.

Thomas, E., Mottram, S., Peat, G., Wilkie, R., & Croft, P. (2007). The effect of age on the onset of pain interference in a general population of older adults: prospective findings from the North Staffordshire Osteoarthritis Project (NorStOP). *Pain, 129*(1-2), 21-27. doi: 10.1016/j.pain.2006.09.027

Torrance, N., Smith, B. H., Lee, A. J., Aucott, L., Cardy, A., & Bennett, M. I. (2009). Analysing the SF-36 in population-based research. A comparison of methods of statistical approaches using chronic pain as an example. *J Eval Clin Pract, 15*(2), 328-334. doi: 10.1111/j.1365-2753.2008.01006.x

Treaster, D. E., & Burr, D. (2004). Gender differences in prevalence of upper extremity musculoskeletal disorders. *Ergonomics, 47*(5), 495-526. doi: 10.1080/00140130310001638171

University of Michigan. (2007). Health and Retirement Study (HRS): Growing Older in America: The Health and Retirement Study. : National Institute on Aging, National Institutes of Health, U.S. Department of health and Human Services. No. 07-5757.

van Dijk, G. M., Veenhof, C., Schellevis, F., Hulsmans, H., Bakker, J. P., Arwert, H., . . . Dekker, J. (2008). Comorbidity, limitations in activities and pain in patients with osteoarthritis of the hip or knee. *BMC Musculoskelet Disord, 9*, 95. doi: 10.1186/1471-2474-9-95

van Weel, C, & Hartman, TO. (28 Jul 2009). The paradox of specialists (e-letter). . http://www.annfammed.org/cgi/eletters/7/4/293 - 11025.

Vela, L. I., & Denegar, C. (2010). Transient disablement in the physically active with musculoskeletal injuries, part I: a descriptive model. *J Athl Train, 45*(6), 615-629.

Wagner, E. H. (2001). Meeting the needs of chronically ill people. *BMJ, 323*(7319), 945-946.

Wesseling, J., Welsing, P. M., Bierma-Zeinstra, S. M., Dekker, J., Gorter, K. J., Kloppenburg, M., . . . Bijlsma, J. W. (2013). Impact of self-reported comorbidity on physical and mental health status in early symptomatic osteoarthritis: the CHECK (Cohort Hip and Cohort Knee) study. *Rheumatology (Oxford), 52*(1), 180-188.

WHO. (1986). *The Ottawa Charter for Health Promotion.* http://www.who.int/healthpromotion/conferences/previous/ottawa/en/index.html.

WHO. (2001a). *ICF : International classification of functioning, disability and health / World Health Organization* (Vol. iii, 299 p. : ill. ; 25 cm). Geneva: World Health Organization.

WHO. (2001b). World Health Organization: International Classification of Functioning, Disability and Health. Genova.

WHO. (2002). Report of the World Health Organization. Active ageing: a policy framework. *Aging Male, 5*(1), 1-37.

WHO. (2005). Preparing a health care workforce for the 21st century: the challenge of chronic conditions. France: Noncommunicable Diseases and Mental Health Cluster Chronic Diseases and Health Promotion Department.

Wittink, H., Goudas, L., & Strassels, S. & et al. (2004). Outcome measurement in pain medicine. In W. C. B. Z. (eds) (Ed.), *Principles and practice of pain medicine* (pp. 69–82.). New York: McGraw Hill.

Woolf, A. D. (2003). The bone and joint decade. strategies to reduce the burden of disease: the Bone and Joint Monitor Project. *J Rheumatol Suppl, 67*, 6-9.

Woolf, A. D., Erwin, J., & March, L. (2012). The need to address the burden of musculoskeletal conditions. *Best Pract Res Clin Rheumatol, 26*(2), 183-224.

Woolf, A. D., & Pfleger, B. (2003). Burden of major musculoskeletal conditions. *Bull World Health Organ, 81*(9), 646-656.

World Health Organization. (2008). Healthy Ageing Profiles: Guidance for producing local health profiles of older people. In L. Kanstrom, G. Zamaro, A. Sjostedt & G. Green (Eds.).

Yen, L., McRae, I., Jeon, Y. H., Essue, B., & Herath, P. (2011). The impact of chronic illness on workforce participation and the need for assistance with household tasks and personal care by older Australians. *Health Soc Care Community, 19*(5), 485-494. doi: 10.1111/j.1365-2524.2011.00994.x

Chapter 3

Evaluating the impact of comorbid upper extremity musculoskeletal disorders on the lives of those transitioning towards retirement (50-65).

Introduction

The global aging as evidenced by the fact that those 65 years and older are becoming the fastest-growing age demographic. In 2010, an estimated 8% of the world's population was aged 65 and over (National Institute on Aging, 2011). By 2050, this number is expected to rise to an estimated 16% of the population (National Institute on Aging, 2011). While much research focuses on older adults over retirement age, little research has focused directly on those transitioning into retirement, which commonly occurs between the ages of 50 to 65 (Gelinas, MacDermid, & Moodie, 2014). Health status while transitioning towards retirement can be a determinant of most retiree's options, of post-retirement health needs and resources, and the anchor for post-retirement quality of life.

For all people health does not mean the absence of illness, disease, or disability. Instead, adults who live with chronic diseases and experience potential functional limitations restricting their ability to do the things planned for the retirement years (Wittink, Goudas, & Strassels, 2004). The World Health Organization (WHO) has classified health and disability through the International Classification of Functioning, Disability and Health (ICF) which provides a unified and standard language for a framework that describes health and health-related states (WHO, 2001a). The term health status refers to the level of health of the individual, group, or population as subjectively assessed by the individual (WHO, 2001a).

While related, measures of health status and quality of life are different. The measure of health outcomes considered suitable, as reported by the WHO, for a wide spectrum of health conditions including musculoskeletal disorders has been the Medical Outcomes Study 36 (SF-36) (Beaton & Schemitsch, 2003; Bergman, Jacobbson, & Herrstom, 2003; Garcia & McCarthy, 1994; Roux et al., 2005). Physical health status as measured by the

SF-36 has been shown to predict transition to disability or pension status due to musculoskeletal joint disorders (Haukenes, Farbu, Riise, & Tell, 2014). Since labour force (occupational) participation is in a time of transition for middle-aged (50-65) adults, work can be a positive factor in health but also potentially a health limitation. The SF-36 can reflect the impact of coexisting comorbidity, pain, and functional disorders. Understanding the multifactorial relationships during this time of transition is important to facilitating a more effective transition into healthy retirement.

Chronic diseases are becoming the rule rather than the exception. The WHO reports the parallel between the growth in the number of chronic diseases with the growth of the aging population, and the increased risk of disability (WHO, 2001b). Major chronic diseases affecting millions of people worldwide include heart and stroke (cardiovascular diseases); cancer; asthma and chronic obstructive pulmonary disease (chronic respiratory diseases); diabetes; and musculoskeletal joint disorders (Krahn, 2011). It has been estimated that over 50% of all years lived with chronic diseases and disability are in low to middle-income countries (Krahn, 2011). Patterns of disability are behind the rise in chronic diseases and are influenced by a complex collection of social, economic, and behavioral factors (i.e. alcohol use and smoking) (Hayden et al., 2006). These factors can contribute to adverse trends in health during the transitional stages of retirement. They often present a diversity of additional challenges when coexisting with levels of pain, fatigue, and physical functioning, all leading to the possibility of being disabled (Hayden et al., 2006).

Musculoskeletal disorders (MSKD) can influence changes in a person's employment status during the peri-retirement (transitioning) period. Several studies have recorded differences in the impact of various diseases and conditions on physical health outcomes. Arthritis and musculoskeletal joint disorders follow heart disease and stroke in their impact on health related outcomes (Reginster & Khaltaev, 2002). These conditions are some of the main causes of activity restriction due to pain and impaired functioning and often occur at multiple sites simultaneously with effects not only to physical and mental health but additionally to a diminished quality of life (Woolf & Pfleger, 2003). Employment status, community mobility, leisure activities, social activities, and close

relationships are most frequently mentioned as being affected (Fredman et al., 2008).

Although there has been substantial literature, with an emphasis on post-retirement, few studies have focused on health outcomes during the peri-retirement period. With the increasing cohort of older adults approaching retirement understanding this transition becomes more imperative. The purpose of this study will be to examine the relationship and impact that comorbidity, pain, and function have on the physical and mental health outcomes of women and men, aged 50 – 65, and living with musculoskeletal disorders, specific to upper extremity joint disorders (UED).

Methods

Study Sample

This retrospective cohort was assembled from the data collected between 1994 -2012 from St. Joseph's Health Care ~ Roth | McFarlane Hand and Upper Limb Centre, London, Ontario, Canada. Study data included cases from joint specific areas that included the shoulder, elbow, and wrist. The Health Sciences Review Ethics Board at Western University and The Lawson Health Research Institute of London, Ontario, Canada approved the use of the secondary data within this study.

A preliminary evaluation of this database (n=2,329) suggested that the variables of age, gender, and occupational status, measured from baseline to two years post joint event, would be viable as potential predictors, based on the prevalence of this data within the sample.

Data Collection

Participants from prospective cohort studies routinely completed self-report health outcome instruments. For this study a database was created using cases from these pre-existing studies to form a study cohort of patients (women/men) with shoulder, elbow, or wrist events. Patients were then extracted from this database if they had data for the predictors of interest: age group of 50-65, occupational status, comorbidity, pain, upper extremity function, and the physical and mental health status scores utilizing the SF-36 Physical and Mental Component Summary Scores as described in *Table 1*. Of the

original 2,329 participants within the sampling frame, data that matched this study's purpose led to a sample of 956 participants who met these inclusion criteria. All data was entirely de-identified prior to analysis.

Table 1. SF-36: Number of items measuring health across eight domains

SF-36 Scales	Number of Items
Summary Scales Evaluating Physical Health	
Physical Function	10
Role-Physical	4
Bodily Pain	2
General Health	5
Summary Scales Evaluating Mental Health	
Vitality	4
Social Functioning	2
Role-Emotional	3
Mental Health	5
General Health Question	1

Statistical Analysis

All data were inspected against original patient assessments to verify accuracy of data entry. The data quality for this study's database was evaluated by exploring descriptive analyses of all variables of interest, inclusive of socio-demographic characteristics (see *Table 2*). This included: frequency distributions examining outliers, cross-tabulations examining the patterns of interaction between all variables inclusive of the demographics of age, gender, and occupational status, and rechecking patient data against the original database. The variable "occupational status" was coded as an ordinal variable highlighting how response patterns vary across subgroups. Ordinal variables are described by frequency counts and are not normally appropriate for linear regressions but it was determined the consequences of possible bias was not too serious as the categories of unpaid work, unemployed, and employed represents approximated equal intervals. All data was entered and analyzed in SPSS version 20, a software package used for statistical analysis (IBM Corp, Released 2011).

Table 2. Socio-demographic characteristics of study population (n=956)

Age, mean (SD)	57.56	(4.45)
Gender (%)		
Female	601	62.9%
Male	355	37.1%
Work Status (%)		
Retired	198	20.70%
Homemaker	56	5.90%
Unemployed, Inability to find a job	12	1.30%
Unable to work, other med. reasons	35	3.70%
Unable to work due to injury	97	10.10%
Part-time light duties	23	2.40%
Full-time light duties	21	2.20%
Part-time regular duties	46	4.80%
Full-time regular duties	197	20.60%
Unknown	271	28.30%
Education Level (%)		
Grade School	82	8.58%
High School	456	47.70%
College/Tech/Diploma	236	24.68%
University	130	13.60%
Graduate	52	5.44%
Lifestyle		
Smoking		
No	563	58.89%
I Quit	246	25.73%
Yes	145	15.17%
Unknown	2	.21%
Alcohol		
Never	320	33.48%
Occasionally	408	42.68%
1-6 drinks/week	136	14.22%
7-14 drinks/week	70	7.32%
15+ drinks/week	22	2.30%

We then explored the association between comorbidity, pain, and function by performing a series of linear regressions with the Physical and Mental Health Component Scores as the dependent variables. A hierarchical linear regression model was used as it takes into account the potential data are related to one another in some manner as scores for the predictor variables of comorbidity, pain, and function were constructed by aggregating subscales of self-report health measures of Self-Administered Comorbidity Questionnaire (SCQ) and the Hand & Upper Limb Centre's Intake Evaluation Checklist (HULC) (see

Table 3), Patient Rated Wrist Evaluation (PRWE), Patient Rated Elbow Evaluation (PREE), American Shoulder and Elbow Surgeons (ASES) Assessment, Shoulder Pain and Disability Index (SPADI), and Western Ontario Rotator Cuff Index (WORC) (see *Tables 4 & 5*). The measures of joint-specific function varied by condition and were all adjusted to a common metric (0-100%) to allow for cross-condition linear regression models to be calculated.

The order of entry in this linear regression is significant as variables entered first will appear more important that those entered later and the regression coefficients for each variable can be interpreted as the total effect of the variable on the outcome both direct and indirect effects (Keith, 2006). It was determined after a review of the literature which observed that comorbid disorders have a tendency to present symptoms of pain and function resulting in decreased physical and mental health outcomes (Bergman, Jacobsson, Herrstrom, & Petersson, 2004; Haukenes et al., 2014; Nicholl et al., 2009; Rice et al., 2011).

To estimate the paths to physical and mental health outcomes we regressed the following variables, (1) those living with co-existing comorbidity (yes/no); (2) pain; (3) function and lastly (4) occupational status, (5) woman gender, and (6) age that can be considered as mediating variables. Paths to comorbidity, pain, and function were estimated by regressing occupational status, female gender and age indicating the relevant regression results in a full joint model for shoulder, elbow, and wrist (see *Figure 1)* and three joint specific models; shoulder (*Figure 2*); elbow (*Figure 3*) and wrist (*Figure 4*). In order to identify multicollinearity, the Variance Inflation Factor (VIF) was used. If the VIF is greater than 5 it is generally considered evidence that there is high correlation of at least one independent variable with a combination of the other independent variables. The VIF is calculated by 1 divided by 1 minus r^2 (Field, 2013).

Measures of Physical Health and Well-being

The SF-36 is a self-administered questionnaire containing 36 items and measures health on eight dimensions covering functional status, well-being, and an overall evaluation of physical and mental health components (see *Table 1*) (Torrance et al., 2009). The SF-36

subscales are scored on a scale from 0 (worst possible health) to 10 (best possible health) and summary scores being normed scores where the overall population norm is 50 – 65 years of age (Torrance et al., 2009).

Measures of Comorbidity

Two measures were used in evaluating comorbidity. They included the Self-Administered Comorbidity Questionnaire (SCQ), a standardized and validated measure of morbidity (Sangha, Stucki, Liang, Fossel, & Katz, 2003) and in early cases the use of a custom-designed Intake Evaluation Checklist (HULC) for patients attending the Roth | McFarland Hand and Upper Limb Centre (see *Table 3*). The SCQ and HULC Intake Evaluation Checklist are self-administered measures of comorbidity that allows the participant to note the comorbidity, severity, and perception of its impact on function (Sangha et al., 2003). For this study the predictor variable measuring comorbidity was computed using data from the SCQ question "Do you have any of the following problems?" which was asked in relation to thirteen disorders as listed in *Table 3*. In addition, a comorbidity summary scale was created with the use of scores from the following four questions, taken from the HULC Intake Evaluation Checklist, which were substituted where SCQ scores were blank. The questions incorporated were: "Do you have heart problems? Do you have arthritis? Do you have diabetes? Do you have other problems?" (see *Table 3*).

Table 3. Comorbidity Measures

Self-Administered Comorbidity Measure (SQC)						
	Do you have the problem?		Do you receive treatment for it?		Does it limit your activities?	
Heart disease	No	Yes	No	Yes	No	Yes
High blood pressure	No	Yes	No	Yes	No	Yes
Lung disease	No	Yes	No	Yes	No	Yes
Diabetes	No	Yes	No	Yes	No	Yes
Ulcer or stomach disease	No	Yes	No	Yes	No	Yes
Kidney disease	No	Yes	No	Yes	No	Yes
Liver disease	No	Yes	No	Yes	No	Yes
Anemia or other blood disease	No	Yes	No	Yes	No	Yes
Cancer	No	Yes	No	Yes	No	Yes

Depression	No	Yes	No	Yes	No	Yes
Osteoarthritis, degenerative arthritis	No	Yes	No	Yes	No	Yes
Back pain	No	Yes	No	Yes	No	Yes
Rheumatoid arthritis	No	Yes	No	Yes	No	Yes
Other medical problems	No	Yes	No	Yes	No	Yes
HULC Intake Evaluation Checklist						
	Do you have the problem?		Do you receive treatment for it?		Does it limit your activities?	
Heart	No	Yes	No	Yes	No	Yes
Arthritis	No	Yes	No	Yes	No	Yes
Diabetes	No	Yes	No	Yes	No	Yes
Other problems	No	Yes	No	Yes	No	Yes

Measures of Pain and Function

Five upper extremity measures were used with a range of items that delineated the requirements for this study's predictor variables, that of "pain" and "function". The aggregated outcome measures indicated sub-scale values that represented specific questions for pain and function as shown in *Tables 4 and 5*.

The first two measures included the Patient Rated Wrist Evaluation (PRWE) with a rating scale of patients with wrist pain and function conditions (MacDermid, 2007) and the Patient Rated Elbow Evaluation (PREE) which is a measurement of patient reported elbow pain and function (MacDermid, 2010). Inclusive within the pain scale for both the PRWE and PREE were two 5-item subscales, as noted in *Table 4,* that were matching and scored from 0 – 10 with lower scores indicating a perceived level of least to worse for both measurement tools.

The function scale was measured for domains of "specific activities" and "usual activities". The "specific activities" subscales were outlined in the PRWE measure with a 6-item subscale and the PREE measure with an eleven-item subscale, both of which had similar contextual content that measured the extent of difficulty in performing specific tasks (see *Table 5*). The "usual activities" evaluation for both PRWE and PREE remained as a matching 4-item subscale as seen in *Table 5* and indicated the amount of difficulty experienced prior to the start of the wrist and/or elbow condition. The sub-

scales for function maintained a score rated on a scale of 0 -10 as with pain sub-scales noted above. Both the PRWE (MacDermid, Turgeon, Richards, Beadle, & Roth, 1998) and PREE (MacDermid, 2001) have been previously demonstrated to be excellent reliable and valid indicators, with ICC scores > 0.90, measuring pain and function associated with elbow and wrist conditions (MacDermid, 2001; MacDermid et al., 1998).

The third measure of pain and disability was the American Shoulder and Elbow Surgeons (ASES) Assessment, a standardized and endorsed assessment tool (Michener, McClure, & Sennett, 2002), with tested reliability ICC scores > 0.84. It measures patient-related shoulder pain from a single pain question and a 8-item measure for function (McClure & Michener, October 2003) as shown in *Tables 4 & 5*. The pain and function subscale scores are weighted equality with 50 points each with a combined score of 100 points (Michener et al., 2002). Previous studies have supported the validity of the ASES with results indicating significant correlations with various joint specific shoulder measurements and as a scale that addresses pain coping behaviour (Michener et al., 2002).

The fourth measure of pain was the Shoulder Pain and Disability Index (SPADI) which was developed to measure shoulder pain and disability. Research has demonstrated the SPADI to have high reliability coefficients (ICC) > 0.89 and internal consistency with Cronbach α on average exceeding 0.90 (Breckenridge & McAuley, 2011). It has also demonstrated construct validity by its significant correlation with other joint specific shoulder measures and is a useful tool for a wide range of in-clinic patients (Breckenridge & McAuley, 2011; MacDermid, Solomon, & Prkachin, 2006).

The SPADI contains a 5-item subscale that measures pain and closely resembles itemized pain items of the PRWE and PREE measures as shown in *Table 4*. The disability subscale was measured with 8-items and resembled the PRWE and PREE in similar context as shown in *Table 5*. The sub-scales for pain and function are scored on a scale of 0-10 with lower scores indicating a perceived level of pain from least to worse.

Lastly, the fifth measure of pain and disability was the Western Ontario Rotator Cuff Index (WORC), a disease-specific measurement tool for those with rotator cuff

conditions. Research has shown the WORC as a responsive measure indicating values of reliability, ICC > 0.95, and validity with Pearson's r > .90 (de Witte, Henseler, Nagels, Vliet Vlieland, & Nelissen, 2012), and is applicable in research and clinical practice as a self-report outcome measurement tool (de Witte et al., 2012).

The WORC is comprised of 21 items in 5 domains with physical symptoms (6 items), sports and recreation (4 items), work (4 items), lifestyle (4 items) and emotions (3 items) (de Witte et al., 2012). The available data was in the form of subscale scores for each domain. This study utilized the physical symptoms domains (6 items), which were considered comparable to the pain predictor variable as shown in *Table 4*. A grouping of the subscale data for the domains of Work, Lifestyle, and Sports/Recreation were used for the function scale (see *Table 5)* and represent the areas of "specific activities" and "usual activities". Each item is scored in that the higher the rating, the higher the negative effect with a maximum score leading to total outcomes ranging from 0 (worst possible) to 100 (best possible) (de Witte et al., 2012).

Results

After exploring the socio-demographical variables (*see Table 2*) through descriptive analysis, it was determined from the available data and this study's objective that the variables of age (50-65), gender, and occupational status, measured from base-line to 2 years post joint event, would be used as predictors in the linear regression models.

Summary results of multiple regression path analyses (see *Table 6~A & B)* indicated a close association between the ability to function and its impact on the patient's physical and mental health status by four major findings: (1) physical and mental disability increases significantly with lower levels of functional capacity; (2) this effect is also predicated on higher levels of pain and its significant interaction with functional capacity; (3) women had higher rates of pain in conjunction with impairments to functional capacity especially due to shoulder ($p < .001$) and wrist ($p < .010$); (4) aging with an UED found patients experiencing a shift in their occupational status from full-time work to either disability or retirement. The predictor power of UED on changes in occupational status was particularly strong for women, as compared to men.

Table 4. **Pain Scale**
Subscale values acquired from outcome measures in context with specific questions

PRWE & PREE	
Pain Scale How severe is your pain?	Rating: 0 – 10 Least to Worse
1. At its worst	
2. At rest	
3. When lifting a heavy object	
4. When doing a task with a repeated movement	
5. How often do you have pain	
ASES	
How bad is your pain?	Rating: 0 - 50
No pain at all	Pain as bad as it can be
SPADI	
Pain Scale How severe is your pain?	Rating: 0 – 10 Least to Worse
1. At its worst	
2. When lying on involved side	
3. Reaching for something on a high shelf	
4. Touching back of neck	
5. Pushing with involved arm	
WORC	
1. How much sharp pain do you feel in your shoulder	
2. How much constant, nagging pain do you experience in your shoulder	
3. How much weakness do you experience in your shoulder	
4. How much stiffness or lack of range of motion do you experience in your shoulder	
5. How much are you bothered by clicking, grinding, or crunching in your shoulder	
6. How much discomfort do you experience in the muscles in your neck because of your shoulder	

Table 5. **Function Scale**:
Subscale values from outcome measures in context with specific questions

Specific Activities		
PRWE	***PREE***	***ASES***
Turn doorknob Cut meat with a knife	Turn doorknob and open door Throw a small object such as a tennis ball Use a telephone Eat with a fork or spoon	
Carry a 10lb object	Pull a heavy object Carry a 10lb object with arms at side	Lift a 10lb object Throw a ball overhead
Fasten buttons on shirts	Do up buttons on front of shirts Tie shoe	Put on a coat Reach for high shelf
Use bathroom tissue	Comb hair Wash opposite armpit	Wash back or do up bra in back Manage toileting Comb hair
Push up from a chair	Use arm to rise from a chair	Sleep on painful or affected side
SPADI	**WORC (Work, Lifestyle, Sports /Recreation)**	
Placing an object on a high shelf Removing something	Doing push-ups or other strenuous shoulder exercises Ability to throw hard or far	
Carrying a heavy object of 10lb	Lifting heavy objects at or below the shoulder	
Putting on an undershirt or pullover sweater Putting on a shirt that buttons down the front Putting on your pants Washing your back Washing your hair	Working over your shoulder Use uninvolved arm to compensate for your injured one Styling your hair Dressing or undressing	
Usual Activities		
PRWE & PREE	***ASES***	***WORC***
Personal care activities Household work Work (job or usual everyday work) Recreational activities	Do usual work Do usual sport	Sleeping Daily activities about the house & yard Affect your fitness level Coming in contact with your shoulder Roughhousing or horsing around" with family or friends

Table 6 ~ A: Summary of Linear Regression Analysis for Predicting Physical Health Outcomes

	Full Model (n=536)			***Shoulder (n=96)***			***Elbow (n=115)***			***Wrist (n=325)***		
Variables	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Comorbidity	.09	1.02	.004	-1.17	2.78	-.04	-5.35	2.75	-.20*	1.37	.99	.08
Pain	-.18	.16	-.08	-.14	.37	-.06	.20	.31	.09	-.53	.18	-.27**
Function	.35	.10	.24***	.87	.26	.55***	-.02	.19	-.01	.45	.11	.38***
Occupational Status	-1.06	.45	-.10*	1.36	1.31	.10	-1.96	1.18	-.19	-1.31	.46	-.16**
Age	.10	.25	.02	.94	.62	.14	-.23	.51	-.05	-.05	.26	-.01
Female Gender	4.05	2.27	.08	7.57	6.43	.11	5.11	4.54	.11	1.0	2.64	.02
R^2		.06			.28			.07			.08	
Adjusted R^2		.05			.23			.02			.07	
F for change In R^2		5.70 ***			5.78 ***			1.29			4.79 ***	

Occupational Status: variable categories: ***Unpaid*** (retired, homework student), ***Unemployed*** (inability to find work, other med. reasons, due to injury), ***Part-time Light Work, Full-time Light Work, Part-time Regular Work, and Full-time Regular Work***

Table 6 ~ B: Summary of Linear Regression Analysis for Predicting Mental Health Outcomes

	Full Model (n=536)			***Shoulder (n=96)***			***Elbow (n=115)***			***Wrist (n=325)***		
Variables	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Comorbidity	-.38	.88	-.02	-2.25	2.32	-.09	-2.90	2.53	-.12	.78	.86	.05
Pain	-.01	.14	-.01	.16	.31	.08	.11	.29	.05	-.32	.16	-.19*
Function	.21	.09	.17*	.63	.21	.46**	.07	.18	.05	.25	.10	.25**
Occupational Status	-.62	.39	-.07	.79	1.10	.07	-1.41	1.09	-.14	-.87	.40	-.12*
Age	.06	.21	.01	.86	.52	.15	-.04	.47	-.01	-.16	.23	-.04
Female Gender	.09	1.95	.002	8.33	5.38	.14	11.71	4.17	.26**	1.09	2.29	.03
R^2		.04			.32			.10			.04	
Adjusted R^2		.02			.27			.05			.02	
F for change In R^2		3.26 **			6.95 ***			2.06			2.12 *	

Occupational Status: variable categories: ***Unpaid*** (retired, homework student), ***Unemployed*** (inability to find work, other med. reasons, due to injury), ***Part-time Light Work, Full-time Light Work, Part-time Regular Work, and Full-time Regular Work***

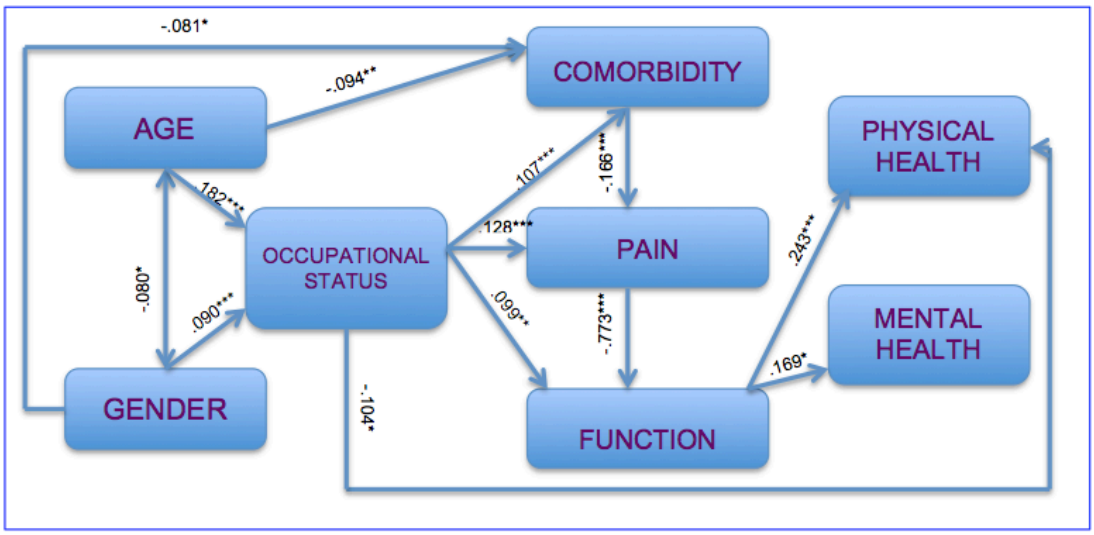
Association Between Comorbidity, Pain, and Function to SF-36 Physical & Mental Health ~ Shoulder, Elbow, and Wrist

Two multiple regressions, both evaluated against an alpha of .010 (n = 956), indicated multicollinearity was not present in each of the models (*VIF* = 1.06 for comorbidity, 2.73 for pain level, and 2.68 for function). Results of the first regression analysis (see *Table 6~A*) suggested that greater upper extremity disability (β = .24; $p < .001$) and changing levels of occupational status towards disability or retirement (β = -.10; $p < .05$) had a

direct effect on a poorer physical health status while comorbidity, pain, age, and female gender demonstrated as indirect effects (see *Figure 1*).

The model suggested that when taking into account the variables of comorbidity, pain, occupational status, and age, women with increased pain levels experienced a larger decrease (as compared to men) in their ability to function leading to lower work participation ranging from full-time regular work towards disability or retirement. This, in turn, indicated that less participation in the work force is associated with an overall lower physical health status. The probability values were statistically significant for these coefficients indicating that function ($p < .001$) and occupational status ($p < .05$) are better predictors of physical health outcomes, than comorbidity, pain, age, and gender. Within this set of variables, therefore, the best fitting model for predicting physical health is a multivariate linear regression model of comorbidity, pain, and function that adjusts for occupational status, age group (50-65) and gender at $p < .001$ (see *Table 6~A*). The overall results indicated a weak association with a 6.1% variance in physical health as explained by incidence(s) of comorbidity and levels of pain and function.

Figure 1. Physical & Mental Health Model For Shoulder, Elbow, and Wrist



Mental health was less explained by the predictor variables (3.6%), however, it was similar in that function ($\beta = .17$; $p < .05$) had the single direct effect on mental health outcomes while the additional predictor variables were shown to be indirect effects (see *Figure 1*). The best fitting model for predicting mental health outcomes was a linear

combination ($p < .010$) of comorbidity, pain, and function that controlled for occupational status, age group (50-65) and gender (see *Table 6~B*). There was an indirect interaction between occupational status, pain, and function (through gender) that suggested women with higher rates of pain leading to upper extremity disability felt a greater impact on their mental health and this, in turn, prompted a change in their work environment. The indirect path from occupational status through pain and towards function was statistically significant at an alpha of .001.

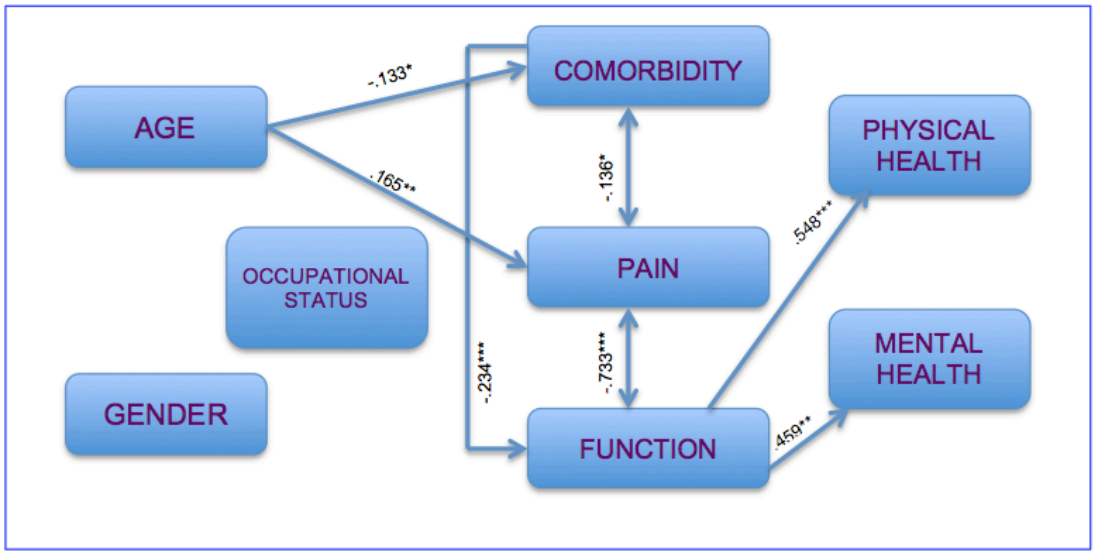
Association Between Comorbidity, Pain, and Function to SF-36 Physical & Mental Health: Joint Specific ~ Shoulder

For both multiple regressions, conducted with patients with shoulder conditions (n = 208), multicollinearity between variables was not significant (*VIF* = 1.09 for comorbidity, 3.09 for pain level, and 3.27 for function). The predictor variable of function ($\beta = .55$; $p < .001$) directly affected physical health outcomes while comorbidity, pain, and age group were shown to have indirect effects (see *Figure 2*). The best fitting model for predicting physical health outcomes lends itself to a linear combination of comorbidity, pain, and function, within the age group (50 – 65) indicating a full effect model with $p < .001$ as shown in *Table 6~A*. This moderate association was reported with a 28% variance in physical health as explained by incidence of comorbidity and levels of pain and function. There was indication that physical health was affected through the indirect path of the predictors of age, pain, and function and this path was statistically significant at $p < .001$. Furthermore, although these regression coefficients were not directly statistically significant, women experienced decreased levels of physical health as indicated by levels of comorbidity, pain, and function and controlling for age.

The analysis suggested that the predictors of function ($\beta = .46$; $p < .010$) directly affected levels of mental health outcomes as shown in *Table 6~B*. The linear combination of comorbidity, pain, and function while controlling for occupational status, age group, and gender was statistically significant when evaluated against an alpha of .001. Furthermore, 32% of the variance in mental health outcomes was explained by the predictor variables (see *Figure 2*). These results suggested that as women with chronic shoulder disorders age, they experienced adverse changes in their ability to work, thereby

affecting their overall mental health.

Figure 2. Physical and Health Model for Joint Specific ~ Shoulder

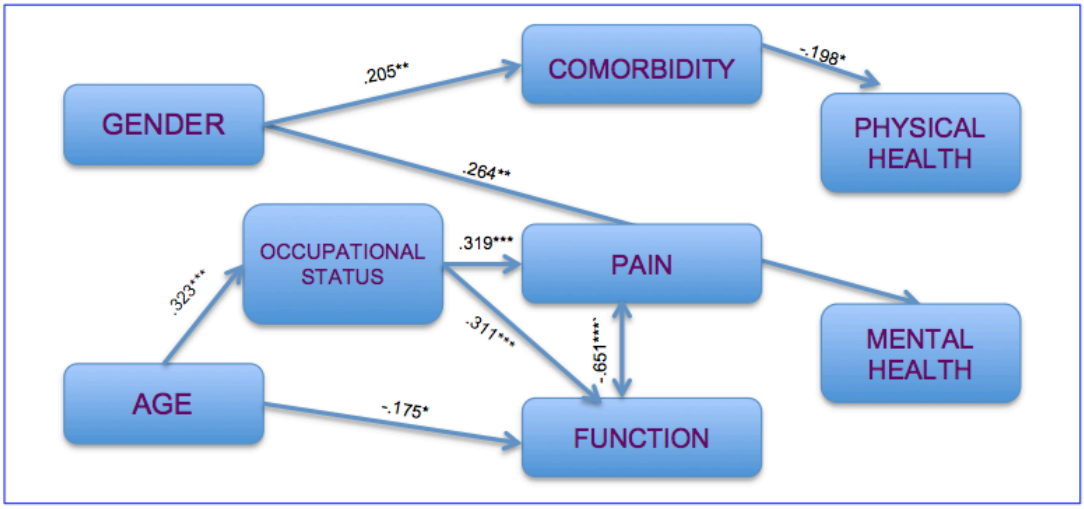


Association Between Comorbidity, Pain, and Function to SF-36 Physical & Mental Health: Joint Specific ~ Elbow

Two multiple regressions were performed on a subset of the sample limited to patients with elbow conditions (n=164). No statistically or substantively significant multicollinearity was found (*VIF* = 1.20 for comorbidity, 2.05 for pain level, and 1.98 for function). The regressions were not statistically significant ($p > .05$) but suggested that comorbidity had a direct effect on physical health ($\beta = -.20$; $p < .05$) (see *Table 6~A*) while gender was the single predictor on mental health at a ($\beta = .26$; $p < .010$) (see *Table 6~B*). Predicator variables of comorbidity, pain, function, occupational status, age group, and gender were shown to be indirect effects at a $p < .05$ on physical health (see *Figure 3*). The best fitting model for predicting a participant's physical health appeared to be a linear combination of age, comorbidity, pain, function, and occupational status. Gender and comorbidity appeared to be the best fitting model in predicting mental health. Each model indicated a moderate association with 6.7% variance in physical health and 10% variance in mental health as explained by the predictor variables.

The indirect path model suggested that as women age, they experience increasing levels of pain, which contributes to an increase in upper extremity disability. This upper extremity disability is associated with lower occupational participation and poorer self-perceived physical and mental health. The indirect effect of the predictor variables was statistically significant ($p < .05$).

Figure 3. Physical and Health Model for Joint Specific ~ Elbow



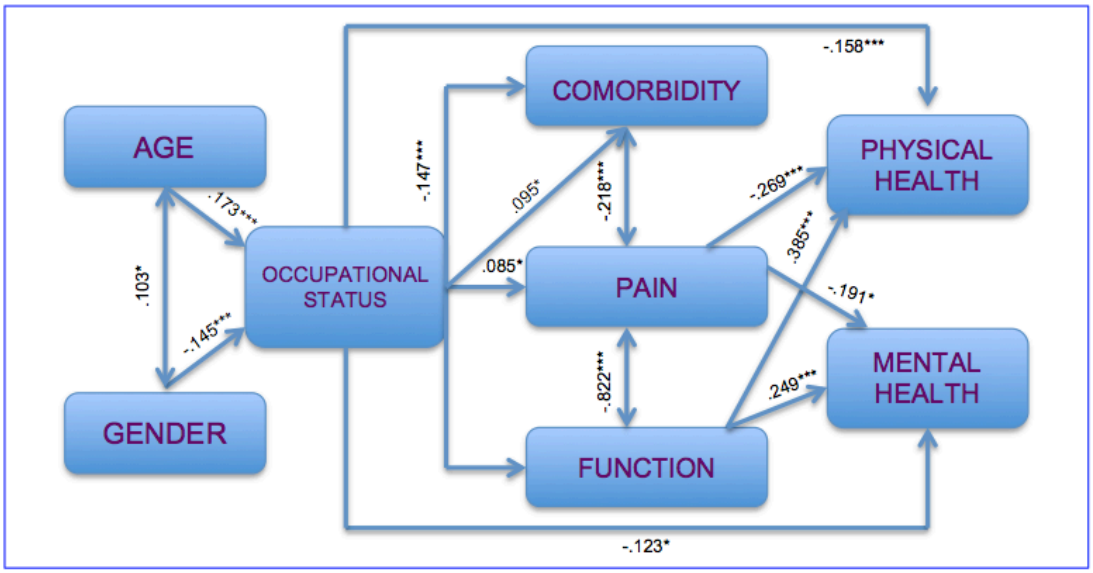
Association Between Comorbidity, Pain, and Function to SF-36 Physical & Mental Health: Joint Specific ~ Wrist

Models created for patients with wrist disorders resulted in a subset of 584 patients (75% females). No statistically or substantively significant multicollinearity was found (*VIF* = 1.03 for comorbidity, 3.05 for pain level, and 2.99 for function). The linear combination of comorbidity, pain, function, and occupational status while adjusting for gender and age group (50-65) significantly predicted the participant's levels of physical health ($p < .001$) (see *Table 6~A*). The predictor variables of pain ($\beta = -.27$; $p < .010$), upper extremity function at ($\beta = .38$; $p < .001$), and occupational status ($\beta = -.16$; $p < .010$) directly affected the patient's physical health status *(Figure 4)*.

The mental health model was statistically significant at $p < .05$, but the pathway trends suggested that pain, function, and occupational status could play a role in both physical and/or mental health status. The results did suggest that women with a wrist disorder

indicated that with increased levels of pain (β =-.19; $p < .05$), upper extremity functional capacity decreased (β = .25; $p < .010$) with a shift in occupational status (β = -.12; $p < .05$) having a greater effect on their mental health status (see *Table 6~B*). Overall the results for women with wrist conditions, in comparison to men, indicated the ability to function is strained due to increased pain levels and this, in turn, saw a shift in their work levels. These variables are predictors interacting within the path models of physical ($p < .001$) and mental ($p < .05$) health status. The best fitting model continues to incorporate the linear combination of comorbidity, pain, function, while adjusting for gender, age, and occupational status (50-65) as shown in *Figure 4*.

Figure 4. Physical and Health Model for Joint Specific ~ Wrist



Discussion

This study found that upper extremity disability is a contributor to a person's physical health status, and to a lesser extent, their mental health status. Comorbidity, pain, and occupational status have indirect relationships with upper extremity disability such that greater pain, a larger burden of comorbid health conditions, and less participation in the workforce, is associated with poorer physical and mental health. The variance explained by these path analyses was, however, relatively small. This may have been due to increased method variance, as constructs of interest were assessed by multiple questionnaires/measures, and were assessed within a number of different patient groups.

A persistent theme across the findings, however, suggested that risk factors such as female gender and age were predictive of UED symptoms of pain and function, and that this resulted in decreases in physical and mental health status. This supports growing evidence that gender differences in the prevalence of UED are significant and that the development of UED is related to work exposures (Jensen, Haahr, Frost, & Andersen, 2012). Women experience more UED disorders than men and potential risk factors include the cultural gender-stereotypic work difference and the psychological and psychosocial differences between genders (Treaster & Burr, 2004).

The first assessment measured the individual relationship between coexisting comorbid disorders on the participant's physical and mental health. More than 55% of participants suffered from at least one comorbid condition, with disorders of arthritis, osteoarthritis/ degenerative arthritis, rheumatoid arthritis, and back pain most prevalent at approximately 44%. This resulted in a weak to moderate direct effect on physical and mental health outcomes (SF-36). In addition, after reviewing different studies on self-reported comorbidity, there appears to be varying prevalence rates due to the number of diseases included on varying surveys and the different populations of interest (van Dijk et al., 2008). Generally speaking comorbidity alone does not directly affect physical and mental health outcomes - but individuals living with one or more chronic diseases describe worse pain, greater limitations in function, and an overall decrease in physical and mental health outcomes (Caporali et al., 2005; van Dijk et al., 2008). Our analysis supported this theory as the association between co-existing comorbid disorders and the intervening variables of pain and function increased significantly, and had greater predictive values, in both the full model and in the joint specific UED (shoulder, elbow, and wrist). UED are a frequent cause of disability for those aged 50 – 65 and are an indicator of the limitations surrounding maintaining paid employment while preparing for withdrawal from the workforce and into retirement (Leclerc et al., 2013).

Pain is one of the most widely cited symptoms underlying disability among older adults and has been commonly endorsed as a cause of disability in occupational status, daily living, and mobility function (Leveille et al., 2009). Pain is also the most widespread impairment associated with arthritic conditions such as chronic or recurrent

musculoskeletal pain (Leveille et al., 2009). An assessment of pain on perceived physical and mental health outcomes suggested that pain did not directly affect health outcomes but the results demonstrated a clear indirect pattern whereby participants experiencing pain reported more problems in physical functioning and poorer physical and mental health outcomes.

A potential reason for the reporting of 'poor' health by participants was their experience with pain due to a comorbid disorder (i.e. upper extremity musculoskeletal disorders) that led to functional limitations (Covinsky et al., 2008). The analysis of the relationship between function and physical and mental health outcomes suggested that the participant's ability to function had a direct impact on health outcomes. More participants experienced decreased physical and mental heath outcomes when the model incorporated the mediating variables of pain and comorbidity. Predictor risks used for this study included age (50 – 65) and gender, with results consistent with other models such as the ICF disability model suggesting numerous risk factors can lead to an impairment of physical function and mobility. Individuals with UED often suffer from significant pain and loss of function leading to possible disability (Covinsky et al., 2008). These limitations make it difficult to maintain employment and affect all aspects of daily living as increased joint specific chronic pain influences a reduction in functional mobility. Those living with chronic UED describe an overall reduction in physical and mental health outcomes, which is indicative of a possible decrease in quality of life of those transitioning into retirement (Covinsky et al., 2008; Vela & Denegar, 2010).

Limitations

While our data provides empirical support of the conceptual models, in that the interrelationships of gender, health, and occupational status are affected by upper extremity conditions and other comorbid health conditions, the explanatory power of the models was lower than anticipated. Limitations in our study may have contributed to this as it was based on a secondary analysis of available surveys in which the method and quality of the data collection procedures differed. An advantage of using secondary data is that the data is already collected and stored in electronic format but there are

disadvantages that can include outdated and/or missing data. Also, there can be data that may not answer the researcher's specific research questions and variables that may have been defined or categorized differently than the researcher would have chosen.

Recognizing this, we extracted items from standardized questionnaires to reflect the concepts that were of interest but were not consistent across different conditions. Joint specific models were examined and results indicated that the shoulder model made substantial improvements in explanatory power. This suggests that the representative items may have been more problematic for elbow as respondents were used from the original database and may not represent the entire subset of patients with upper extremity disability at large. As the sample sizes are different across the joint specific disorders, power varies across the samples used, however, all models were fully powered considering the number of variables examined. Although we choose to use a broad sample, difference in the original cohorts in terms of timing and follow-up measures contributed some measurement error reducing the overall explanatory power of the models. The use of subset analyses (i.e. upper extremity disorders to shoulder, elbow, and wrist) allowed us to investigate model differences across these clinical groups and confirmed that the relationships were robust across different types of patient groups.

Summary

Self-report health status outcome measures allow both participants and health care providers to develop an understanding of the chronic, pervasive nature of arthritis and other musculoskeletal disorders and the impact upon people's perception of their own health. These measures, such as the SF-36, are powerful predictors of health-related quality of life, a concept that refers to the perceived physical and mental health levels over time. A limitation within the data set suggested a lack of data regarding occupational status but this study concurs with current research that suggests the correlation with multi-site pain poses a considerable risk to function and work ability and may predict difficulty with the transition towards retirement (Miranda et al., 2010). The association between chronic pain and physical disability is predictive for this segment of the study's population that falls within a typical working age range (50 – 65), particularly

for women. With gender as an important factor in shaping the experience of aging, it is commonly recognized that, on average, women will live longer and on their own compared to men and will experience greater levels of chronic disease (Hayden et al., 2006; Kelley-Moore & Ferraro, 2005; Kelley-Moore et al., 2006).

Mobility is key in facing these challenges both as a determinant of the ability to live independently and as a factor in promoting health and quality of life. By gathering and assessing data on UED, barriers and limitations can be identified and potential health interventions developed, which in turn, will contribute towards a successful transition into retirement. The results presented in this study suggest that more research is needed on links between health, gender, working conditions, employment, and retirement from a lifelong perspective. Future studies might help to disentangle various causal processes, the extent to which they are voluntary versus involuntary, and their interactions.

Reference List

Beaton, D. E., & Schemitsch, E. (2003). Measures of health-related quality of life and physical function. *Clinical Orthopaedics and Related Research*®(413), 90-105. doi: 10.1097/01.blo.0000079772.06654.c8

Bergman, S., Jacobbson, LTH, & Herrstom, H. (2003). Health status as measured by SF-36 reflects changes and predicts outcome in chronic musculoskeletal pain: A 3-year follow up study in the general population. *Pain, 108*, 115-123.

Bergman, S., Jacobsson, L. T., Herrstrom, P., & Petersson, I. F. (2004). Health status as measured by SF-36 reflects changes and predicts outcome in chronic musculoskeletal pain: a 3-year follow up study in the general population. *Pain, 108*(1-2), 115-123. doi: 10.1016/j.pain.2003.12.013

Breckenridge, J. D., & McAuley, J. H. (2011). Shoulder Pain and Disability Index (SPADI). *J Physiother, 57*(3), 197. doi: 10.1016/S1836-9553(11)70045-5

Caporali, R., Cimmino, M. A., Sarzi-Puttini, P., Scarpa, R., Parazzini, F., Zaninelli, A., . . . Montecucco, C. (2005). Comorbid conditions in the AMICA study patients: effects on the quality of life and drug prescriptions by general practitioners and specialists. *Semin Arthritis Rheum, 35*(1 Suppl 1), 31-37. doi: 10.1016/j.semarthrit.2005.02.004

Covinsky, K. E., Lindquist, K., Dunlop, D. D., Gill, T. M., & Yelin, E. (2008). Effect of arthritis in middle age on older-age functioning. *Journal of the American Geriatrics Society, 56*(1), 23-28. doi: 10.1111/j.1532-5415.2007.01511.x

de Witte, P. B., Henseler, J. F., Nagels, J., Vliet Vlieland, T. P., & Nelissen, R. G. (2012). The Western Ontario rotator cuff index in rotator cuff disease patients: a comprehensive reliability and responsiveness validation study. *Am J Sports Med, 40*(7), 1611-1619. doi: 10.1177/0363546512446591

Fredman, L., Cauley, J. A., Satterfield, S., Simonsick, E., Spencer, S. M., Ayonayon, H. N., . . . Health, A. B. C. Study Group. (2008). Caregiving, mortality, and mobility decline: the Health, Aging, and Body Composition (Health ABC) Study. *Archives of Internal Medicine, 168*(19), 2154-2162. doi: 10.1001/archinte.168.19.2154

Gelinas, Catherine, MacDermid, J., & Moodie, Sheila. (2014). A Scoping Review: Transitioning into Retirement with Chronic Health Disorders. *Sociology Study, Volume 6*(March).

Haukenes, I., Farbu, E. H., Riise, T., & Tell, G. S. (2014). Physical health-related quality of life predicts disability pension due to musculoskeletal disorders: seven years follow-up of the Hordaland Health Study Cohort. *BMC Public Health, 14*, 167. doi: 10.1186/1471-2458- 14-167

Hayden, E., Roerecke, M., Giesbrecht, N., Rehm, J., & Kobus-Matthews, M. (2006). Chronic Diseases in Ontario and Canada: Determinants, Risk Factors and Prevention Priorities. *Ontario Chronic Disease Prevention Alliance and the Ontario Public Health Association*.

Jensen, J. C., Haahr, J. P., Frost, P., & Andersen, J. H. (2012). Do work-related factors affect care-seeking in general practice for back pain or upper extremity pain? *Int Arch Occup Environ Health*. doi: 10.1007/s00420-012-0815-z

Kelley-Moore, J. A., & Ferraro, K. F. (2005). A 3-D model of health decline: disease, disability, and depression among Black and White older adults. *J Health Soc Behav, 46*(4), 376-391.

Kelley-Moore, J. A., Schumacher, J. G., Kahana, E., & Kahana, B. (2006). When do

older adults become "disabled"? Social and health antecedents of perceived disability in a panel study of the oldest old. *J Health Soc Behav, 47*(2), 126-141.

Krahn, G. L. (2011). WHO World Report on Disability: a review. *Disabil Health J, 4*(3), 141- 142. doi: 10.1016/j.dhjo.2011.05.001

Leclerc, A., Pascal, P., Chastang, J. F., & Descatha, A. (2013). Consequences of Musculoskeletal Disorders on Occupational Events: A Life-long Perspective from a National Survey. *J Occup Rehabil*. doi: 10.1007/s10926-013-9457-6

Leveille, S. G., Jones, R. N., Kiely, D. K., Hausdorff, J. M., Shmerling, R. H., Guralnik, J. M., . . . Bean, J. F. (2009). Chronic musculoskeletal pain and the occurrence of falls in an older population. *JAMA, 302*(20), 2214-2221. doi: 10.1001/jama.2009.1738

MacDermid, J. (2007). *The Patient-Rated Wrist Evaluation (PRWE) User Manual*: School of Rehabilitation Science, McMaster University, Hamilton, Ontario; Clinical Research Lab, Hand and Upper Limb Centre, St. Joseph's Health Centre, London, Ontario, Canada.

MacDermid, J. (June 2010). *The Patient-Rated Elbow Evaluation (PREE) User Manual*: School of Rehabilitation Science, McMaster University, Hamilton, Ontario; Clinical Research Lab, Hand and Upper Limb Centre, St. Joseph's Health Centre, London, Ontario, Canada.

MacDermid, J. C. (2001). Outcome evaluation in patients with elbow pathology: issues in instrument development and evaluation. *J Hand Ther, 14*(2), 105-114.

MacDermid, J. C., Solomon, P., & Prkachin, K. (2006). The Shoulder Pain and Disability Index demonstrates factor, construct and longitudinal validity. *BMC Musculoskelet Disord, 7*, 12. doi: 10.1186/1471-2474-7-12

MacDermid, J. C., Turgeon, T., Richards, R. S., Beadle, M., & Roth, J. H. (1998). Patient rating of wrist pain and disability: a reliable and valid measurement tool. *J Orthop Trauma, 12*(8), 577-586.

McClure, P., & Michener, L. A. (October 2003). Measures of Adult Shoulder Function: The American Shoulder and Elbow Surgeons Standardized Shoulder Form Patient Self- Report Section (ASES), Disabilities of the Arm, Shoulder, and Hand (DASH), Shoulder Disability Questionnaire, Shoulder Pain and Disability Index (SPADI), and Simple Shoulder Test. *Arthritis & Rheumatism (Arthritis Care & Research), 49, No. 5S*, S50– S58.

Michener, L. A., McClure, P. W., & Sennett, B. J. (2002). American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form, patient self-report section: reliability, validity, and responsiveness. *J Shoulder Elbow Surg, 11*(6), 587-594. doi: 10.1067/mse.2002.127096

Miranda, H., Kaila-Kangas, L., Heliovaara, M., Leino-Arjas, P., Haukka, E., Liira, J., & Viikari- Juntura, E. (2010). Musculoskeletal pain at multiple sites and its effects on work ability in a general working population. *Occupational and Environmental Medicine, 67*(7), 449- 455. doi: 10.1136/oem.2009.048249

National Institute on Aging, National Institutes of Health, US Department of Health & Human Resources. (2011). Global Health and Aging: World Health Organization (WHO).

Nicholl, B. I., Macfarlane, G. J., Davies, K. A., Morriss, R., Dickens, C., & McBeth, J. (2009). Premorbid psychosocial factors are associated with poor health-related quality of life in subjects with new onset of chronic widespread pain - results from the

EPIFUND study. *Pain, 141*(1-2), 119-126. doi: 10.1016/j.pain.2008.10.022
Panagotaki, H. (2012). The Association between Musculoskeletal Disorders and Quality of Life. *Journal of Trauma Treatment, 1*(e101). doi: 10.4172/2167-1222.1000e101
Reginster, J. Y., & Khaltaev, N. G. (2002). Introduction and WHO perspective on the global burden of musculoskeletal conditions. *Rheumatology (Oxford), 41 Supp 1*, 1-2.
Rice, N. E., Lang, I. A., Henley, W., & Melzer, D. (2011). Common health predictors of early retirement: findings from the English Longitudinal Study of Ageing. *Age Ageing, 40*(1), 54-61. doi: 10.1093/ageing/afq153
Roux, C. H., Guillemin, F., Boini, S., Longuetaud, F., Arnault, N., Hercberg, S., & Briancon, S. (2005). Impact of musculoskeletal disorders on quality of life: an inception cohort study. *Annals of the Rheumatic Diseases, 64*(4), 606-611. doi: 10.1136/ard.2004.020784
Sangha, O., Stucki, G., Liang, M. H., Fossel, A. H., & Katz, J. N. (2003). The Self-Administered Comorbidity Questionnaire: a new method to assess comorbidity for clinical and health services research. *Arthritis Rheum, 49*(2), 156-163. doi: 10.1002/art.10993
Torrance, N., Smith, B. H., Lee, A. J., Aucott, L., Cardy, A., & Bennett, M. I. (2009). Analysing the SF-36 in population-based research. A comparison of methods of statistical approaches using chronic pain as an example. *J Eval Clin Pract, 15*(2), 328-334. doi: 10.1111/j.1365-2753.2008.01006.x
Treaster, D. E., & Burr, D. (2004). Gender differences in prevalence of upper extremity musculoskeletal disorders. *Ergonomics, 47*(5), 495-526. doi: 10.1080/00140130310001638171
van Dijk, G. M., Veenhof, C., Schellevis, F., Hulsmans, H., Bakker, J. P., Arwert, H., . . . Dekker, J. (2008). Comorbidity, limitations in activities and pain in patients with osteoarthritis of the hip or knee. *BMC Musculoskelet Disord, 9*, 95. doi: 10.1186/1471- 2474-9-95
Vela, L. I., & Denegar, C. (2010). Transient disablement in the physically active with musculoskeletal injuries, part I: a descriptive model. *J Athl Train, 45*(6), 615-629. doi: 10.4085/1062-6050-45.6.615
WHO. (2001a). *ICF : International classification of functioning, disability and health / World Health Organization* (Vol. iii, 299 p. : ill. ; 25 cm). Geneva: World Health Organization.
WHO. (2001b). World Health Organization: International Classification of Functioning, Disability and Health. Genova.
Wittink, H., Goudas, L., & Strassels, S. & et al. (2004). Outcome measurement in pain medicine. In W. C. B. Z. (eds) (Ed.), *Principles and practice of pain medicine* (pp. 69–82.). New York: McGraw Hill.
Woolf, A. D., & Pfleger, B. (2003). Burden of major musculoskeletal conditions. *Bull World Health Organ, 81*(9), 646-656.

Chapter 4
Conclusion

This work concludes with a consideration of the emerging insights and reflections on healthy aging and its relationships with those living with chronic diseases, such as musculoskeletal disorders, and readying themselves for retirement. Two main questions posed in this research have been to establish was "What constitutes healthy aging for those transitioning from peri to post retirement and living with chronic diseases?" and "What are the processes through which aging for those living with chronic diseases, can be enhanced during this transitional stage?

Within this thesis a scoping review was conducted to report on the nature and extent of the literature addressing the transition from peri to post retirement for people living with chronic diseases. Public discussion in relation to the aging population has often tended to categorize this cohort as "a burden" on the costs of healthcare and pensions. According to a 2008 survey of older workers, those between the ages of 50 – 59 and preparing for retirement are planning to work past the age of 60 with most planning to work part-time after aged 60 (Pignal, Arrowsmith, & Ness, 2008). The 2008 financial crisis and economic slowdown may have prompted some Canadians to postpone retirement due to a lack of financial readiness. Those aged 55 and over, have record levels of household debt (Anguelov & Tamborini, 2010) and if not paid off prior to retirement, will become more difficult on a reduced income.

Additionally, leading factors continue to prompt further research into the physical and mental health concerns that may affect a person's plans for retirement. Concerns are heightened when considering the increasing burden of multiple health conditions (Muggah et al. 2012) and research models are beginning to illustrate and measure the impact of diverse physical and socio-environmental factors and how this differs between females and males in the rates of decline in health and quality of life outcomes (Golden & Earp, 2012). This can be seen in the fact that most of the resources devoted to healthy aging in the community are being spent on health care while a relatively small proportion

is devoted to providing physical, social, psychological, and financial support designed to promote and preserve health (Latif, 2012).

The second approach to this thesis research was a retrospective cohort design study examining the relationship between comorbidity, pain, and function and its impact on the physical and mental health outcomes of adults, aged 50 – 65, and living with upper extremity musculoskeletal disorders. Utilizing secondary data (1994-2012) collected from the Roth | McFarlane Hand and Upper Limb Centre, London, Ontario, Canada, results confirmed that the ability to function is closely associated with physical and mental health. Based on higher levels of pain, the probability of disability increases significantly with lower levels of functional ability.

The experience of health in old age depends on the ability to function. Physical function can be affected negatively by many physical, mental, and environmental factors such as advancing age, comorbidity, and low levels of physical activity. Pain is a common symptom and is associated with significant reduction in function and is the most widespread impairment associated with arthritic conditions such as chronic or recurrent musculoskeletal pain (Leveille et al., 2009). Persistent pain is a significant risk of pain-related impairments in adults transitioning from peri to post retirement. This study's assessment of pain on perceived physical and mental health outcomes suggested that pain did not directly affect health outcomes but the results demonstrated a clear indirect pattern whereby participants experiencing pain reported more problems in physical functioning leading to a poorer physical and mental health outcomes. Links between lower levels of income, education, and social support have been associated with functional limitations and has been commonly endorsed as a cause of disability in occupational status, daily living, and mobility function (Leveille et al., 2009; Thomas, Mottram, Peat, Wilkie, & Croft, 2007).

Multi-purpose socio-ecological models such as the World Health Organization's guidelines and targets for healthy aging are growing in recognition as they take a comprehensive approach in the understanding of the interrelationships between individuals and their environments (Golden and Earp 2012). These approaches represent

the physical, emotional, and social aspects of health and well-being along with the economic and collective aspects of community and living environments, all of which can influence the healthy aging of a given person's health outcome (Golden and Earp 2012). It is increasingly recognized at international policy levels that healthy aging requires a broad all-inclusive approach to health production; this requires not only investment in medical care, but also investment in health promoting behaviours within the community(University of Michigan, 2007).

The World Health Organization defines healthy and active aging as a process through which opportunities for health, participation, and security are utilized in order to enhance not only physical and mental health but ultimately the quality of life as people age(WHO, 2002). Promoting healthy lifestyles can lead to fewer disabilities associated with chronic diseases for adults moving from peri to post retirement, can reduce healthcare costs, increase greater participation within family and community, and contribute to a positive quality of life in older age (WHO, 2002).

People are now living longer than in previous generations and it is increasingly recognized many live with chronic diseases. Having access to meaningful forms of interaction at a time when retiring from employment and/or be less engaged with family and friends is vital (Golden & Earp, 2012). Further research and pro-active initiatives are needed to encourage newly retired women and men to maintain their independence while living with chronic diseases by participating in social contacts and self-help activities of a cultural, educational, and active nature aimed at enhancing quality of life. To promote a more positive attitude to aging and the retirement process will enable retired people to enjoy a full and active life and to be an advocate on social, health, learning and economic issues.

Reference List

Anguelov, C. E., & Tamborini, C. R. (2010). Retiring in debt? An update on the 2007 near retiree cohort. *Soc Secur Bull, 70*(4), 69-76.

Golden, S. D., & Earp, J. A. (2012). Social ecological approaches to individuals and their contexts: twenty years of health education & behavior health promotion interventions. *Health Educ Behav, 39*(3), 364-372. doi: 10.1177/1090198111418634

Latif, E. (2012). The impact of retirement on health in Canada. *Can Public Policy, 38*(1), 15-29.

Leveille, S. G., Jones, R. N., Kiely, D. K., Hausdorff, J. M., Shmerling, R. H., Guralnik, J. M., .. Bean, J. F. (2009). Chronic musculoskeletal pain and the occurrence of falls in an older population. *JAMA, 302*(20), 2214-2221. doi: 10.1001/jama.2009.1738

Pignal, J, Arrowsmith, C, & Ness, A. (2008). *First Results from the Survey of Older Workers, 2008*. Ottawa, Canada: Statistics Canada.

Report of the World Health Organization. Active aging: a policy framework. (2002). *Aging Male, 5*(1), 1-37.

The University of Michigan Health and Retirement Study (HRS). (2007). Growing Older in America: The Health and Retirement Study. : National Institute on Aging, National Institutes of Health, U.S. Department of health and Human Services. No. 07-5757.

Thomas, E., Mottram, S., Peat, G., Wilkie, R., & Croft, P. (2007). The effect of age on the onset of pain interference in a general population of older adults: prospective findings from the North Staffordshire Osteoarthritis Project (NorStOP). *Pain, 129*(1 2), 21-27. doi: 10.1016/j.pain.2006.09.027

APPENDIX A

Western Research

Research Ethics

Use of Human Participants - Ethics Approval Notice

Principal Investigator: Dr. Joy MacDermid
File Number:103961
Review Level: Full Board
Approved Local Adult Participants:5000
Approved Local Minor Participants:0
Protocol Title:A Health Promotion Perspective: The Impact of Chronic Upper Limb Musculoskeletal Disorders and Associated Risk Factors for People Transitioning Towards Retirement
Department & Institution: Schulich School of Medicine and Dentistry\Surgery,Western University
Sponsor:
Ethics Approval Date: August 06, 2013
Ethics Expiry Date: April 30, 2014

Documents Reviewed & Approved & Documents Received for Information:

Document Name	Comments	Version Date
Western University Protocol		2013/06/13
Recommendations Form	Recommendations	2013/06/24
Other	flyer	2013/07/24
Other	Self-Report Surveys	2013/08/01

This is to notify you that the University of Western Ontario Health Sciences Research Ethics Board (HSREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the Health Canada/ICH Good Clinical Practice Practices: Consolidated Guidelines; and the applicable laws and regulations of Ontario has reviewed and granted approval to the above referenced study on the approval date noted above. The membership of this HSREB also complies with the membership requirements for REB's as defined in Division 5 of the Food and Drug Regulations.

The ethics approval for this study shall remain valid until the expiry date noted above assuming timely and acceptable responses to the HSREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the University of Western Ontario Updated Approval Request form.

Member of the HSREB that are named as investigators in research studies, or declare a conflict of interest, do not participate in discussions related to, nor vote on, such studies when they are presented to the HSREB.

The Chair of the HSREB is Dr. Joseph Gilbert. The HSREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000940.

[redacted]

Signature

Ethics Officer to Contact for Further Information

[redacted]

This is an official document. Please retain the original in your files.

APPENDIX B

LAWSON
HEALTH RESEARCH INSTITUTE

LAWSON FINAL APPROVAL NOTICE

RESEARCH OFFICE REVIEW NO.: R-13-280

PROJECT TITLE: A Health Promotion Perspective: The Impact of Chronic Upper Limb Musculoskeletal Disorders and Associated Risk Factors for People Transitioning Towards Retirement

PRINCIPAL INVESTIGATOR: Dr. Joy MacDermid

LAWSON APPROVAL DATE: August 12, 2013

Health Sciences REB#: 103961

Please be advised that the above project was reviewed by the Clinical Research Impact Committee and the project:

Was Approved

Please inform the appropriate nursing units, laboratories, etc. before starting this protocol. The research office review number must be used when communicating with these areas.

[redacted]
V.P. Research
Lawson Health Research Institute

All future correspondence concerning this study should include the Research Office Review Number and should be directed to S[redacted] CRIC Liaison, Lawson Health Research Institute, 750 Baseline Road, East, Suite 300.

cc: Administration

VITAE

List of Scholarships

Title of Award	Type of Award	University of Tenure	Period Held
Tuition Scholarship	Academic – Graduate Master's Program	Western University	2012-2014
Tuition Bursaries	Honours Specialization in Sociology; Minor in Population Studies	King's University College	2008/2011

Current Academics

- (2012-2014). Defense Date: August 21, 2014**. Masters of Health & Rehabilitation Sciences (***M.H.R.Sc.***) -** Health & Rehabilitation Sciences. Field: Health Promotion. Western University, London, Ontario

Publications

- (2014, March). *Journal of Sociology Study*. "A Scoping Review: Transitioning into Retirement with Chronic Disorders". Authors: Catherine P. Gelinas, Joy C. MacDermid, and Sheila Moodie.

Presentations

- (2014, January). *Aging, Rehabilitation & Geriatric Care Research (ARGC) / Faculty of Health Sciences (FHS) Symposium,* Western University, Elborn College, London, Ontario. Poster Presentation: A Scoping Review: Transitioning into Retirement with Chronic Disorders
- (2013, October*). International Association of Quality of Life Research 2013 Conference.* Miami, Florida. Poster Presentation: A Scoping Review: Transitioning into Retirement with Chronic Disorders
- (2011 to Present). *Donor to Recipient: What's Your Type (Canadian Blood Services)*. Address students of Faculty of Medicine, Western University, Sir Frederick Banting Secondary School, and Oakridge Secondary School, London, Ontario.

Associations – Memberships

- (2013-2014). International Association of Quality of Life Research

Significant Academic Accomplishments

Teaching

- **Professor** (Winter Term 2015): Faculty of Sociology, Statistics for Sociology (Course Code 2205), King's University College, Western University, London, Ontario
- **Professor** (Winter Term 2015): Faculty of Sociology, Research Methods in Sociology (Course Code 2206), King's University College, Western University, London, Ontario
- **Instructor *(Statistical and Presentational System Software (SPSS),*** (2008 – 2014): Faculty of Sociology, Statistics for Sociology (Course Codes 2205 and 3306), King's University College, Western University, Ontario, London, Ontario (Fall/Winter/Intersession Terms)

Teaching Research Assistantships

- 2013 - 2014: School of Communication Sciences and Disorders (Course Code CSD 9523b ***Professional Practice III***), Elborn College, Western University, London, Ontario
- 2008 - 2014: Faculty of Sociology, ***Statistics for Sociology (Course Code 2205)***, King's University College, Western University, Ontario, London, Ontario (Fall/Winter/Intersession Terms)
- 2008 - 2014: Faculty of Sociology, ***Research Methods in Sociology (Course Code 2206)***, King's University College, Western University, Ontario, London, Ontario (Fall/Winter/Intersession Terms)
- 2012 - 2014 - Present: Faculty of Sociology, **Sociology of the Family** (Course Code 2235), King's University College, Western University, London, Ontario (Full Term)
- 2012 - 2014 - Present: Faculty of Sociology, **Sociology Theory** (Course Code 2240), King's University College, Western University, London, Ontario (Full Term)
- 2011 - 2013: Faculty of Sociology, **Investigating the Social World: Quantitative Research** (Course Code 3306), King's University College, Western University, London, Ontario (Fall Term)