WORK, HEALTH AND THE ECONOMY:

EXAMINING PREDICTORS OF EARLY RETIREMENT AMONG OLDER CANADIAN WORKERS

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By

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ABSTRACT

TITLE: Work, Health and the Economy: Examining Predictors of Early Retirement Among Older Canadian Workers

OBJECTIVES: To investigate the contribution of socio-demographic, health, work, and health behaviour factors to the transition from work to early non-disability retirement among older Canadian workers during a period of economic recession compared to a period of non-recession.

METHODS: A systematic scoping review was conducted to identify the predictors of early retirement reported in the published literature. This study also used data from Statistics Canada's National Population Health Survey to explore the predictors of early retirement among two prospective cohorts of older Canadian workers aged 45-64 that spanned a non-recessionary economic period in Canada (cohort 1: 1994-1999) and a period which included an economic recession (cohort 2: 2006-2010). The impact of various factors on early retirement was examined using logistic regression analyses.

RESULTS: Findings from the systematic scoping review were used to construct a list of variables to explore as predictors in the model. Factors which were associated with higher transitions into early retirement included older age (cohort 1: OR=1.42; cohort 2: OR=1.31), living in Quebec (cohort 1: OR=2.26), occasional (cohort 1: OR=2.56) or regular drinking (cohort 1: OR=2.32), low job satisfaction (cohort 1: OR=3.42; cohort 2: OR=3.33), working part-time (cohort 1: OR=2.16; cohort 2: OR=2.26), and employment in public administration (cohort 1: OR=2.77). While being a woman (cohort 1: OR=0.59), immigrant (cohort 1: OR=0.57), and higher job security (cohort 1: OR=0.73) were associated with lower exits to early retirement. There were differences observed in the effects of occasional and regular drinking, and for living in Quebec, on early retirement between the two contrasting economic time periods. The comparison of the provincial effect suggested that early retirement varies to some extent with the provincial unemployment rate.

CONCLUSIONS: Predictors of early retirement among older Canadian workers are multifactorial. Results suggest that factors beyond individual determinants may influence early retirement and future research is needed to better understand what aspects of the provincial context are driving retirement decisions.

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CHAPTER 1: INTRODUCTION

1.1 Research Aims

In recent years, several demographic changes have given rise to an increasing number of retirees in the population (Statistics Canada, 2011). This trend will intensify as the baby boom generation moves into retirement in large numbers. Social and economic implications are expected as the proportion of the working-age population to the number of retirees drops (Duchesne, 2004; Statistics Canada, 2011). Compounding these changes has been a trend toward early retirement in most developed countries in recent decades (OECD, 2011a). In response, policymakers and researchers have become increasingly interested in the forces which have contributed to the early withdrawal of workers from the labour market over the past few decades. From previous research, a variety of factors influencing early retirement have been identified, namely those related to concepts such as social, financial and personal life, health status and health behaviours, and work-related factors (Taylor et al, 2000). Although these studies have provided some evidence into the determinants of early retirement, most studies have focused on a limited set of determinants. Moreover, the role of macro level factors such as economic conditions during recessionary periods, as measured by unemployment and national wealth, have scarcely been studied.

Therefore, the aim of this thesis is to investigate the contribution of socio-demographic, health, work, and health behaviour factors to the transition from work to

early non-disability retirement among older Canadian workers during a period of relative economic peak compared to a period of economic recession.

1.2 Thesis Overview

This thesis is structured into six chapters. The first chapter, [Introduction], will provide the study rationale, background, and previous evidence on the determinants of early retirement. It will also include the research objectives and data sources for the thesis. Chapter two, [Key Theories of Retirement], will review leading models and theories related to the retirement process to help guide the analysis of this study. Chapter three, [Predictors of Early Retirement: A Systematic Scoping Review], will address research question 1 using the methodology of a systematic scoping review to identify predictors of early retirement from the published literature. It will also include the main findings from the review which will be used to address research questions 2-4 in the subsequent chapters. Chapter four, [Methods and Analyses], outlines details of the National Population Health Survey, ethical considerations, information on the study sample, and the study variables. It will also present the statistical methods used to answer research questions 2-4. Chapter five, [Results], will present the descriptive statistics, univariate models, and adjusted multivariate models on the predictors of early retirement. It will also include a descriptive comparison of predictors between two periods of contrasting macroeconomic conditions. Chapter six, [Discussion and Conclusions], summarizes the overall findings, the study strengths and limitations, and the contribution to the literature on early retirement and potential policy implications.

1.3 Rationale

With the first cohort of the baby boomers – those born between 1946 and 1964 – turning 65 in 2011, the early withdrawal of older workers[1] from the labour market has received increasing attention from policy-makers, researchers and lay audiences (Statistics Canada, 2011). With the population aging and baby boomers fast approaching retirement age, a number of social and economic changes are expected to occur that will put broad pressures and demands on current systems. In particular, changes to the labour market will be substantial, as those aged 55 and over are estimated to represent close to 25% of the Canadian labour force by 2021, the highest proportion on record (Statistics Canada, 2011). Statistics Canada defines the 'labour force' as all individuals aged 15 years and older who work or who are looking for work, or in other words, the pool of individuals who are employed or available for employment in a population (Statistics Canada, 2010a). If the present rates of labour force participation by age and gender remain fairly similar, the workforce could see a considerable drop with a large number of workers retiring (Statistics Canada, 2011). The overall participation rate, which is the labour force expressed as a percentage of the total population aged 15 and older, could drop as low as 59.7% by 2031, a considerable decrease from the rate of 66% in 2014 (Statistics Canada, 2013a). With life expectancy in Canada reaching 81 years of age and declining birth rates over the past couple of decades (Statistics Canada, 2012a; 2013b), there is also concern regarding an increasing age dependency ratio[2] (the number of

[1] Older workers are defined as workers aged 45 to 65 in the majority of literature and by Human Resource Development Canada (HRDC, 2002). This definition of older workers will be used throughout this thesis.
[2] The dependency ratio is the ratio of the senior population (65 or older) to the working-age population (20 to 64 years). The dependency ratio is based on age with a strict cut-off of 65 and older to define those who are "dependent". It does

economically active persons for each ageing dependent) (Statistics Canada, 2010b). These demographic realities facing society and the labour market are compounded by the significant number of older workers who exit the labour force due to early retirement (Kieran, 2001).

Given the amount of research that has been conducted on retirement, defining the concept of retirement is still not straightforward (Gower, 1997). This is because retirement can mean different things to different people and thus is a complex event or state to measure (Bowlby, 2007). Traditionally, retirement has been defined as exiting the labour force permanently after a career of full-time jobs (Feldman, 1994). However, more recently this has been complicated due to non-traditional and precarious work arrangements in which people are employed. For those working part-time or in temporary employment, retirement has a different meaning than the transition from full-time work to no work at all. Or for some people, retirement can also mean some form of "bridge employment" such as a part-time job, self-employment, consulting, or temporary employment after a full-time career and before permanent exit from the labour force (Feldman, 1994). Others may re-enter the labour force some time in the future after being retired (Kieran, 2001). Since retirement is difficult to define, it is difficult to measure precisely. Canada's Labour Force Survey measures retirement by asking individuals who are no longer working, but who had worked in the previous 12 months, why they are no

not account for seniors who are working, nor for working-age people who are unemployed or not in the labour force - it merely reflects population age structure (Statistics Canada, 2010b). However, due to longer life expectancy and improved quality of life, older people are "younger" (in terms of remaining life expectancy), healthier and fitter than similar aged people in the past. In fact, it has been suggested that a dependency ratio calculated using the sum of individuals with a remaining life expectancy of ≤15 years divided by the number of people in employment shows much less cause for concern (Spijker and MacInnes, 2013).

longer employed. Those who report being retired are considered to be retirees (Duchesne, 2004). In reality, retirement does not happen overnight; rather it occurs as individuals transition from more involved labour market activity toward relative inactivity (Bowlby, 2007). But what is known about these individuals is that they are currently not working and they self identify as, and report being, 'retired' from working (Kieran, 2001).

While retirement is at its most basic a descriptor of employment status, (i.e. an individual who is not working), the concept of retirement is typically reserved for older workers who have stopped working and is often linked to a predetermined age at which pension benefits typically begin (Bowlby, 2007). Although Canada has no statutory retirement age[3], 65 is considered to be the "normal" retirement age, for the reason that it is the standard age at which Canada Pension Plan full benefits are payable (Milligan, 2010). Workers who begin collecting benefits between ages 60 and 64 are penalized 0.5% on their monthly benefits for each month before their 65th birthday that their pension begins. Pension benefits of retirees who begin receiving payments at age 65 are not penalized[4]. Older workers who delay receiving their pensions, earn an increase of 0.6% for every month delayed, up to a maximum of 36% at age 70. While the standard age of eligibility to receive pension benefits differs across countries, it is currently set at 65 years in most countries (OECD, 2009); although several countries including Canada plan to change this to 67 in the future (OECD, 2013).

[3] In December 2012, amendments to the Canadian Human Rights Act and the Canada Labour Code were brought into force to prohibit federally regulated employers from setting a mandatory retirement age, unless there is a bona fide occupational requirement (Government of Canada, 2012).

[4] In 2012, the government made changes to the age of eligibility for Old Age Security (OAS) pension and the Guaranteed Income Supplement (GIS) which will gradually increase from 65 to 67 over six years, starting in April 2023. OAS and GIS are additional retirement income systems that help to support Canadians 65 and over (Service Canada, 2013).

In light of a standard retirement age, three forms of retirement emerge when considering the timing of retirement and age at retirement: 1) Normal retirement is when a worker leaves the labour market at the statutory retirement age or at the age at which eligibility begins for full old-age pension benefits; 2) Early retirement is when a worker leaves the labour market before the official retirement age or before the predetermined age at which eligibility begins for full-old age pension benefits; and 3) Late retirement is when a worker leaves the labour market after the standard age of retirement and defers claiming a pension (OECD, 2011a).

The early withdrawal of older workers from the labour market is one of the most striking developments common to most OECD countries, including Canada, in recent decades (OECD, 2013). In the late 1970s and early 1980s, the median retirement age was close to 65, however in the mid-1980s, it started declining considerably both in Canada and elsewhere (Duchesne, 2004; OECD, 2011b) (see Figure 1). In Canada, there was a drop in 1987, likely due to the lowering of the minimum age (from 65 to 60) at which one could draw benefits at a reduced rate from the Canada Pension Plan (Gower, 1997). Since then, the mean retirement age has dropped more or less steadily from 63.5 in 1987, to 61.4 in 2008, although there has been a slight upward trend to 62.9 in 2012 and 63 in both 2013 and 2014 (Statistics Canada, 2013c). The last time it reached 65 was 1978 (Figure 1). In almost all OECD countries, the average effective age[5] at which workers withdraw from the labour force has declined substantially since 1970 (OECD, 2012). The

[5] The average effective age of retirement is defined as the average age of exit from the labour force during a 5-year period. Labour force exits are estimated by taking the difference in the participation rate for each 5-year age group (40 and over) at the beginning of the period and the rate for the corresponding age group aged 5-years older at the end of the period (OECD, 2012).

average effective age of retirement is below the official age for receiving a full pension in most countries[6] (OECD, 2012) (see Figure 2).

While the ageing population and retirement of older workers in large numbers will have economic effects in terms of public costs to fund pensions, there are other reasons why keeping older workers on the job and delaying retirement are important. Enabling older workers to stay at work can encourage knowledge transfer to younger workers in workplaces that employ both older and younger workers; it can maintain a highly skilled labour force; and it can potentially improve the quality of life of older workers (Expert Panel on Older Workers, 2008). It may also prevent the impending labour shortages of workers required to maintain current levels of output, as well as reduce the dependency ratio and relieve younger workers from funding large social benefits (Hering and Klassen, 2010). Therefore, extending the working life of older workers can have large positive economic and fiscal effects; important consequences for the future direction of the labour market; and have a range of social benefits (Hicks, 2011). At the same time, keeping older workers in the labour force may create hardships for workers trying to remain employed and manage their health, and an aging labour force may create new health and safety issues in workplaces, or for employers in staff planning and in meeting potentially growing job accommodation demands. Improving our understanding of the multitude of reasons why older workers choose to retire early is essential if policies are to help reduce early exit from the labour market and to support older workers in the workplace.

[6] Japan and Korea are notable exceptions where the average age of retirement is close to 70 despite an official retirement age of 60 (OECD, 2012).

1.4 Background

Feldman's (1994) definition of retirement is frequently used in academic discourse: "an exit from an organizational position or career path of considerable duration... taken with the intention of reduced psychological commitment to work thereafter" (Feldman, 1994, pg. 287). The decision to exit can differ for individuals due to the timing, choice and control over the transition (Moen, 1996). Accordingly, the transition process can be separated into two pathways: voluntary and involuntary retirement. Voluntary retirement can occur when older workers choose an early retirement scheme or apply for their pension benefits when eligible, while involuntary retirement can occur when older workers require disability benefits for health reasons, or become unemployed due to, for instance, company restructuring/resizing, or are forced to leave the labour market for other reasons. It is reasonable to regard choosing to retire as different from being forced into involuntary early retirement – or when an individual no longer controls when they retire (Moen, 1996). Indeed several studies and a recent systematic review have shown that the underlying pathway and risk factors leading to involuntary exits from the labour force (i.e. disability pension, unemployment) and voluntary exits (i.e. early retirement) differ considerably (van Rijn et al, 2014; Anderson, 1985; Adams and Beehr, 1998; Shultz et al, 1998; Boumans et al, 2008; de Wind et al, 2014). Therefore, the two routes can be considered to be distinct and mutually exclusive, such that different determinants and factors underlie the processes to each route. For the purposes of this thesis, early retirement will refer to the voluntary non-disability exit from the labour market before the "traditional" retirement age of 65.

There are numerous theoretical frameworks describing individual retirement patterns. Some retirement theories build on economic models which combine individual preferences and budget possibilities and constraints (Schils, 2005; Bloom et al, 2007). As well, a wide range of other concepts have been applied to the retirement transition, such as Beehr's model for the retirement process (Beehr, 1986), a life course epidemiologic model on retirement (Moen, 1996), and the Push and Pull framework (Feldman, 1994; Shultz et al, 1998). The lack of consensus on a theoretical model of retirement behaviour is reflected in the heterogeneous set of predictors considered in previous studies.

1.4.1 Summary of Evidence on Individual Determinants

An individual's decision to retire early is influenced by a variety of factors (Feldman, 1994). Many studies have attempted to identify the factors that play a role in the early retirement process. It appears that early retirement results from a complex inter-relationship between factors that can operate at the macro institutional level, at the level of workplaces and industry, and at the micro level of individual workers (Taylor et al, 2000; van Oorschot and Jensen, 2009). A majority of past studies have mainly focused on variables related to individual differences, such as demographic factors, personal finances or general health (Beehr and Bennett, 2007). While these studies have helped identify groups of workers who are more likely to retire early, many of the identified factors are tied to the worker and are not easily changed or are stable. These factors include being a women (Cardano et al, 2004), having a spouse or partner (Friis et al, 2007; Lund et al, 2001), lower educational attainment (Cardano et al, 2004; Blekesaune and Solem, 2005),

or lower gross income (Friis et al, 2007). In terms of health-related factors, poor self-perceived health has consistently been found to be associated with increased probability of entering early retirement (de Wind et al, 2014; Friis et al, 2007; Schuring et al, 2013). Some specific chronic conditions, such as cardiovascular disease, rheumatologic inflammatory disease (Jensen et al, 2012), and arthritis in women (Renna and Thakur, 2010) have also been found to be linked with increased early retirement. A smaller number of studies have examined work-related factors, and have found several of these to be associated with early retirement, such as low work autonomy (Blekesaune and Solem, 2005), working overtime (Hardy and Hazelrigg, 1999) or having an evening work schedule (Friis et al, 2007), job dissatisfaction (Mein et al, 2000), and high workload (Boumans et al, 2008; Friis et al, 2007). However, considering how relevant work is to the retirement decision (Moen, 1996) and the fact that work factors are to some extent modifiable, the lack of studies is quite striking (van den Berg et al, 2010a). More recently a few studies have also examined the impact of health behaviours on the decision to retire early, and found a positive relationship with factors such as excessive intake of alcohol (Robroek et al, 2013a) and smoking behaviour (Jensen et al, 2012).

The most common approach used in past studies was to examine the effects of a small number of available risk factors, so that the literature on the determinants of early retirement exists in a "piecemeal fashion" (Schreurs et al, 2011). The result is a list of factors potentially associated with early retirement but little insight into which factors are most strongly related (Taylor et al, 2000). Comprehensive studies exploring a broader set of factors and a more complex perspective of the early retirement process are needed

(Beehr and Bennett, 2007). In addition, most epidemiological studies have used small samples of workers (Lund et al, 2001) or narrow cohorts including only one gender (Karpansalo et al, 2002) or one occupational group (Friis et al, 2007; Boumans et al, 2008).

Furthermore, despite the interest from policymakers in retaining older workers in the Canadian workforce, research on the predictors of early retirement within the Canadian context is very limited. Two recent systematic reviews related to the risk factors that influence workers to retire early did not find any published studies conducted with Canadian workers (van Rijn et al, 2014; van den Berg et al, 2010a). One study from Statistics Canada examined the longitudinal effects of health and workplace stress on early labour market exit due to disability or retirement among Canadian workers (Park, 2010). It found that fair or poor self-perceived health was related to early exit, as well as obesity, heavy drinking and smoking. In terms of working conditions, it found that high job strain, job dissatisfaction, and low support from a supervisor were associated with early retirement. These findings are consistent with studies in other jurisdictions; however additional studies within the Canadian context are needed to support evidence based policies. In order to offer a comprehensive and focused synthesis of published literature on the predictors of early retirement, a systematic scoping review was carried out.

1.4.2 Summary of Macroeconomic Effects

While the reciprocal effects of economic conditions on the labour market are well established (Clark and Barker, 1981), there exists a scarcity of studies which have examined macroeconomic conditions in relation to early retirement (van Oorschot and Jensen, 2009). The vast majority of studies on macro level issues have been focused on studying the direct impact of social security and pension policies (Glomm et al, 2009; Gruber and Wise, 1998; Hernoes et al, 2000; Michel and Pestieau, 2013; Røed and Haugen, 2003). These studies consistently show that there are strong economic incentives to withdraw from the labour force before the standard pension age; or conversely strong disincentives to continue working (Gruber and Wise, 1998; OECD 1998). Economic incentives include the implicit tax[7] on continued work, which has increased steeply since the 1960s; and by the early 1990s, virtually all OECD countries had in place generous old age pension systems that made it financially unattractive to work after the age of 55 (Gruber and Wise, 1998; OECD 1998). Furthermore, in some countries, these policies were amplified by the introduction of early retirement schemes (Hernoes et al, 2000; Røed and Haugen, 2003). Blöndal and Scarpetta (1999) studied the impact of social security policies in 15 OECD countries over the period 1961-95 and found that older workers labour market participation could be explained by various features of old age pensions systems, other social security policies (e.g. disability pension, unemployment

[7] Implicit tax, as it relates to retirement, refers to the tax partly used to fund retirement pension that is imposed on a person who decides to work one more year. The implicit tax varies over a worker's career, so that the increase in benefits from additional work at the start of a career is relatively large; while workers who are closer to retirement may earn little or no additional benefit from continued work. Gruber and Wise (1998) calculated the implicit tax for 11 OECD countries and found a strong correspondence between the tax on retirement postponement and older workers exit from the labour force. The pension accrual rate, has the same impact; it is defined as the gains in old-age pensions from working for an additional period. If the pension accrual rate is zero there are no penalties from withdrawing from the labour market, whereas if it is high there are incentives for workers to continue working.

benefits), and early retirement schemes. Baker and Benjamin (1999) studied the introduction of an early retirement scheme in Canada, by comparing regions with different start dates of the new scheme, and found the reforms led to an increase in pension receipt[8]. It is important to know the extent of pension coverage in each national system (i.e. what proportion of the workforce can expect to receive benefits in retirement), because the greater the coverage rate of policies, the greater its potential impact on the national labour participation rate of its older workers. The relative universality of the Canadian system of public pension covering all residents[9], relative to some other countries, can potentially have an effect on the extent to which macroeconomic conditions affect retirement behaviour. So while a credible link has been established between pension policies and retirement; only a few studies have examined the relationship between early retirement and other macro level factors, such as unemployment, national wealth, or periods of recession.

Over the last three decades, Canada has experienced three recessions[10]: one that started during the early 1980s; a second in 1990; and the most recent one started in October 2008. The most recent recession was of the shortest duration, taking total national employment only 27 months to return to its pre-downturn level. Nonetheless, as

[8] In the early 1980s, both the Canadian Pension Plan (CPP) and the Quebec Pension Plan (QPP) were available starting at age 65. An early retirement programme was introduced in 1984 for the QPP, and 1987 for the CPP, where an individual could choose to initiate benefits any time between the ages of 60 and 70 (Baker and Benjamin, 1999).
[9] CPP is mandatory for most employed Canadians (excluding the self-employed). Any Canadian who is over the age of 18 who makes at least $3500 must pay premiums to the CPP, with only a few, rare exceptions, and outside of Quebec (where a similar program exists) (Service Canada, 2013).
[10] Recession is defined as two or more successive quarters of declines in the national real Gross Domestic Product. Recessions are triggered by a decline in large scale demand for goods and services, alongside a decline in consumer expenditure, business investments, government expenditure, or international exports. These components cause drops in sales, production and employment (Chan et al, 2011).

a result of the recession, unemployment rates for Canadians aged 45 to 64 increased sharply from 4.7% in 2007 to 6.7% in 2009, and by 2014 had only recovered to 5.6%.

The global economic downtown in 2008 may have affected older workers' retirement decisions and its timing. An outcome of the recession is a weak labour market, which may have influenced or forced some older workers to choose early retirement. Employing economic theory such as the discouraged-worker theory[11] (Ehrenberg and Smith, 1988), if unemployment rates were assumed to reflect the chances of finding employment, then from a supply perspective, periods of high unemployment would lead to higher rates of early retirement through discouragement (Blöndal and Scarpetta, 1999). From a demand perspective, spikes in unemployment may be a shock to business demand, to which businesses may respond to by modernizing or reducing their work force (Duval, 2003; Dorn and Sousa-Poza, 2005). A Canadian study found that while workers were less likely to be laid-off during the most recent recession than their counterparts in previous recessions, the workers laid-off during the most recent recession were older than those laid-off previously (Chan et al, 2011). The job market mobility of older workers is extremely low in general (Salvanes and Førre, 2003), and in addition, laid off older workers would be competing with younger and possibly better educated workers in new and diversified industries (Chan et al, 2011). These discouragement effects among older workers may be correlated with retirement.

[11] The discouraged-worker theory argues that people who would otherwise have entered the labour force become discouraged workers in a recession and tend to remain out of the labour market. The expected pay-off of looking for work is so low that they decide against spending time in job search and instead stay at home, thereby leading to a reduction of the labour force mainly associated with these discouraged workers in a recession (Ehrenberg and Smith, 1988).

There is some evidence of a link between unemployment rates and early retirement specifically (Blöndal and Scarpetta, 1999). High unemployment rates has been shown to be linked to downsizing at the company level which leads to offers of early retirement packages or pressure to early retire (Dorn and Sousa-Poza, 2005; Røed and Haugen, 2003). As well, a study from the UK found that the country's annual national unemployment rate was a significant determinant of early retirement patterns of older workers (Schils, 2008). There is also a Canadian study which found a descriptive trend showing that, between 1997 and 2000, provinces with higher unemployment rates also had a higher rate of early retirement (Kieran, 2001). Also, a previous study compared retirement patterns among Canadian workers from a recession period (1990-1992) to a pre-recession period (1987-1989) to determine if there was a relationship between the state of the economy and earlier than planned retirement. It found that the number of workers taking earlier retirement due to layoffs, company closures, and early retirement packages rose during the recessionary period (Siroonian, 1993).

Yet the unemployment rate may not fully grasp the labour market pressure on older workers to retire early. Poor economic growth may have opposing effects on the retirement behaviour of older workers than unemployment. Economic theory expects persons in households with greater wealth to retire earlier than persons in poorer households (Fields and Mitchell, 1984). This income or wealth effect predicts that a portion of the higher wealth is used to reduce lifetime work, whereas poorer persons have a greater need to continue working and earning (Fields and Mitchell, 1984). At the national level, this is reflected in a lower participation rate for older persons in countries

with higher per capita wealth (Clark and Anker, 1990). There is also evidence that participation rates of older persons decline with increases in economic development as measured by per capita income (Fischer and Sousa-Poza, 2006; Johnson, 2000). The macro level effect of higher national wealth has been suggested to increase the demand for leisure because of rising living standards, and thereby acts as an incentive for early withdrawal from work (Duval, 2003; Johnson, 2000). A study that found a positive relationship between Gross Domestic Product (GDP) levels and voluntary retirement probability supports the idea of a link between national wealth and the rate at which workers choose to leave work prematurely (Dorn and Sousa-Poza, 2005). Inversely, a study which examined annual fluctuations in the stock market found that long-term declines in the value of stocks delayed retirement and reduced the likelihood of retirement among older workers (Coile and Levine, 2011).

There is noticeably a relationship between economic recession and retirement; however the effects of unemployment and GDP on early retirement are far from clear. The "natural" downturn in the Canadian economy in the fall of 2008 provides an opportunity for the analytical basis for studying the impact of macroeconomic conditions on the retirement decisions of older Canadian workers. One approach would be to assign varying aggregate economic measures to individuals in the study and examine them statistically alongside individual risk factors. However to use aggregate data to study individuals is subject to ecological fallacy[12]. This is especially true in economics where there have been questions about the credibility of findings when summary measures of

[12] The term ecological fallacy alludes to the fact that the analysis of individual decision making at an aggregate level may generate biased estimators compared to the outcome at an individual level (Robinson, 1950).

the labour market or economy have been used to describe the behavior of individuals (Sogaard, 1992; Wagstaff, 1985). Therefore, this study will aim to provide a descriptive analysis of the relationship between early retirement and macroeconomic measures, as well as a comparison of predictors between a period of relative economic peak and a recessionary period.

1.5 Research Objectives

The present study attempts to fill existing gaps in the literature by introducing a broad framework of risk factors for early non-disability retirement which aims to be more comprehensive than those reported previously. To contribute to our understanding of the predictors of early retirement, the specific research objectives of this thesis are:

1) To conduct a systematic scoping review of the peer-reviewed literature to answer the question: *What are the socio-demographic, health, work, and health behaviour predictors of early non-disability retirement identified in the published literature?* in order to construct a list of potential predictors to be explored in this study;
2) To examine the association between predictors from each domain (socio-demographic, health, work, and health behaviour factors) and early retirement;
3) To examine the association of predictors from each domain with early retirement after adjusting for all other domains; and
4) To compare predictors of early retirement between an economic period of non-recession to a period of economic recession.

1.6 Data Source

The data used to study the predictors of early retirement among older Canadian workers are from the National Population Health Survey (NPHS) conducted by Statistics Canada. The NPHS collected information from a representative cohort of Canadians every two years from 1994/1995 to 2010/2011. The NPHS enables researchers to examine causal relationships within a longitudinal framework using the economic, social, demographic, health, and occupational information collected (Statistics Canada, 1995). The NPHS was used to develop two prospective cohorts of older Canadian workers that spanned a period of economic peak in Canada (1996-2000) and a period which included an economic recession (2006-2010). The impact of socio-demographic, health, work, and health behaviour factors on the outcome of early retirement were examined; and the relationship between predictors and early retirement between the two time periods were compared. This study also used annual data on labour market and macroeconomic indicators obtained from Statistics Canada's Socio-economic Information and Management System Database (CANSIM), the Canadian Labour Force Survey (Statistics Canada, 2010b), and the Provincial Economic Accounts.

CHAPTER 2: KEY THEORIES OF RETIREMENT

Research on the determinants of early retirement is fragmented (Crego et al, 2008) and using theoretical models may provide the necessary framework to untangle the complex relationship of what is driving early retirement (Taylor et al, 2000). This chapter briefly reviews the most influential theories of retirement including Beehr's model for the retirement process (Beehr, 1986), Moen's life course epidemiologic model on retirement (Moen, 1996), and the Push and Pull framework (Feldman, 1994; Shultz et al, 1998). These theories were selected as they have been the basis for some of the most frequently cited works in the literature on retirement.

2.1 Beehr's Model for Retirement Process

The model for the retirement process developed by Beehr (1986) is a multidimensional model based on two categories: individual and environmental factors. Individual factors related to retirement include personal health and economic well-being; whereas environmental factors include work-related (e.g. working conditions) and non-work characteristics (e.g. leisure interests). These elements together can either assist work ability[13] and keep the worker in the workforce; or lead to loss of work ability and early retirement (Taylor and Shore, 1995). Specifically, work ability can be sustained when individual factors are in equilibrium with the demands of the work environment, while an imbalance can drive a worker out of the workforce (Lahelma et al, 2012). Examples of

[13] The work ability concept refers to the balance required for a worker to perform job tasks successfully determined by the worker's capacity and resources and their physical and mental work demands (Tuomi et al, 1998).

imbalances can include excessive physical and mental demands at work, or a deterioration of working conditions (Taylor and Shore, 1995).

2.2 Moen's Life Course Model on Retirement

Moen's (1996) life course model is based on the concept that transitions in later adult life are influenced by continuing and cumulative effects of experiences over our lifetime (Kuh et al, 2003). Using a social epidemiological perspective, the model conceptualizes "exposure" as made up of early-life physical and social experiences that overall help explain different routes to retirement (Figure 3). The phenomenon of retirement exists within historical circumstances created by the institutionalization of retirement starting in the 1800s and into the 20th century[14], which has led to retirement as a social structure and normative life stage (Moen, 1996). Moen's two-fold concept of 'structural' and 'situational' exigencies attributes the context of retirement to the policies and legislation that grant pensions; and to the personal circumstances of the worker such as their education, marital status or personal health, respectively. Next, using a life course analysis requires retirement to be placed in the context of past experiences. Moen (1996) suggests that while family, education and other personal experiences help shape retirement "employment history is paramount" (pg. 136). He also stipulates that work patterns and job conditions measured by other theories such as the job strain model of Karasek and Theorell (1990) can be used to describe the effects of work on retirement. Finally, the differential pathways of workers approaching retirement can be described as

[14] The federal government of Canada introduced the first Old Age Pensions Act establishing a national pension scheme in 1927, while Germany, France and Britain introduced fixed age retirement and government sponsored pension plans starting in the 1800s and early 1900s (Streib and Schneider, 1971).

involuntary (due to poor health or layoffs) or voluntary. The backdrop of the life course helps in the understanding of the timing and choice of the retirement transition (Moen, 1996).

2.3 The Push and Pull Model

Attempts have been made to categorize all the different variables that potentially predict retirement in order to help us understand the forces behind retirement decisions (Beehr et al, 2000). One widely used categorization refers to push and pull factors that influence older workers' decisions to retire (Feldman, 1994; Shultz et al, 1998; Taylor and Shore, 1995).

Push factors are negative considerations or generally aversive factors that induce older workers to retire (van den Berg et al, 2010b, Beehr et al, 2000). These explanations include individual level factors, such as financial status (Blundell et al, 2002) or poor health (McGoldrick and Cooper, 1994; Stattin, 2005). However, push factors could also include workplace effects, such as job dissatisfaction (Shultz et al, 1998), stressful working conditions (Henkens and Tazeelar, 1997), or excessive workload (Kim and Feldman, 2000). Conversely, pull factors are typically positive considerations which make retirement seem more attractive than employment to older workers (Shultz et al., 1998). These explanations derive from the desire to pursue leisure interests and can lead to voluntary withdrawal from the labour force in order to pursue self-realisation and self-activation in retirement (Lund and Villadsen, 2005). Some examples include enjoying free time, pursuing hobbies, unpaid volunteer work, and family support (McGoldrick and

Cooper, 1994). Pull factors can also derive from financial factors, where the decision to retire is based on an economical rationale involving pension benefits and retirement incentives such as buyouts (Siddiqui, 1997).

While at first it may seem that push and pull factors are easily defined, these factors can often overlap and vary depending on how workers perceive these factors in their own particular context (Shultz et al, 1998). Depending on the context, similar factors can be considered a push or a pull by different individuals, such as retirement incentive programs (Shultz et al, 1998). The complex combinations of these perceptions can lead to the decision to retire. While this framework can help researchers conceptualize the multi-factorial nature of retirement, due to the potential for overlap and shifting of factors as determined by particular contexts, adapting a firm distinction between push and pull factors may not be as useful (Lund and Villadsen, 2005). Most factors in the domains of socio-demographics, health, and work may push or pull workers to early retirement (de Wind et al, 2013b). In addition, the fact that retirement rates of older workers vary greatly between countries, suggests that in addition to individual-level factors, macro level factors are also pushing and pulling older workers in relation to retirement (Shultz et al., 1998; van Oorschot and Jensen, 2009). The macroeconomic context can result in pull factors from financial incentives and higher national wealth (Clark and Anker, 1990; Siddiqui, 1997), but may also create push factors resulting from a weak labour market during times of recession, or discriminating policies against older workers (Schils, 2008).

2.4 Conclusions

These theoretical frameworks help the understanding of the early retirement transition. While these theories differ in their conceptualization, they all hypothesize that early retirement stems from a complex relationship between several domains – mainly those related to the individual's social, personal, health, work-related and macroeconomic context. These three frameworks will help guide the analytic approach, in terms of taking into account theoretical considerations when developing the statistical model. It will also help in the interpretation of results, and the framing of the discussion and conclusions of this thesis.

CHAPTER 3: PREDICTORS OF EARLY RETIREMENT: A SYSTEMATIC SCOPING REVIEW

3. 1 Background and Rationale

Research on early exits from the workforce dates back to the early 1920s and has increased substantially in the last couple of decades. Numerous studies have attempted to unravel the factors that play a role in the processes leading to early retirement. Although there have been some attempts at reviewing and synthesizing the literature on early retirement, previous reviews have either focused on a few risk factors (van Rijin et al, 2014; van den Berg et al, 2010a; Robroek et al, 2013a), are outdated (Mitchell and Fields, 1982; Doering et al, 1983), or have not taken a systematic approach to the search and reviewing process (Taylor et al, 2000). There is currently a lack of consensus on the critical risk factors that lead to early retirement, and the existing evidence on the predictors of early retirement is heterogeneous and fragmented (Crego et al, 2008).

For these reasons, a systematic scoping review of the literature was undertaken to answer the following research question: "*what are the socio-demographic, health, work, and health behaviour predictors of early retirement identified in the published literature?*"

Scoping reviews are similar to systematic reviews as defined by the Cochrane Collaboration: "A review of clearly formulated questions that uses systematic and explicit methods to identify, select, and critically appraise relevant research, and to collect and analyse data from the studies that are included in the review" (Higgins and

Green, 2011). Scoping reviews differ from a systematic review in a few ways including: the scope and research questions are often broader; depending on the extent of studies found inclusion/exclusion criteria can be added *post hoc*; and they do not include a quality assessment of studies (Armstrong et al, 2011). Scoping reviews are also unlike narrative reviews, which reshape findings or advance theories in order to contribute new perspectives; and unlike literature reviews, which often lack systematic methodology and simply summarize or count the frequency of themes found in a set of papers (Rumrill et al, 2010).

This scoping review was guided by the general Cochrane systematic review protocol (Higgins and Green, 2011), as well as the scoping review methodology recommended by Arksey and O'Malley (2005) and the extended framework by Levac et al (2010). There are five levels to this systematic scoping review including: formulating the review question, searching for potentially relevant articles, screening and selecting relevant articles, data extraction from selected articles, and synthesizing the findings qualitatively. The findings from the review were used to construct a list of characteristics within the socio-demographic, health, work, and health behaviour domains to explore as predictors in the analysis portion of this thesis.

3.2 Review Methodology

The scoping review research question was formulated to identify studies with evidence on the predictors of early retirement. While scoping review questions can be kept broad, it has been suggested that "having a comprehensive understanding of

concepts can help to set boundaries" (Armstrong et al, 2011). Therefore, it was pre-specified *a priori* within the research question that the purpose of the review was to find predictors within the domains of interest, specifically socio-demographic, health, work, and health behaviours. There was also an interest in finding predictors measured beyond the individual-level, specifically macro-level factors such as economic or labour market conditions.

A list of search terms was identified and combined to capture all papers which referred to early retirement. A specialized search strategy was developed and adapted to each database. The following electronic databases were searched: Ovid MEDLINE and ProQuest PsycInfo. Appendix 1 includes the complete list of search terms and strategy by database. A list of "must-have" articles compiled from a previous systematic review (van den Berg et al, 2010a) and earlier non-systematic searches was used to test the sensitivity of the search terms. The search strategy was adjusted and improved until the must-have articles were captured. The search was restricted to human studies, and to papers published between 1995 and the search dates (May 27-30, 2014). The date restriction was applied for feasibility and because adequate reviews exist for papers published prior to 1995 (Singh, 1998; Mitchell and Fields, 1982; Doering et al, 1983). No other search restrictions were applied. In order to locate published articles not identified by the electronic search, reference lists of studies selected for data extraction were manually

reviewed for relevant studies and the table of content of key journal issues were also reviewed[15].

The first level of screening was a scan of the titles and abstracts, during which the *a priori* inclusion/exclusion criteria were applied. Studies were excluded if they were not written in English or were not peer-reviewed. In addition, book reviews, case reports, commentaries, letters to editors, opinion or editorial papers, theoretical papers, cost-benefit/economic costs or health burden studies, and simulation/modelling studies were excluded. Studies related to military personnel, professional athletes and farmers were also excluded. Studies which examined intentions to retire or retirement thoughts, or in which purely descriptive statistics were described, were also excluded. Qualitative studies were excluded for the purposes of the scoping review but were noted for insight into other sections of the thesis. The inclusion criteria required the main findings of the paper to pertain to predictors of actual retirement before the age of 65, to include some quantitative statistics, and to have established the outcome temporally following some labour market participation (i.e. not cross-sectional or studying transition from unemployment to retirement). The next level of screening involved obtaining the full-text of articles that passed the titles and abstract stage. The same inclusion/exclusion criteria were applied to the full-text of the articles. The last stage of the review was data extraction on the remaining studies found to be relevant. Data was extracted from each article on the authors, year of publication, country or jurisdictions in which the study was conducted, the study design and follow-up period, range of years for study data, study

[15] Table of contents of the following journals were scanned: Labour Economics, Canadian Journal of Economics/Revue canadienne d'économique, Relations industrielles/Industrial Relations, Journal of Labor Economics

population, the assessed outcome, and any significant determinants of early retirement. Data about significant predictors were extracted from fully adjusted models, and for direct effects on early retirement (only applicable in the case of structural equation modeling examining indirect effects).

3.3 Search Results

A total of 1,854 potentially relevant studies were identified by the search strategy. An additional 36 articles were added to the titles and abstract level after manually scanning reference lists and the table of contents of key journal issues. After removing duplications, 1797 were evaluated at the titles and abstract level. Of these, 316 articles met the inclusion criteria and were moved to the full-text article level. After reviewing the full-text, another 278 articles were excluded, leaving a final set of 38 articles for data extraction. Figure 4 provides a flow diagram depicting the different phases of the scoping review and maps the number of records identified, included and excluded, and the reasons for exclusions.

3.4 Main Findings

The study characteristics of the 38 articles are presented in Table 1. The literature originated from several Europe countries and the United States. The longitudinal studies ranged in the number of years for follow-up from 1 year to 15 years. The data sources were markedly dated, 15 (40%) of the 38 studies used data from pre-2000, and only 2 studies used data more recent than 2010. The age range of samples was mostly older than

50 years of age. Many studies (19) used large population-based data, while a few used workplace samples, and two used clinic samples. A number of studies were restricted to males only (6), two studies were restricted to females, and some studies were restricted to specific occupations, such as civil servants, municipal workers, waste collectors, university faculty, autoworkers, nurses' aides, and daycare teachers. The majority of studies employed a self-reported outcome of early retirement, while several others studied the transition into early retirement schemes or programs.

The breakdown of studies which reported significant predictors of early retirement within the domains of interest were as follows: 23 (61%) of the 38 studies reported at least one socio-demographic predictor; 26 studies (68%) reported health characteristics as predictors; 21 studies (55%) found work characteristics, and 7 studies (18%) found health behaviours as significant predictors.

The most common type of socio-demographic characteristics reported to be a significant predictor of early retirement was not surprisingly age. Other socio-demographic characteristics commonly reported as predictors were gender, marital status and education. The influence of income related predictors were also fairly common, with 16 (42%) of 38 studies finding a significant relationship. There were also about 26% of studies (10 of 38) that described characteristics of the study participant's partner, such as their income, employment status, or attitude toward retirement. A couple of studies also found geographic descriptors, related to the participant's place of residence or place of birth, to be significant.

Health characteristics were mostly derived from a one-item question on self-perceived assessment of general health (10 of 26 studies whose findings included a significant health predictor). Others reported health variables that were less subjective, such as the number of visits to a general practitioner, hearing loss, or diagnoses of disease such as cancer or diabetes (albeit still self-reported). Three studies found the presence of chronic conditions to be a significant predictor of early retirement. No studies explicitly found mental health related predictors, although one study constructed an index to measure health shocks which included anxiety and depression (Jones et al, 2010) and another study included chronic conditions which assessed both physical and mental health conditions (Schuring et al, 2007). Another study used the General Health Questionnaire score (GHQ) (Mein et al, 2000), which is commonly used for the assessment of general mental well-being and can detect those likely to have or be at risk of developing psychiatric disorders, depression, or social withdrawal (Jackson, 2007).

Work characteristics found to be significant predictors of early retirement included several dimensions directly from the Job Content Questionnaire (JCQ) (Karasek and Theorell, 1990), such as job demand, job control, physical workload and job satisfaction, while others were very similar to dimensions included in the JCQ, such as job monotony, pressure at work, being challenged at work, or having influence at work. There were also several job related characteristics, such as the industries or sectors in which participants were employed, the type of work schedule, shift work or work hours. A few studies also found tenure, job experience, productivity, or job training to be important.

The finding of a significant relationship between health behaviours and early retirement was reported less commonly than the other domains of predictors. Still, health behaviours such as physical activity, weight and/or body mass index (BMI) were significant in three studies each. There was also one study for each health behaviour which found alcohol intake and smoking to be related to early retirement.

All but three studies reported individual-level predictors of early retirement only. One study found significant workplace-level predictors; specifically planned plant closures at the company, and worker solidarity at an auto plant (Hardy and Hazelrigg, 1999). Two studies found significant macro-level predictors. The first study found that annual fluctuations in the stock market value, as measured by a composite index, significantly influenced participants complete labour withdrawal due to retirement (Coile and Levine, 2011). The second study found that for UK workers, the country's mean national unemployment rate was a significant determinant of early retirement patterns (Schils, 2008).

3.5 Key Messages and Conclusions

The objective of this scoping review was to utilize a systematic and explicit search and review process to find as many of the relevant published literature in order to answer the research question. The research question was aimed at collecting significant predictors of early retirement from previous studies. The main item which emerged from this review was a broad list of potential predictors to explore in this study of Canadian workers during two periods. This list can be found in Appendix 2. The most common

types of predictors that were not available in the current study data were the following: information on pension plans, health insurance, or other benefits; perceived financial adequacy to retire; drug use; less common and specific health assessments or health conditions (e.g., hearing loss, max flow velocity); hospital admission; information on partner's attitudes, income, employment, or retirement status; job tenure, overtime, or job tasks or positions (e.g., extreme bending, standing); union membership; and very specific job characteristics relevant to the occupation sampled (e.g., nursing area, publication productivity, teaching certificate). Several variables in the current study and those measured in previous studies may not be measured the same, however a number of them were considered to be sufficiently similar, such as low back pain in last year and low back pain as a health condition (NPHS); dyspnoea and asthma (NPHS); or angina pectoris diagnosis and heart disease (NPHS). The review included 38 studies that reported at least one significant predictor of early retirement. The breadth and variation of variables identified emphasize the need for more clarity and consensus on the underlying causes of early retirement. The findings do support however the framework of categorizing predictors into the domains of socio-demographic, health, work and health behaviour as over 90% of predictors could be classified to these domains. Furthermore, the presence of several studies that found predictors from several domains to be significant reveals the importance of considering the contribution of factors from each domain. Another message arising from the findings of this review is that the data used for nearly half of the existing studies are from periods prior to the new millennium. This renders the evidence available somewhat outdated and highlights the need for more

recent data to explore the causes of early retirement in a labour market that has experienced vast changes. The review also found little information in the literature on predictors beyond those at the individual-level. Future evidence is needed to examine how macro-level predictors are influencing the early retirement process.

CHAPTER 4: METHODS AND ANALYSES

4.1 Study Hypotheses

From theoretical frameworks regarding retirement behaviour and findings from the scoping review, five main hypotheses can be conceptualized that may lead to increased transition of older workers into early retirement.

While the findings from the scoping review suggested that women and older age influenced early retirement, it found the effect of marital status to be weaker, and found conflicting results for the effects of education (Blekesaune and Solem, 2005; Cardano et al, 2004). The life course model and economic theories generally state that having a partner and investing in education are forms of social and financial human capital; and that a lack of them will stimulate a need to remain in the labour market. Therefore the first hypothesis is:

1. That workers who are older, female, have lower education, and who are partnered will be significantly more likely to report early retirement.

As part of every theoretical framework and nearly all previous studies on early retirement, health has played an important role in determining the timing of retirement. While ill health can result in increased health care related financial costs, there is strong evidence from previous findings that poorer health pushes older workers into early retirement. Therefore the second hypothesis is:

2. That workers with poorer self-rated health, those with chronic conditions, and those who have experienced psychological distress or depressive episodes will be significantly more likely to report early retirement.

Related to health effects, there are several behaviours that lie upstream of these effects which may negatively influence health outcomes and work ability. Conversely there are behaviours that often lead to more positive and healthier psychological and physical states. Some of these health behaviours can be targeted by public health programs or policies and thus are an important set of predictors due to their potential for intervention and change. The third hypothesis is:

3. That workers who are smokers, overweight/obese, regular drinkers, who engage in less leisure time physical activity, and who have a lower sense of mastery will be significantly more likely to report early retirement.

The work environment of older workers can play an important role in the decision to enter retirement. According to Beehr's model for retirement, work ability can be sustained when older workers feel they are in equilibrium with the demands of the work environment, while an imbalance can drive a worker out of the workforce. Likewise the life course model states that working conditions as measured by the job strain model by Karasek and Theorell (1990) can describe both the positive and negative effects of work on retirement. Findings from the scoping review suggest that negative working conditions act as a push factor to leave work, and that transitions into part-time work are a form of reduced attachment to work. Therefore, the fourth hypothesis is:

4. That workers who report a poor psychosocial working environment, high physical exertion at work, lower job satisfaction, working part-time and irregular hours will be significantly more likely to report early retirement.

Finally, there is some evidence suggesting a relationship between macroeconomic conditions and retirement; which provided the basis of the analytic time period of the current study in order to compare a period of non-recession to a period of economic recession in the fall of 2008. The fifth hypothesis is:

5. That predictors of early retirement during a period of non-recession will be significantly different from predictors of early retirement during a period of economic recession.

4.2 Study Data

This study was a population-based prospective cohort study of Canadian workers aged 45-64 using secondary data from Statistics Canada's Canadian National Population Health Survey (NPHS) (Statistics Canada, 1995). This study used cycle 1 (1994/1995), cycle 2 (1996/1997), and cycle 3 (1998/1999) of the NPHS to create a cohort to prospectively assess the relationship between predictors and the risk of early retirement assessed two and four years later during a period of relatively strong national economic performance (cohort 1). In addition, this study used cycle 7 (2006/2007), cycle 8 (2008/2009), and cycle 9 (2010/2011) of the NPHS to create a second cohort to prospectively assess the relationship between predictors and the risk of early retirement assessed two and four years later during a period which included an economic recession

(cohort 2) (Figure 5). Detailed collection procedures and response profiles of the NPHS are extensively described elsewhere (Statistics Canada, 1995; Tambay and Catlin, 1995; Swain et al, 1999). In brief, the NPHS collected information from a representative sample of Canadians by employing a stratified multistage sampling design of households across Canada. Information was collected directly from a randomly selected household member using either in-person or telephone interviews, or a combination of both. The NPHS covered the population 12 years of age and over living in the ten provinces and the three territories. Excluded from the survey's coverage are: persons living on reserves and other Aboriginal settlements; full-time members of the Canadian Armed Forces Bases; residents of health institutions or penitentiaries; and persons living in certain remote regions of Ontario and Quebec (Statistics Canada, 1995). Beginning in 2000/2001, the survey became strictly longitudinal. The NPHS collected information related to the health of members of the Canadian population and related socio-demographic information every two years. The longitudinal sample in 1994-95 consisted of 17,276 randomly chosen individuals with an overall response rate of 83.6%[16]. This sample was followed over time and the response rates for the cycles used in this study were 92.8% in 1996-97, 88.3% in 1998-99, 77.0% in 2006-07, 70.7% in 2008-09, and 69.7% in 2010-11 (Statistics Canada, 2012b).

This study also used data on labour market and economic indicators obtained from Statistics Canada's Socio-economic Information and Management System Database (CANSIM), the Canadian Labour Force Survey (Statistics Canada, 2010a), and the

[16] Cycle 1 response rate is based on the 20,095 in-scope persons selected to form the longitudinal panel while the response rate for subsequent cycles is based on the 17,276 individuals who form the longitudinal panel (Statistics Canada, 2012b).

Provincial Economic Accounts. For each indicator, annual data at the national and provincial level was obtained for study periods (1994-1999 and 2006-2011).

4.3 Study Sample

The population for this study were Canadians aged 45-64 years of age who were in the labour market. For this study, samples in each baseline cycle were restricted to those respondents who were 45 to 64 years of age. The number of respondents aged 45-64 years totalled 2951 in 1994/1995 and 2983 in 2006/07. In order to examine predictors of early retirement, the sample was restricted to those in the labour market at baseline. Participants in the labour market were defined as those respondents who reported that during the week prior to the interview they were working for pay or profit, or who stated that their reason for being absent or not working was partly paid or unpaid vacation, labour dispute, temporary or seasonal layoff, casual or seasonal job, they were waiting to start a secured job, or they were looking for work (Statistics Canada, 2010c). The baseline cohorts excluded those who were already retired, and those who were not in the labour market due to their own disability, caring for family, attending school, or other specified reasons. Labour market participants totalled 2270 in 1994/95 and 2342 in 2006/07. After removing those missing information on one or more of the predictors, those who turned 65 without experiencing the outcome or who left the labour market due to other reasons, there was a final sample of 1291 (7.5% of original sample) for cohort 1 (Figure 6a) and a final sample of 1491 (8.6% of original sample) for cohort 2 (Figure 6b).

4.3. 1 Missing Data

There are different types of missing data in the NPHS. The NPHS uses a complex sampling design to select a sample representative of the Canadian population. Survey weights are provided by Statistics Canada and represent the probability of selection of the unit of analysis at the time of sample selection. The principle behind estimation in a probability sample such as the NPHS is that each person in the sample "represents", besides himself or herself, several other persons not in the sample (Statistics Canada, 1995). Secondly, a major source of non-sampling errors in surveys is the effect of non-response on the survey results. The extent of non-response varies from partial non-response (failure to answer just one or some questions) to total non-response. Total non-response occurred because it was impossible to trace the respondent, no member of the household was able to provide the information, or the respondent refused to participate in the survey (Statistics Canada, 1995). Total non-response can occur at the first stage of selection and at each cycle of the NPHS. The failure to follow-up or trace a respondent at follow-up is a type of total non-response called attrition. The number of people answering the survey slightly decreases at follow-up due to attrition caused by non-respondents, refusals and individuals that were untraceable (Statistics Canada, 1995). Despite the attrition, the NPHS survey cycles remained representative of the Canadian population. Total non-response was handled by Statistics Canada by adjusting the weight of persons who responded to the survey to compensate for those who did not respond (Statistics Canada, 1995). Partial non-response results in item-level missing data. This type of missing data was minimal in the NPHS; once the questionnaire was started, it tended to

be completed with very little non-response (Statistics Canada, 2012b). In most cases, partial non-response to the survey occurred when the respondent did not understand or misinterpreted a question, refused to answer a question, could not recall the requested information, or could not provide personal or proxy information (Statistics Canada, 2012b). In this study, those with missing item-level responses were removed from the study. A missing analysis was performed to compare those who were eligible to be selected into the study cohorts, those lost to follow-up, and those removed from the study due to missing information from those included in the study. A logistic regression examined whether there were differences in characteristics between those respondents who were not included in the sample and to the final study sample with full information. This analysis found that in cohort 1, older respondents, those who completed a college/trade school diploma or certificate, and respondents from the Atlantic provinces and Quebec provinces were more likely to be missing in the study sample, while respondents with an annual income of more than $60,000, and those working in educational services and health care/social assistance were overrepresented in the study sample. In cohort 2, women, older respondents, and those working in the trades, manufacturing, or primary industries were more likely to be missing in the final sample, while respondents with an annual income between $40,000 and $60,000, respondents from Alberta/Manitoba/ Saskatchewan, and those working in public administration were overrepresented in the study sample. The analysis shows that there are no systematic differences between the excluded and the included cases.

4.3.2 Weighting Estimates

According to Statistics Canada, the principle behind weighting a sample is that each respondent "represents", besides themselves, several other persons from the population who are not in the sample. For instance, if a survey collects a random sample of 2% of a population, each survey participant has a weight of 50, which represent people from the same population who are not in the sample (Statistics Canada, 1994). For the NPHS, the weighting provided calculates for each survey respondent their associated weight. When using the NPHS this weight must be used to derive meaningful estimates from the survey. In addition, the provided weights account for the probability of selection into the original sample and non-response (Statistics Canada, 1994). In this study, responses were analyzed using both un-weighted and weighted measures. Final results are presented using weighted responses only for data release purposes and in order to be able to interpret results as representative of the Canadian population. Where results differ between the weighted and un-weighted samples, this will be noted.

4.4 Ethical Consideration

This study used the NPHS microdata file housed at Statistic Canada's Research Data Centres (RDC). The data is kept on a secure server and entry to the RDC is restricted to key card access. Before researchers can access the data, Statistics Canada performs an Enhanced Reliability Check on the researcher. Any output from analyses is vetted by a Statistics Canada Analyst before it is allowed to be removed from the

premises or used in any reporting or publication. All vetted data has been stripped of any personal identifying information. No further consent from respondents was required.

4.5 Study Variables

Main Outcome Measure

Early retirement

Early retirement was defined using two survey questions at follow-up: 1) if the respondent reported that he or she was not working at a job or a business in the week prior to the interview, and 2) if the main reason given for not working at a job or business last week was due to being retired. The event of interest occurred when a respondent working at baseline reported being retired at follow-up and was younger than 65. For the purposes of this study, those who retired early are compared to those who reported that they were still working.

Main Independent Measures

There were three main categories of predictor variables consisting of: 1) socio-demographic characteristics; 2) physical and mental health characteristics; and 3) health behaviors. Categorical variables with two levels were directly entered as predictors in regression models. However, categorical variables with more than two levels were transformed into variables each with two levels. The process of creating dichotomous variables from categorical variables is called dummy coding.

Socio-demographic Characteristics

The following socio-demographic characteristics were examined: gender, age (continuous), marital status (categorized as married/common-law/partnered or single/separated/widow), immigration status (immigrant or Canadian-born), population density of living location (urban or rural), household living arrangement (single & living alone, single & living with others, or living with partner and/or children), and estimated total personal income from all sources (continuous in increments of $10,000). In addition, the following socio-demographic characteristics were also examined:

Highest Level of Education. The respondent's highest level of education attained was included and categorized into four-levels as: secondary school not completed; secondary school completed; college/trade school diploma or certificate completed; Bachelor's degree completed; Master's degree or higher completed.

Province of Residence. The respondent's province of residence was included using a dummy-coded variable for three provinces (Ontario, Quebec, and British Columbia), an aggregated four Atlantic provinces (Newfoundland and Labrador, Nova Scotia, New Brunswick, and Prince Edward Island), and an aggregated group which included Alberta, Manitoba, and Saskatchewan.

Household Income Adequacy. Household income adequacy was categorized into four groups based on total household income and number of people who reside in the

household: lowest income (<$15,000 if 1-2 people in household, <$20,000 if 3-4 people, or <$30,000 if 5+ people); lower middle income ($15,000-$29,999 if 1-2 people in household, $20,000-$39,999 if 3-4 people, or $30,000-$59,999 if 5+ people); upper middle income ($30,000-$59,999 if 1- 2 people in household, $40,000-$79,999 if 3-4 people, or $60,000-$79,999 if 5+ people); and highest income ($60,000+ if 1-2 people in household, or $80,000 if 3+ people).

Physical and Mental Health Characteristics

The following physical and mental health characteristics were included as predictors:

Self-rated Health. General health was assessed with one question asking respondents to rate their current level of health on a five-point scale (excellent, very good, good, fair, and poor). For the analysis, self-rated health was grouped into excellent, very good, good, fair/poor. Level of self-rated health is associated with future morbidity and mortality in a variety of different populations (DeSalvo et al, 2006; Idler and Benyamini, 1997).

Health Utility Index (HUI) Mark 3 Score. The HUI3 is a single numerical value based on a composite index assessing eight self-reported health attributes (range -0.36 to 1.00; 2 decimal places, where 1.00 = perfect health; 0.00 = dead; -0.36 = a state worse than dead) (see Appendix 3). The value provides a description of an individual's overall functional health based on these eight attributes: vision, hearing, speech, mobility (ability to get

around), dexterity (use of hands and fingers), cognition (memory and thinking), emotion (feelings), and pain and discomfort (Feeny et al, 1995). An individual can suffer from any possible combination of these attributes. The HUI3 is based on complex calculations that embody the views of society concerning health status (Horsman et al, 2003). The HUI3 measure has been validated in the general Canadian population and shown to be associated with quality of life (Kopec et al, 2000). As has been commonly found with health questionnaires of a general population sample (van Doorslaer and Jones, 2003), the distribution of the HUI3 was heavily skewed to the left (closer to 1) with a majority of respondents reporting very good health. One method of handling the skewness of the HUI3 is to transform the variable using a mathematical function (Bernier et al, 2011), and in this study, the HUI3 was log transformed to improve the distribution.

Chronic Health Conditions. The NPHS includes information on chronic conditions which were defined for respondents as conditions that have lasted or were expected to last more than six months, and as diagnosed by a health professional. They included conditions such as asthma, arthritis, back problems, high blood pressure, migraines, chronic bronchitis, diabetes, epilepsy, heart disease, ulcers, urinary incontinence, eye problems (cataracts and glaucoma), cancer, effects of a stroke, and Alzheimer's disease or any other dementia. After examining the distribution of the reported number of chronic conditions, the variable was classified into no chronic conditions present, 1 chronic condition present, 2 chronic conditions present, 3 or more chronic conditions present.

Psychological Distress. The psychological distress score was based on a 6-item index of the Composite International Diagnostic Interview (CIDI) (see Appendix 2). The CIDI is a structure diagnostic instrument that was designed to produce diagnoses according to the definitions and criteria of both DSM-III-R and the Diagnostic Criteria for Research of the ICD-10 (Statistics Canada, 1995). Each response was coded on a four-point scale according to the frequency of the psychological response and then summed (range 0 - 24). Higher scores indicate more distress. The internal reliability of the scale has been reported by Statistics Canada as α of 0.79 (Wade and Cairney, 1997). The measure was included as a continuous predictor.

Depression. The depression scale was based on a subset of items from the Composite Diagnostic Interview (CIDI) which measured major depressive episodes (MDE) (see Appendix 2). MDE diagnosis was based on a respondent's score on a short-form of the index (range 0-1) that was developed to assess MDE related criteria in the DSM-III-R (Statistics Canada, 1995). The measure was included as a continuous predictor.

Health Behaviours

Alcohol Consumption. Alcohol consumption was based on self-reported number of drinks and frequency of drinking collected from respondents and was categorized into never drank/former drinker, occasional drinker, and regular drinker.

Smoking. Respondents were asked to report their current and past smoking habits. Using the respondent's history of smoking three categories were created: smoker (daily smoker or occasional smoker); former smoker (former daily or occasional smoker); and never smoked.

Body Mass Index. BMI is based on self-reported height and weight and is calculated by dividing weight (kg) by squared height (meters). BMI is often used as a predictor of obesity and certain health risks in adults (Mooney et al, 2013). BMI was classified into <24 BMI (normal weight), and >25 (overweight/obese).

Leisure Time Physical Activity. LTPA is measured in the NPHS by using a self-reported recall of the frequency and duration of 21 different common activities (plus an option for other activities) over the previous three months. From this information and a standardized metabolic equivalent value for each activity, the estimated energy expenditure (EE) level for each respondent over the previous 12 months was calculated. EE values were used to categorize individuals into: active (those who averaged 3.0+ kcal/kg/day EE); moderate (those who averaged 1.5 - 2.9 kcal/kg/day EE); and inactive (those with an EE below 1.5 kcal/kg/day). Those who are categorized as active are at the approximate level of exercise that is required for cardiovascular health benefits, while those who are moderately active may expect to experience some health benefits but little cardiovascular benefit (Statistics Canada, 1995).

Sense of Mastery. Sense of mastery was assessed with seven questions derived from an index developed by Pearlin and Schooler (1978) which measures the extent to which individuals believe that their life chances are under their control (Appendix 3). Higher scores indicate superior mastery. The internal consistency for the sense of mastery scale has been previously reported as a Cronbach α estimate of 0.76 (Wilkins and Beaudet, 1998).

Work Characteristics

Each respondent was asked work-related questions and instructed to answer while considering the position they considered their main job. The following work-related characteristics were included:

Work Schedules. Respondents were asked to select a description that best reflected their working schedule. The responses were collapsed into regular daytime/night shifts, and irregular shifts (on call, rotating, and split shifts).

Work Hours. Respondents were asked to report "about how many hours a week" they usually worked, including extra hours or unpaid or paid overtime. Statistics Canada (2010c) classifies full-time workers as employed persons who usually worked 30 hours or more per week, and part-time workers as those who worked less than 30 hours per week. The responses were categorized into full-time (>30 h/wk) or part-time work hours.

Psychosocial Work Environment. Aspects of the psychosocial work environment were assessed by using a 12-item index based on an abbreviated form of the Job Content Questionnaire (JCQ) designed by Karasek and Theorell (1990) (Appendix 3). The items reflect the respondents' perceptions about various dimensions of their work including: skill discretion (3 questions; range 0 - 12); decision authority (2 questions; range 0 - 8); psychological demands (2 questions; range 0 - 8); social support (3 questions; range 0 - 12); and job security (1 question; range 0 - 4). All questions are coded on a five-point Likert scale. All questions are listed in Appendix 3. Higher scores indicate greater work stress. Scores are reversed for positively phrased questions so that higher scores indicate a more stressful work environment. Each dimension was kept separate to examine whether particular dimensions were more strongly related to retirement.

Cronbach's alpha is a measure used to assess the internal consistency between multiple items in one dimensional index. The internal consistency can be calculated for work stress indices that were measured by at least two items. Statistics Canada has reported internal consistency as Cronbach α estimates of 0.61 for decision latitude, 0.34 for psychological demands, and 0.22 for social support (Wilkins and Beaudet, 1998). Previous studies using the non-abbreviated JCQ have reported internal consistency estimates of 0.7 or above, and consistency across different workplaces and countries for these three scales (Hellerstedt and Jeffery, 1997; Karasek et al, 1998). The relatively low estimates of internal consistency found in the NPHS are mainly due to the limited number of items available to measure work stress (Wilkins and Beaudet, 1998).

Physical Exertion. Respondents were asked whether their job required a lot of physical demands. Responses are coded on a five-point Likert scale.

Job Satisfaction. Respondents were asked how satisfied they were with their job. Responses were grouped as very satisfied, somewhat satisfied, not too/not at all satisfied.

Industry. Industrial grouping was derived from respondents reporting what kind of business they worked in and classified using the North American Industry Classification System (NAICS) 2007 codes. These were further collapsed into the goods industry (agriculture, mining, utilities, construction, manufacturing, transportation/warehousing), the service industry (wholesale trade, informational/cultural, finance, real estate, professional, arts/entertainment, accommodation/food service), educational services, health care and social assistance, public administration, and retail trade.

Occupation. This variable indicates the occupation group the respondent belonged to. The classifications are based on the National Occupational Classification Statistics (NOC-S) 2006 at the 2-digit level. These were further collapsed into management/ business/ administration occupations; natural and applied sciences occupations; health care occupations; social science, education, government occupations; art/ recreation/ sales occupations; and trades, manufacturing and primary industry occupations.

4.6 Statistical Analyses

4.6.1 Descriptive analyses

Descriptive statistics were used to describe the entire population included in the study. Descriptive statistics are mathematical techniques used to organize and summarize sets of numerical data in order to gain an understanding of the sample studied. Means, standard deviations, and frequency distributions were used to describe the participants' socio-demographic and other characteristics. Bivariate Pearson correlations and Spearman's nonparametric correlations were computed to examine the relationship between all of the measures and the outcome. Collinearity of predictors within each domain was checked. Multicollinearity arises because variables that measure the same thing are present in a regression model, which can cause problems in estimating the regression coefficients and inflating the standard errors for the coefficients. The variance inflation factor test was used in SAS to check for multicollinearity. There was a degree of collinearity among the health characteristics domain, which improved by omitting the HUI variable from the regression models.

All data from the study instruments were coded, entered, verified, and analysed using SAS version 9.3 software (SAS Institute Inc., 2000).

4.6.2 Statistical Procedure

A prevalent method that has been used in analyzing labour market and health data has been logistic regression. Logistic regression is a form of the generalized linear model

(GLM) which allows for non-normal distributions, such as binomial, Poisson, or exponential (Montgomery et al, 2006). Logistic regression is appropriate for analyses in which the dependent variable is dichotomous, such as workers entering early retirement denoted as yes or no (coded as "1" and "0", respectively) (Allison, 2012). Logistic regression measures the effect of an independent variable on a dependent variable and estimates regression coefficients that specify the capability of each independent variable to predict the response outcome (Harrell, 2001).

Logistic regression does not assume a linear relationship between the independent variables and the dependent variable, instead it models the relationship between the two using a logit model; the natural logarithm of an odds ratio (Hosmer and Lemeshow, 2013). This is necessary because using a linear relationship to plot a continuous predictor (e.g. age) and a binary outcome variable (e.g. early retirement, yes/no) would result in two parallel lines that could not be meaningfully described with a linear regression equation due to the dichotomous level of the outcome. Instead if the mean of the outcome variable is calculated for a predictor variable, and then plotted, it would result in a curve which is generally linear in the centre with curved ends (Hosmer and Lemeshow, 2013). This curve, called sigmoidal, or simply S-shaped, does not represent a fully linear trend and violates the assumption of homoscedasticity[17] (i.e. same variance) (Peng et al, 2002). Logistic regression is able to handle this scenario since it does not assume that the independent and dependent variables vary linearly, does not assume normally distributed variables, and does not require homoscedasticity. By applying the logit transformation to

[17] Homoscedasticity is an assumption of linear regression, requiring that the standard deviations of the error terms are normally distributed and constant for all values of the independent variable (Kleinbaum and Klein, 2010).

the dependent variable it predicts the log-odds of the dependent variable from the value of the predictor variable (Allison, 2012). The logit is the natural log of the odds of Y (the dependent variable), and odds are defined as the ratios of probabilities (*P*) of Y occurring (i.e. entering early retirement) to probabilities (1 - *P*) of Y not occurring (i.e. staying in the labour market).[18] The logistic model is the inverse of the logit given by the formula (Peng et al, 2002):

$$\text{Logit}(P) = \log [P / (1 - P)] = \log (P) - \log (1 - P) = - \log (1/ P - 1) \quad [1]$$

Applying the antilog to Formula 1, results in a formula that can be used to estimate the probability of the outcome occurring:

$$P = (e^{\alpha + \beta X}) / (1 + e^{\alpha + \beta X}) \quad [2]$$

where *P* is the probability of the outcome of interest occurring, in this case early retirement; α is the Y intercept; β is the regression coefficient, and e is the base of the natural logarithm; and X can be categorical or continuous values of the independent variable. The logistic regression coefficients (βs) estimate the change in the log odds of the dependent variable for any one unit increase in the independent variable (Kleinbaum and Klein, 2010). The β coefficients vary between plus and minus infinity, and indicate the direction of the relationship between X and the logit of Y (i.e. positive or negative) (Peng et al, 2002). For the purposes of inferential statistics, the β coefficients can be used as a criterion to accept the null hypothesis or infer a relationship between the variables exists (Kleinbaum and Klein, 2010). For practical purposes, the logit is converted back into odds ratios, which estimate the change in the odds of being a case or "event" for a

[18] Given that the curve is bound between values of zero and one, the predicted values obtained using the logistic model can be interpreted as probabilities, since the odds is defined as the probability that a particular outcome is a "event" divided by the probability that it is not an "event" (Kleinbaum and Klein, 2010).

one-unit increase in X (Peng et al, 2002). The formula for the odds ratio from a logistic regression, extended to include multiple predictors, is given by:

$$OR = e^{\alpha + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_j X_j} \quad [3]$$

With multiple logistic regression, more than one predictor can be entered into the model; continuous values for continuous predictors, and dummy codings for categorical predictors (Kleinbaum and Klein, 2010). Adjusted odds ratios, which can be calculated from coefficients from a multiple regression that estimate the magnitude of the association between each predictor and the outcome after adjusting for all other predictors, are the preferred measure of association estimated from a multiple logistic model (Kleinbaum and Klein, 2010).

4.6.3 Alternative Statistical Approach

The selection of the most appropriate statistical technique to answer research questions should take into account the design of the study, the type of data being used, the study assumptions, and feasibility of analysis (Hosmer et al, 2008; Allison, 2012). An alternative statistical approach for this study could be a time-to-event survival model. A survival model is used when there is censoring in the data, such as observations that are right censored when the period of observation terminates before the outcome of interest is observed (Hosmer et al, 2008). For example, in the NPHS when an individual younger than 65 remains in the workforce at the end of observation their outcome is right censored. It is also used to account for time-dependent variables when covariates include static factors , such as gender and immigration, and changing factors, such as marital

status and self-rated health (Hosmer et al, 2008). Lastly, when studying a cohort over time, follow up may terminate due to multiple modes of "failure"; this is generally referred to as competing risks; that is if one outcome is of primary interest, then the other failures are said to be "competing" with the primary event (Hosmer et al, 2008).

With the NPHS being administered every two years, the time of exposure to the various predictors (i.e. poor working conditions) is only accurate for two years at a time. Most importantly, the time to event (the primary interpretation of results obtained from a survival model) can only be measured in two years periods, as the date of retirement is not available, and it can occur anytime in the preceding 24 months. This limitation reduces the benefits of a traditional survival analysis as it is lacking an accurate time to event outcome. Similarly, limitations in the data diminish the benefits of accounting for time-dependent variables, as key predictors found to be of importance in the scoping review were not consistently measured in the NPHS, thereby making the time varying analysis less effective. The ability to consider competing risks as an outcome, for example, how many people moved into unemployment or left the labour market due to disability, or other reasons (not retirement), were beyond the scope of this thesis and are outcomes which merit additional studies. The clarity of using a dichotomous outcome offered in logistic regression allowed for comparison between two cohorts at two different meaningful economic time periods (non-recession versus recession) focused specifically on the outcome of interest – early retirement. Therefore, while survival analysis could be a valid alternative statistical approach, due to limitations in the data,

interpretation of results, and feasibility and scope, a logistic regression was utilized to meet the study objectives.

4.6.4 Model Development

Prior to model building, variables were coded into meaningful categories and then dummy coded for regression analyses. All variables were checked individually by using PROC UNIVARIATE to verify a variety of statistics summarizing the data distribution of each predictor variable, including the means, standard deviations, and variances (for continuous variables), as well as measures of variability using quantiles, and checking for extreme observations or values. In addition, using PROC TABLES, frequency counts for each response category (for categorical variables) were computed, and a 2x2 table for each predictor and the outcome was calculated to verify sufficient counts in each response category by outcome. Continuous variables were checked for outliers, skewness and distribution using PROC MEANS. The selection of covariates should be based on both empirical and statistical significance (Allison, 2012). The preliminary choice of covariates to explore in a predictive model for early retirement was based on the results of the systematic scoping review with some limits posed by the data available (Appendix 2). The predictor variables were classified into the domains of socio-demographic characteristics, physical and mental health characteristics, health behaviours, and work characteristics. It was determined *a priori* that in addition to age and gender, at least one variable from each domain would be included in the final model by selecting the variable that showed the strongest association with the outcome. The stepwise model selection

was based on recommendations of Hosmer, Lemeshow, and Sturdivant (2013) and methods previously used by de Wind et al (2014). As an initial step, univariate logistic regressions were performed individually for each predictor and early retirement using PROC LOGISTIC. In the second step, variables from the first step that showed a relationship with the outcome at the $p<0.20$ level were used in multivariate regression analyses by domain, whereby a separate multivariate model was run for each of the four domains. To construct the full model, variables from the second step that showed a relationship with the outcome at the $p<0.20$ level, were selected for inclusion in the final model. Each step of the process considered the theoretical significance of the selection or removal of a predictor when the relationship was near the significance level, the regression coefficient as a measure of the size of the effect, and the p-value of the effect, thereby not simply relying on the automatic selection process offered by statistical software packages. Significance of predictors in the final multivariate model was set at $p<0.05$. The process of model building (steps one to three) was performed separately for both cohorts. If a predictor was selected for the final model for one cohort, it was included in the final model of the other cohort as well, so that the final models were comparable. All logistic regression models were used to calculate odds ratio estimates with 95% confidence intervals (CI). The final model was weighted using Statistics Canada provided weights in order to be able to interpret results as representative of the Canadian population. As well, the final model was run using PROC SURVEYLOGISTIC using 500 replicated outputs with adjustments for each estimate using Statistics Canada's bootstrap technique (Yeo et al, 1999).

4.6.5 Comparison between Economic States

The aim of the econometric comparison was to offer preliminary evidence for a potential association between macroeconomic conditions and the early retirement of older Canadian workers. The comparison did not intend to assess the statistical effects of macroeconomic variables on early retirement; rather it was to compare and describe the relative significance of the various predictors found to explain early retirement between two contrasting economic time periods. This comparison will enable one to see how such macro level factors may have contributed to our understanding of early retirement patterns.

To accomplish this, firstly, a descriptive comparison of results from the final adjusted model was undertaken. Differences in the significant predictors found and strength of association between predictors and early retirement was noted between the two economic conditions. Furthermore, in order to statistically compare the contribution of predictors to early retirement between a period of non-recession (cohort 1) and a period which included a recession (cohort 2), a comparison of regression estimates from the two final multivariate models predicting early retirement from each cohort was used to calculate Wald chi-square test for difference. The overall comparison was used to identify any differences in the early retirement patterns between the two time periods.

Secondly, two indicators of economic performance and labour market conditions were used to examine early retirement patterns and the state of the economy. The annual data on the real Gross Domestic Product (GDP) per capita for Canada and each province

was obtained from Statistics Canada's Socio-Economic Information Management System (CANSIM). GDP values used chain-weighting, which is a series of GDP statistics adjusted for the effect of inflation to give a measure of 'real GDP'. Chained GDP statistics measure output at the price of each preceding year in order to give a reflection of actual output changes and real growth for that period (Steindel, 1995). The scale of the GDP value is per capita, meaning it is the mean GDP income per person in Canada, calculated by taking total GDP and dividing it by the total population. As well, annual data on the unemployment rate for Canada and each province was obtained from the Canadian Labour Force Survey (Statistics Canada, 2010a). The unemployment rate for the working-age population (15 years and over) was used to reflect the whole of the labour market and its collective influence on retirement decisions. The relationship between each of these indicators and the provincial early retirement rate was examined descriptively.

CHAPTER 5: RESULTS

5.1 Descriptive Statistics

Between 1994 and 1999, a total of 210 (19.4%) respondents reported making the transition from work to early retirement (n=1291). Between 2006 and 2011, a total of 91 (6.1%) respondents reported making the transition from work to early retirement (n=1491). The prevalence of early retirement (as well as not working due to other reasons) was higher among those aged 60-64 years old (Table 2).

Table 3a and 3b present descriptive information of working and early retirement across all predictors for the sample used for the analysis. For each cohort, the results will be reported separately. For cohort 1, the mean age of early retirement was 55.7 years of age. The prevalence of early retirement was highest among women, Canadian-born respondents, and those who earned between $40,000 and $60,000 annually. There was a steady increase in the prevalence of early retirement as the level of education completed increased. Those with very good or good self-reported health had a higher prevalence of early retirement than those with excellent or poor health. Sense of mastery and psychological demands at work were lower among those who retired early than those working, while skill discretion at work was higher among those who retired early. Those working full-time had a much higher prevalence of early retirement than those working part-time. For cohort 2, the mean age of early retirement was 55.6 years of age. The prevalence of early retirement was higher among women than men. Physical exertion at work was lower among those who retired early than those working, and those working

full-time had a high prevalence of early retirement. The prevalence of early retirement was highest among those employed in management, business or administration occupations.

5.2 Univariate Models

Table 4a and 4b present the unadjusted odds ratios and confidence limits for early retirement across all predictors from a series of univariate logistic regression analyses. For cohort 1, women, immigrants to Canada, those with lower sense of mastery, lower health utility index score, and workers with higher psychological demands at work were less likely to retire early. Older workers, those with less than secondary school education, a personal annual income of less than $60,000, those suffering from three or more chronic conditions, good self-reported health, working part-time hours, being not too or not at all satisfied with work, and workers with lower skill discretion at work were more likely to retire early. For cohort 2, women, workers employed in art, recreation, sales occupations, or trades, manufacturing, primary industry occupations were less likely to retire early. Older workers, those suffering from three or more chronic conditions, and those working part-time hours were more likely to retire early.

5.3 Multivariate Models

In order to reduce the number of predictors in the final multivariate model, and reduce overlap between predictors of interest, while keeping the most important predictors from each domain, predictors found to be individually related to early

retirement were used in multivariate domain models. A series of multivariate logistic regression analyses were performed for the set of predictors within each domain and adjusted associations were computed. Table 4a and 4b present the adjusted odds ratios and confidence limits for early retirement separately for each domain. In cohort 1, within the socio-demographic domain, woman and immigrants were less likely to retire early, while older age and working in Quebec predicted more early retirement. Within the health behaviours domain, after controlling for age and gender, occasional drinking and regular drinking predicted early retirement. No significant predictors from the health domain were observed. Among work characteristics, working part-time, being employed in public administration, and being not too or not at all satisfied with work predicted early retirement, while workers who reported higher job security were less likely to retire early. In cohort 2, within the socio-demographic domain, women and immigrants were less likely to retire early, while older age and living in a rural area predicted early retirement. No health behaviours were found to be significant within this domain. No significant predictors from the health domain were observed. Among the work domain, working part-time hours, and being not too or not at all satisfied with work predicted early retirement.

Table 5 presents the adjusted odds ratios for early retirement in the final multivariate model that includes all predictors that were found to be related to the outcome from univariate analyses and multivariate domain analyses. The final model was weighted for probability of selection into the sample and initial survey non-response. For cohort 1, older age, working in the province of Quebec, being an occasional or regular

drinker, working part-time hours, working in public administration, and being not too or not at all satisfied with work was associated with an elevated odds of early retirement, while women, immigrants, and workers with higher job security were less likely to retire early. Education, personal income, presence of chronic conditions, self-reported health status, and skill discretion were not found to be significant predictors in the final model for cohort 1; the effect of these factors was attenuated in the multivariate adjusted model. For cohort 2, older age, living in a rural area, working part-time, and being not too or not at all satisfied with work predicted early retirement. Gender, occupation, immigration, and chronic conditions were not found to be significant predictors in the final model for cohort 2 as their influence was attenuated by adjusting for other covariates.

5.4 Relationship of Predictors and Macroeconomic Conditions

The final multivariate model in a time of non-recession (cohort 1) resulted in an explained variance of early retirement of r^2=0.23 (pseudo r-square calculated for logistic distribution). The final multivariate model during the time period which included a recession (cohort 2) resulted in an explained variance of early retirement of r^2=0.12). In terms of the ability to account for early retirement the predictive power is relatively large for both models in terms of social science research, however it seems the set of predictors included in this study is better able to account for early retirement during a period of non-recession compared to recession. A comparison of estimates revealed that there was a significant difference in the relationship between several predictors and their effect on early retirement between the two cohorts from different time periods. Being an

occasional drinker or regular drinker was associated with significantly higher transition to early retirement in cohort 1, but in cohort 2 the effect of occasional or regular drinking was in the opposite direction. During 1994 to 1999, workers living in Quebec were significantly more likely to retire early, but between 2006 and 2011, the effect of working in Quebec was in the direction of lower odds for early retirement.

Figure 7 displays the change in prevalence of early retirement by province between cohort 1 and 2, in relation to the change in provincial unemployment rate between 1999 (non-recession year) and 2009 (recession year). The unemployment rate was grouped where necessary to provincial categories by taking the mean unemployment rate of the provinces within a group. The unemployment rate was higher in 1999 than in 2009 in all provinces except for Ontario. The prevalence of early retirement was higher in 1999 than in 2009. Quebec had a relatively small difference in unemployment rate between 1999 and 2009; however the prevalence of early retirement had the highest percentage change between these years compared to other provinces. The Prairie provinces combined had the lowest unemployment rate in both 1999 and 2009, and also the smallest change in unemployment rate between 1999 and 2009, as well as the lowest prevalence of early retirement in both cohort 1 and cohort 2.[19]

Figure 8 presents the change in prevalence of early retirement by province between cohort 1 and 2, in relation to the change in the provincial gross domestic product per capita between 1999 (non-recession year) and 2009 (recession year). The GDP per

[19] A similar figure examining the prevalence of early retirement and employment rate showed the inverse relationship as when comparing prevalence of early retirement and unemployment rate. Specifically, the change in employment rate is transposed from year 1 to 2; that is, it was higher in 2009 than in 1999, except for Ontario, similar to the unemployment rate.

capita was higher in 2009 than in 1999 in all provinces. The Atlantic provinces combined had the highest change in GDP from 1999 to 2009 than any other province, and in cohort 2, had the lowest prevalence of early retirement except for the Prairie provinces combined. The Prairie provinces combined had the highest overall GDP per capita in 2009 and correspondingly the lowest prevalence of early retirement in 2009.

Figure 9 displays the change in the likelihood of early retirement by province between cohort 1 and 2 (calculated as the difference in odds of early retirement between cohorts) in relation to the change in provincial unemployment rate between 1999 and 2009. The change in the likelihood of early retirement between cohorts was the highest in Quebec and the Atlantic provinces, and likewise the change in the unemployment rate between 1999 and 2009 was the highest among these two provinces. On the other hand, living in the Prairie provinces resulted in the smallest decrease in the likelihood of early retirement between cohort 1 and 2, while also showing the smallest difference in the unemployment rate between 1999 and 2009. Except for British Columbia, the trendline suggests a positive relationship between early retirement and provincial unemployment rate; specifically that as the unemployment rate decreases, the likelihood of early retirement decreases as well.

5.5 Sensitivity Analyses

The statutory age for "normal" retirement considered to be 65 years of age was used to define early retirement as those retiring before 65. However, there may be factors that are related to the transition from work to early retirement at a relatively younger age.

These factors may be push factors related to an individual's occupation such as high physical work demands (Lund et al, 2001) or high work pressure (Friis et al, 2007) which forces the worker to retire early because their work demands reduce their ability to continue working (Reeuwijk et al, 2013). Physical work demands were also the basis for setting mandatory retirement ages for certain occupations in the past, which stipulated that due to declining age-dependent physical capacities, workers were unfit to perform their duties, such as firefighters, ambulance workers, police officers, and army officers (Saupe et al, 1991).[20] Workers in industries such as health care or education may also have a disproportionate propensity toward earlier than standard retirement ages compared to other industries. For instances, there is concern of a trend toward earlier retirement within nursing (Blakeley and Ribeiro, 2008; Boumans et al, 2008) due to burnout, pressure from work, or work speed (Friis et al, 2007), with a Danish study finding that approximately one-third of nurses entered early retirement at age 60 and at the age of 61 about half of nurses had left the labour market for early retirement (Friis et al, 2007). On the other hand, unlike many professions, occupations that are predominantly academic and scholarly in nature, such as university faculty members, allow these individuals to remain productive for a longer period of time (Kim and Feldman, 2000). There may also be other factors such as financial aspects that prevent workers from taking early retirement because it is not financially feasible (Shultz et al, 1998). Alternatively, there

[20] In Canada, workers cannot be forced to retire, and since December 2012 (Government of Canada, 2012), mandatory retirement of federally regulated employees is also prohibited, except for judges who are subject to mandatory retirement at age 70 or 75 depending on the court, and federal senators who must cease to hold their seats at age 75. In the United States, air traffic controllers have a mandatory retirement age of 56 (with some exceptions), and federal law enforcement officers, national park rangers and firefighters have a mandatory retirement age of 57 after 20 years of service.

may be financial aspects that pull workers into early retirement, such as very generous registered pension plans which are often available to workers employed in certain sectors with high coverage rates such as educational services, health and social assistance, and public administration (Drolet and Morissette, 2014). Less common are professions that have ultra high earnings which enable individuals to retire at a much younger age, such as technology developers, inventors, or film/media personnel.

As part of a sensitivity analyses of the main study findings, an examination of early retirees in the sample was performed to compare the predictors of early retirement (60-64 years of age) versus very early retirement (under 60 years of age). Very early retirement was defined as less than 60 years of age since public pension eligibility begins at age 60 thereby making early retirement after 60 appear less nonstandard. To increase the sample size, early retirees from cohort 1 and 2 were merged to create a sample of early retirees (n=301). Descriptive statistics were computed to examine the prevalence of early retirement and very early retirement across all predictors. A multivariate logistic regression then examined the association between predictors and the probability of very early retirement compared to early retirement. Due to the small sample size and number of outcomes, a reduced model was run that examined the relationship between socio-demographic characteristics of early retirees and the transition to very early retirement. Table 6 presents descriptive information of early retirees and very early retirees across all predictors. Of the early retirees, 50.2% retired very early. The prevalence of very early retirement was lowest among those with less than secondary school education and those with Master's degrees or higher. The prevalence of very early retirement increased as the

level of household income adequacy and personal annual income increased. Those working full-time hours also had a higher prevalence for very early retirement compared to those working part-time. By industry, the highest prevalence of very early retirement was for workers in the goods or services industries. Table 7 presents the adjusted odds ratios and confidence intervals for very early retirement across these predictors. Canadian-born workers were much more likely to retire very early compared to immigrants to Canada, while respondents who were employed in public administration were much less likely to retire very early.

CHAPTER 6: DISCUSSION AND CONCLUSIONS

6.1 Summary of Findings

The objectives of this study were to examine the relationship between a variety of predictors and non-disability early retirement among older Canadian workers. In particular, it was to examine the relative impact of socio-demographic characteristics, health characteristics, health behaviours, and work characteristics on the transition to early retirement. In addition, it was to examine whether the predictors of early retirement differed between two contrasting economic periods – a period of non-recession in Canada and a period which included an economic recession. It was hypothesized that higher transitions into early retirement would be associated with older age, being a woman, lower education, and being married, in addition to reporting poorer health and negative health behaviours. The study findings were that older age, living in Quebec, occasional and regular drinking, part-time work, being employed in public administrations, and being not too or not at all satisfied with work were associated with higher transitions from work to early retirement for those working in 1994/95. Whereas women, immigrants, and workers with higher job security were less likely to retire early. For workers in 2006/07, older age, living in a rural area, part-time work, and being not too or not at all satisfied with work were associated with higher odds of early retirement.

These findings partially support the study hypotheses. Specifically hypothesis 1 was partially confirmed by the finding that older workers were more likely to retire early. However, women were less likely to retire early, while education and marital status was

not found to be a significant predictor of early retirement after accounting for all other covariates. Hypothesis 2 was not supported as no health characteristics were found to be significant predictors of early retirement in the adjusted model. The finding that occasional and regular drinking was associated with higher odds of early retirement partially confirmed hypothesis 3, but no significant relationship was found for smoking, body mass index, physical activity, or sense of mastery. Hypothesis 4 was also partially confirmed with the finding that low job satisfaction and part-time work was associated with higher odds of early retirement, and higher job security was associated with lower odds of early retirement. Other work stress measures were not found to be significant in predicting early retirement. Finally, hypothesis 5 was confirmed by differences that were observed in the relationship between certain predictors and early retirement between the two contrasting economic time periods. The effect of occasional or regular drinking was associated with higher transition to early retirement during a time of non-recession, whereas during a period which included the effects of a recession, occasional or regular drinking resulted in lower transition to early retirement. Furthermore, during 1994 to 1999, workers living in Quebec were more likely to retire early than workers in other provinces, but between 2006 and 2011, workers in Quebec were less likely to retire early.

A majority of earlier studies have shown older age to be a determinants of early retirement (de Wind et al, 2014; Hardy and Hazelrigg, 1999; Lund and Villadsen, 2005; Mein et al, 2000; Schuring et al, 2013). There is also previous evidence that women are less likely to retire early compared to men (Seitsamo, 2005), however Cardano et al (2004) found the odds of leaving work for early retirement was much higher for women.

A study by Schils (2008) found that Dutch women have a lower rate into early retirement, whereas the effect was reversed for British women, while de Wind et al (2014) found no significant relationship between gender and early retirement. This study found women were less likely to retire early compared to men in cohort 1, but did not find a significant relationship between gender and early retirement in cohort 2. The inconsistent findings regarding the relationship between gender and early retirement may be partly due to the influence of a partner's employment status, or attitude and support for early retirement (Gortz, 2012; Henkens and Tazelaar, 1997). Another explanation may be that the single women are less likely to retire early as they are without the financial support or health benefits of their partner as compared to partnered women.

The finding in cohort 1 that immigrants to Canada were significantly less likely to retire early compared to Canadian-born workers may be one of the first results of this kind, at least among Canadian workers. Roberts et al (2010) found that in Germany workers who were “foreigners” defined as those without German citizenship were less likely to retire early compared to Germans, and Cardano et al (2004) examined whether coming from the south of Italy where there is a great majority of immigrants was linked to early retirement and found that southerner had a lower odds of entering early retirement. There is evidence that the labour market and financial outcomes of immigrants arriving in Canada raises questions about the adequacy of their financial preparedness of retirement (Picot, 2004), and related to this that the retirement outlooks of immigrants are far less positive than individuals born in Canada (Schellenberg and Ostrovsky, 2008).

Similarly the finding that living in a rural area in Canada was associated with higher odds of early retirement may be the first evidence of this relationship. In a Danish study, place of residence was an important predictor of nurses' retirement age as it found that nurses living in the "provinces" (i.e. outside of Copenhagen) were more likely to take early retirement than those living in the Copenhagen area (Friis et al, 2007). Another Danish studies which found that women living in the provinces had a higher chance of early retirement suggested that this may be due to living expenses being higher in the Copenhagen area than in the provinces (Mark et al, 2004). Similarly if living expenses are higher in urban areas this may postpone retirement for financial reasons. Another reason suggested by Mark et al (2004) was that nurses had more job opportunities in Copenhagen than in the provinces which could reduce the decision to retire early, and similarly there may be more options for older workers to find new jobs or better accommodation in their jobs in urban settings than in rural areas.

The relation between part-time work hours and early retirement was strong and significant in both cohort 1 and 2. Damman et al (2011) also found that part-time work resulted in a higher likelihood of early retirement, and Schils (2008) found an inverse relationship between the number of hours worked and the likelihood of early retirement in workers from Germany and the UK. The relatively strong relationship between working part-time hours and early retirement may be due to reduced attachment of workers to the labour force when already considering retirement. Retirement is often a process or is planned instead of a sudden event for most people (Kuh et al, 2003); therefore some workers may already have cut their hours in the period before retirement.

However, it cannot be ruled out that reduced hours initiated from the employer's side resulted in pushing older workers into early retirement. Furthermore, this finding may also be pointing to the presence of bridge employment in the study sample. Bridge employment refers to any paid work after an individual has previously retired, and may involve either a gradual reduction in time spent working or exiting from, and returning to, the labour force one or more times prior to the final exit from the labour market (Hebert and Luong, 2008). In this study, it may have been possible that individuals had previous episodes of retirement before the baseline measurements were taken, and may have re-entered the labour force to take up bridge employment in the form of part-time work.

Several previous studies have found that job dissatisfaction induces workers to retire early (Kubicek et al, 2010; Mein et al. 2000) consistent with this study's finding that being not too or not at all satisfied with work resulted in higher transitions to early retirement in both cohort 1 and 2. Job dissatisfaction can be considered a push factor to leave a dissatisfying work situation, as implied by Taylor and Shore (1995) who found that negative views of one's job might push someone towards retirement. Henekens and Tazelaar (1997) also suggested that workers may choose early retirement to avoid stressful work environments resulting from reorganization or pressures at work. Similarly, Biefang et al (1998) found that medium high levels of job satisfaction reduced the probability of early retirement in German men.

Higher job security was associated with lower odds of early retirement in cohort 1; however comparison of this finding to previous studies is not straightforward. One study found that male autoworkers who were at least 50 years old had a higher rate of

early retirement when a plant was scheduled for closure and who were faced with a layoff queue in the near future (Hardy and Hazelrigg, 1999). However, Raymo et al (2011) found that workers who had experienced involuntary job loss and exposure to bad jobs at mid-career had a lower risk of retiring early, whereas they found that labour union membership was associated with a higher likelihood of early retirement. Their results were mediated to some extent by differences in pension eligibility, wealth, and job characteristics. One potential explanation for better job security leading to less early retirement may be that jobs that offer employment security are also jobs that offer pension or health insurance benefits and a better work environment (Kalleberg et al, 2000), which can encourage older workers to continue working. On the other hand, jobs with low security may be reflective of a poor work environment and can have negative implications for earnings, wealth, and health (Kalleberg et al, 2000) leading to earlier exits from this type of job.

While previous studies have reported that alcohol consumption is associated with early retirement, finding that being an occasional or regular drinker was associated with higher odds of early retirement in cohort 1 is to some extent distinct in that the severity of the drinking habits the variable was measuring was not excessive. The variable in the NPHS is calculated using a time frame of the last 12 months and the frequency of drinking alcohol. Statistics Canada used responses to derive the respondent's drinking habit, so that those who reported drinking alcohol beverages more than once a month were classified as regular drinkers, and those who drank less than once a month were occasional drinkers. In contrast, Robroek et al (2013b) who found that excessive alcohol

intake was related with early retirement defined their variable as alcohol consumption of more than two glasses of alcohol beverages in a single day more than five days a week in the past six months. Also, a Canadian study found that men who consumed five or more alcoholic drinks on one occasion at least once per month were almost twice as likely to exit the labour force early (Park, 2010). This study's finding of a strong effect for regular to occasional drinking may not be comparable to other studies that measured excessive or binge drinking, since heavy drinking has been shown to be a major cause of mortality, liver disease, cardiovascular disease, depression, increased risk of injury and many other consequences (Cargiulo, 2007). Another explanation for seeing an effect for occasional and regular drinkers may be grouping those who have never drank and former drinkers, who may be recovering from alcohol dependence, together to form the abstainers group. Similarly individuals may be abstaining from alcohol because they are already at greater risk of mortality due to chronic conditions and do not or cannot consume alcohol for reasons of health or harmful interactions with medication (Holahan et al, 2010). Also it appears that while mortality rates of heavy drinkers are significantly elevated, all-cause mortality rates may be lower among moderate drinkers than abstainers (Holahan et al, 2010). There is also evidence that a moderate level of alcohol consumption among older men and women is associated with better cognition and subjective well-being, and fewer depressive symptoms (Lang et al, 2007).

In this study, workers employed in public administration had significantly elevated odds of retiring early. From previous studies, it appears that the effect of working in the public sector versus other industries is a proxy for differences between

wealth effects or the pension systems applying to public and private sector employees. A study that found public sector workers had a lower rate of early retirement suggested that the reason may be accumulated wage differences among public sector employees, who on average are paid lower wages than their private sector counterparts (Siddiqui, 1997). However, one study which included indicators for employment sector to serve as a proxy for accumulated pension benefits found that working in the civil and local government sector increased the probability of retirement (Jones et al, 2010). Pension entitlements include those with an occupational pension, private pension, or people who have neither and must rely on their public pensions. It is expected that, in general, occupational pensions will provide the most generous retirement income, while relying solely on the state pension will result in the lowest income post-retirement. Another study found that men working in the civil service or local government had significantly higher rates of early retirement and speculated that this was due to the generosity of the civil service pension or arrangements specific to that sector such as early retirement schemes that encourage early retirement (Roberts et al, 2010). A further interesting explanation may be that workers in private sectors may have private pensions that are heavily dependent on the length of the contribution period encouraging them to continue working longer (Roberts et al, 2010).

In this study, health characteristics did not predict early retirement. This is contrary to a systematic review in which four out of six studies found a significant association between poor health and early retirement (van den Berg et al, 2010a). Another systematic review reported that four out of five studies found that self-perceived poor

health was a significant risk factor of early retirement (van Rijn et al, 2014). Few studies also found a statistically significant association between chronic disease and early retirement. No studies reported on the association between mental health problems and early retirement (van Rijn et al, 2014). This study's results may be different due to the definitions of early retirement which is used. In this study, early retirement was operationalized as voluntary early retirement from work and was exclusive from other routes of exit from work. Previous research has suggested that health status may not be as important to voluntary retirement as to involuntary retirement (Szinovacz and Davey, 2005). The current study also assessed early retirement at two and four years, whereas some studies had a shorter follow up time (de Wind et al, 2014; van den Berg et al, 2010b). The shorter the period of time between the assessment of health and early retirement, the stronger the association may be in terms of influencing the self reporting of health status. In general it seems that the inconsistency of the effect of health within in a sample can result in contradictory findings because health can impact retirement in two distinct and opposing ways – one, poor health could result in early retirement because workers can no longer continue to work or they experience a decline in work ability due to health – a push factor; or second, good health may lead to early retirement because individuals want to enjoy life while their health is well and they are still able to – pull factor (de Wind et al, 2014).

The effect of occasional and regular drinking on early retirement was significantly different between a non-recession period and a period which included a recession. Considering that in this study there was no significant effect found for poor health on

early retirement, the influence of alcohol consumption may not be pointing to the effects of poor health through negative health behaviours, but perhaps to the social interaction or related factors of this lifestyle that impact retirement transition or a worker's desire to continue working. The final model for early retirement in the current study did not include a measure of social interaction (due to some changing survey content of the NPHS). If alcohol habits were to some degree a proxy for social interaction, it could help explain the change in its effect on early retirement depending on economic well-being. Moderate levels of alcohol consumption are often associated with socializing (Center for Substance Abuse Treatment, 1998), therefore the associations identified in this study may relate to effects of social interaction not identified in the model. One could speculate that since retirement could mean less disposable income as well as a loss of job-related social support systems and the self-esteem that work provides (Center for Substance Abuse Treatment, 1998), the importance of social interactions may then influence an individual's decision to stay at work during a time of recession.

The finding that in cohort 1, respondents living in Quebec were significantly more likely to retire early than those in Ontario suggests that there may be broader factors operating at the provincial level that are influencing retirement decisions. Workers in Quebec have traditionally tended to retire earlier when compared to the rest of Canada. Between the 1980s and 1995, Quebec experienced the largest drop in retirement age than any other province from a median retirement age of 64.9 years of age to 61.1 (Gower, 1997). In 1984, Quebec lowered the minimum age for the Quebec Pension Plan entitlement from 65 to 60, with the new law coming into effect three years earlier than a

similar change to the Canada Pension Plan, which may have accelerated the trend to earlier retirement in Quebec (Gower, 1997). The percent of workers covered by employer-sponsored pension plans may also help explain provincial differences in the prevalence of early retirement. In 1997, coverage rates were highest in Newfoundland and Quebec, 39% and 35% respectively (Kieran, 2001), and the current study found that Quebec and the Atlantic provinces also have the highest prevalence of early retirement during this time.

In this study, the effect of living in Quebec between 1994 and 1999 was predictive of early retirement however its effect was significantly different when compared to 2006 and 2011. Early retirement incentives which exist in both the CPP and QPP were still available during the full study period.[21] The change in the Quebec effect may be related to early retirement issues particular to the Quebec context. Specifically, the demographic projections related to the aging of baby boomers are more substantial in Quebec compared to the rest of Canada. This is due to a very low birth rate, a rapidly aging population, and a proportion of older residents that is increasing faster than the rest of Canada (Guillemette, 2004). However by October 2003, the Régie des rentes du Québec, the board responsible for applying the Act respecting the Québec Pension Plan, proposed several reforms to the QPP and held public consultations on the proposed modifications (Régie des rentes du Québec, 2003). The proposals aimed to improve the QPP's fairness

[21] Specifically the CPP/QPP enforces only a reduction of 0.5 per cent per month for retirement before age 65 and an increase of only 0.5 per cent per month for later retirement (Guillemette, 2004). In terms of private pension plans, those who retire early can receive bridge benefits and there are laws that stipulate that the rate of reduction applied to early retirement cannot place a long-term financial penalty on beneficiaries.

on workers who retire later and substantially reduce the implicit tax on work.[22] This demographic reality and political context may have contributed to a shift in the prevalence of early retirement in the later study period.

The effect of living in Quebec between 1994 and 1999 was associated with higher odds of early retirement; however this provincial effect was significantly different between a non-recession time period and during a time period with a recession. The economic results provide some preliminary evidence that this may be related to economic conditions. The influence of unaccounted for broad economic factors in this study may also explain the reduced predictive power of the set of predictors in the recessionary model. The likelihood of early retirement during non-recession was the highest in Quebec and the Atlantic provinces, and likewise the unemployment rate was the highest among these two provinces during this time. On the other hand, living in the Prairie provinces had the lowest likelihood of early retirement and the lowest unemployment rate at both times, while also showing the smallest difference in the unemployment rates between a time of non-recession and a time of recession. A very recent paper by Statistics Canada found similar results when examining expected retirement ages and regional unemployment rate (Galarneau et al, 2015). They found that the expected retirement age in 2007 was highest in the Prairie provinces while it had the lowest unemployment rates in the country. Conversely, Quebec and three of the Atlantic provinces had relatively high unemployment rates and some of the lowest expected retirement ages.

[22] In June 2011, the government adopted revisions to the QPP to improve pension benefits to those who retire later than the normal retirement date, and increase the benefit reduction for those who retire earlier, starting in January 1, 2013 and 2014, respectively. Similar amendments have been made to the CPP.

6.2 Limitations and Strengths of Study

The results of this study should be interpreted given the following limitations. All information in the NPHS are from self-reported measures, which may lead to inflated associations between predictors and early retirement due to common method variance, as well as positive reporting bias (Spector, 2006). It should be noted however that the outcome of employment status can be considered a fairly objective measure and therefore this issue may be a relatively minor one.

Most measures within the NPHS are abbreviated from their original form. To use the original measures would make the NPHS almost impossible to administer, due to its length. However abbreviated measures often have relatively lower levels of consistency that can lead to fewer associations than expected between certain variables (Wilkins and Beaudet, 1998). As well, the broad categories for some concepts which were created by collapsing several response categories due to small cell sizes may have attenuated the association with early retirement. Also concepts such as chronic conditions were all reported as either present or absent, and therefore it does not take into account severity of each condition, which may affect the results if there was a difference by severity and it was possible to account for this in the study.

There may also be issues related to the healthy worker effect which may make the results more conservative than in reality as information is only reported from individuals who were employed and no information is considered from individuals whose health problems or injuries prevented them from actively participating in the labour force (Wilkins and Beaudet, 1998).

Since the NPHS is only administered every two years, there may be some limitations related to the possibility that respondent's responses at baseline may not be representative of their life over the preceding two years. Therefore there is an assumption that respondent's states at baseline are predicting early retirement after two or four years, either with a lag or their state at baseline is representative of the period preceding it. For example, unhealthy behaviour (such as smoking) at baseline is independently related to early retirement at follow-up or the behaviour continues for two years and is related to early retirement at follow-up. Mainly the effects of health issues, behaviours or work stress may be different dependent upon how long they have been prevalent in each respondent's life.

The design of the study included two pseudo cohorts in order to compare two contrasting economic periods, however the selection into the two cohorts was based on a longitudinal dataset. Therefore, respondents who were 45-54 in 1996 (baseline for cohort1) would be eligible for cohort 2 if they were still in the labour market in 2006 (baseline for cohort 2). The overlap of the respondents who were present in both cohorts accounted for 31% of cohort 2. To check if the results would have been different if these respondents were excluded from the sample, a reduced final multivariate logistic regression was run and no differences were observed in the pattern of predictors and early retirement. It was decided that the full cohort would be used for this study to keep the sample size high and as excluding respondents from cohort 2 may affect the representativeness of the sample. Furthermore, since baseline measures for cohort 2 were collected 12 years after cohort 1, it could be assumed that the measures are sufficiently

different to constitute a new cohort. Still, the limitation with the overlap may be that the cohorts are more similar than they would be if completely new cohorts were recruited and sampled. This may introduce a type 1 error in the study results as it may be harder to detect a difference between cohorts, however the differences that are observed can be considered to be more robust.

This study also has a number of strengths. The selection of predictors was based on the results of a systematic scoping review of the peer-reviewed literature. The study also used a large population-based study sample representative of the Canadian labour force, with relatively low unit and item-level non-response and high response rates. Unlike many previous studies which were conducted in small samples of workers or subgroups, such as one occupational group (i.e. nurses, civil servants), the results from this study allow for some generalizability of findings to the Canadian working population. The diversity of individuals performing a variety of jobs allows for a uniquely valuable source of insight into the changing nature of work during the time period under study. Furthermore, the collection methods in the NPHS made it possible to examine the effects of predictors prospectively, meaning the presence or onset of predictors occurred in the correct order and timing (i.e. before retirement). The sample size was also large enough to allow a large number of predictors to be considered in the model. The wide range of predictors from several different domains studied simultaneously enabled the examination of the complex set of factors that are theoretically posited to influence the heterogeneous retirement process. Another strength is that unlike many previous studies the data used included relatively more recent data,

from 2006 to 2011, to explore early retirement. This allowed for improvement on earlier studies which relied on older surveys several decades old and which may not reflect the state of retirement in the recent labour market. As well, previous longitudinal studies assessed the effects of predictors after short follow-up periods, during which it may be difficult to see the effects of health conditions or other factors on retirement. A previous study suggested that future studies consider follow-up periods longer than 2.5 years (Lund et al, 2001).

6.3 Conclusions

The aging population and potential demographic challenges it poses are receiving increasing attention in Canada, and the issue of preventing early retirement has made it important to understand the drivers of early retirement. The current study has demonstrated that the predictors of early retirement among older Canadian workers are multifactorial. The factors which were associated with higher transitions into early retirement included older age, living in Quebec, being an occasional or regular drinker, low job satisfaction, working part-time, and being employed in the public administration, while being a woman, an immigrant, and high job security was associated with lower exits to early retirement. On the basis of this there is potential in reducing the transition of workers into early retirement by targeting modifiable factors that were found to impact the pathway to early retirement. Work-related interventions focusing on creating positive work environments to improve job satisfaction may help extend the working lives of older workers. Labour market changes to retain the expertise of older workers, especially

employers or industries who are in need of maintaining the labour supply provided by older workers, should target factors that can promote job security for older workers. Moreover, this study provides insight on the changing effects of predictors depending on the economic conditions at the provincial level. The observed effect of occasional and regular alcohol consumption and living in Quebec was different in a non-recession period compared to a recessionary period. The comparison of the provincial effect suggested that early retirement varies to some extent according to the unemployment rate of the province. These results imply that factors beyond individual determinants influence early retirement and future research is needed to better understand what aspects of the provincial context are driving retirement decisions. The contribution of this study is to offer support for integrating a broad approach to planning policies, regulations and interventions to influence the early retirement decision of older workers in Canada.

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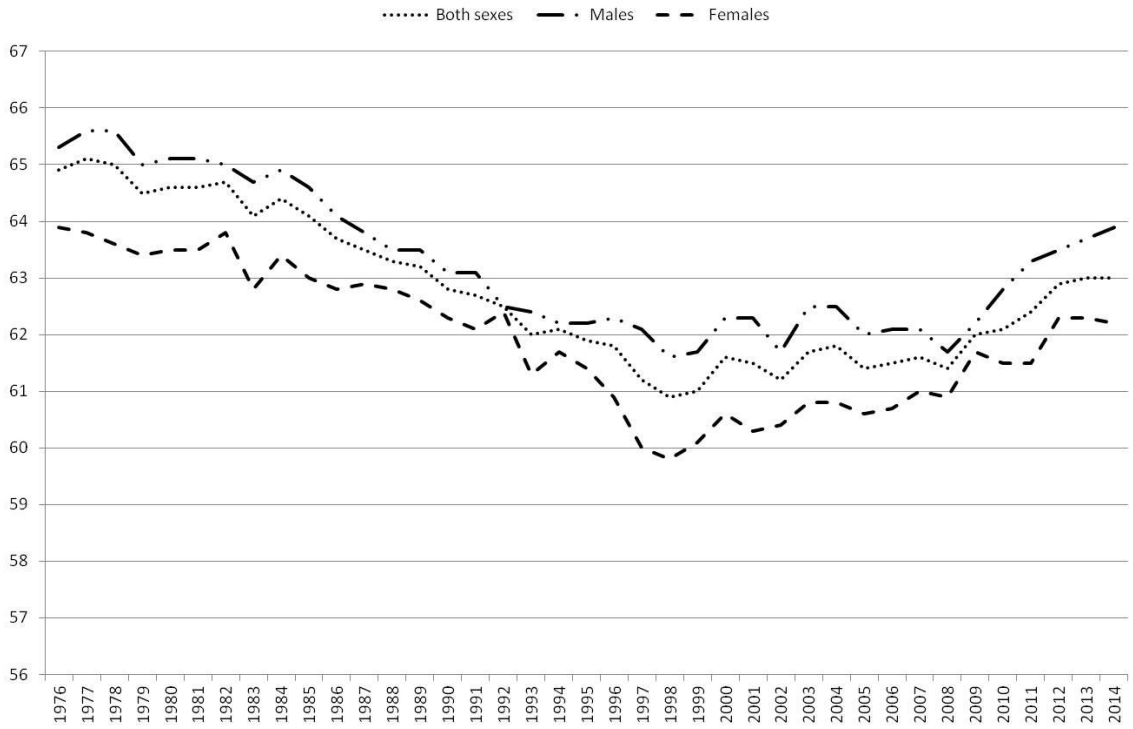
FIGURES

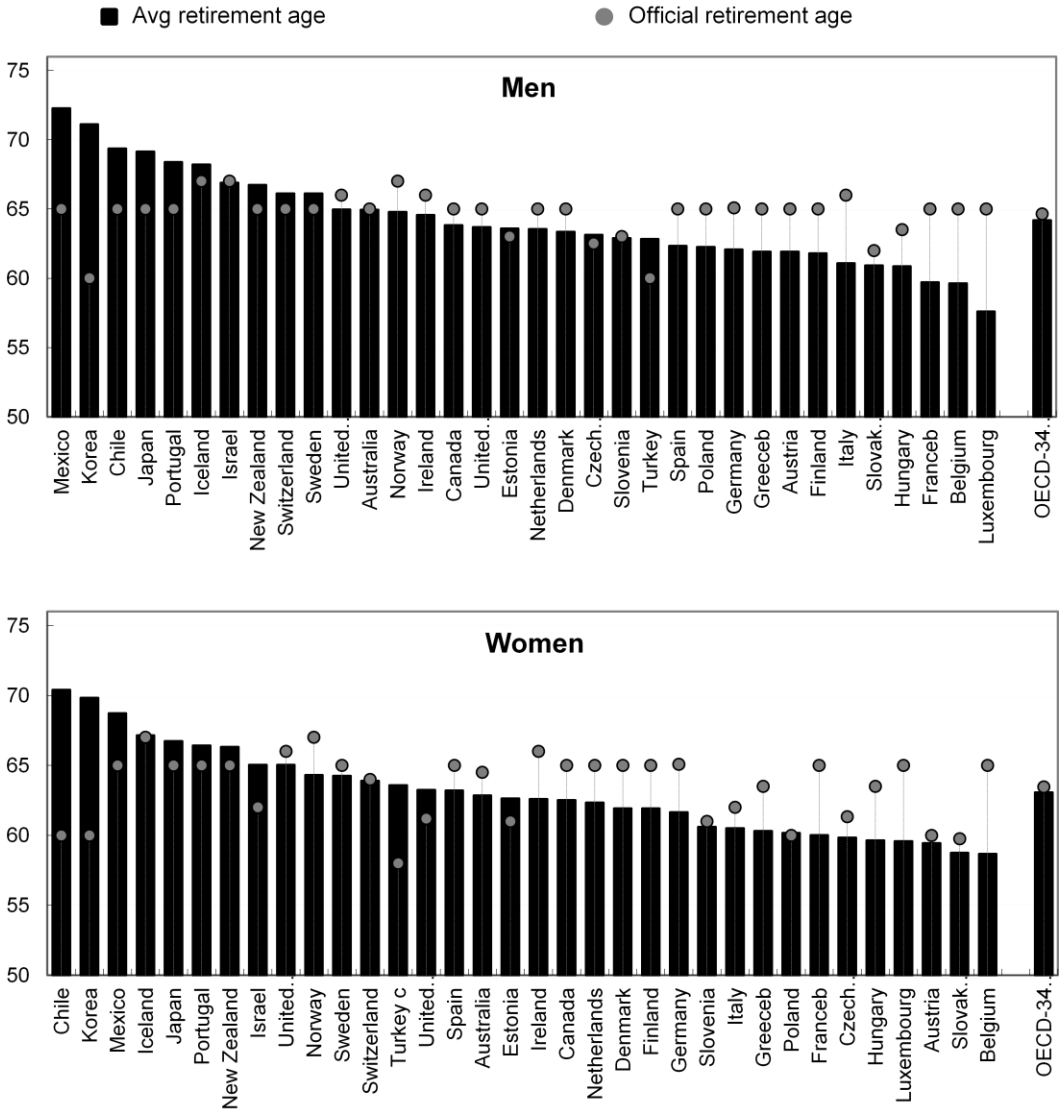
Figure 1: Average age of retirement for Canadian labour force by both sexes; men and women, 1976-2014



Source: Statistics Canada. Table 282-0051 - Labour force survey estimates (LFS), retirement age by class of worker and sex, annual (years), CANSIM

Note: The average retirement age is calculated from the Canadian Labour Force Survey which asks people not working the reason for not working, with one of the response categories being retired (Statistics Canada, 2010a).

Figure 2: Average age of retirement versus the official age for 34 OECD countries by sex, 2007-2012



Source: Organisation for Economic Co-operation and Development. Ageing and Employment Policies - Statistics on average effective age of retirement, OECD 2012.

Note: Estimates are derived from national labour force surveys. The average effective age of retirement is defined as the average age of exit from the labour force during a 5-year period, in this case 2007-2012. Labour force exits are estimated by taking the difference in the participation rate for each 5-year age group (40 and over) at the beginning of the period and the rate for the corresponding age group aged 5-years older at the end of the period. The official age corresponds to the age at which a pension can be received irrespective of whether a worker has a long insurance record of years of contributions. (OECD, 2012).

Figure 3: Adapted version of Moen's Life Course Model on Retirement (Moen, 1996)

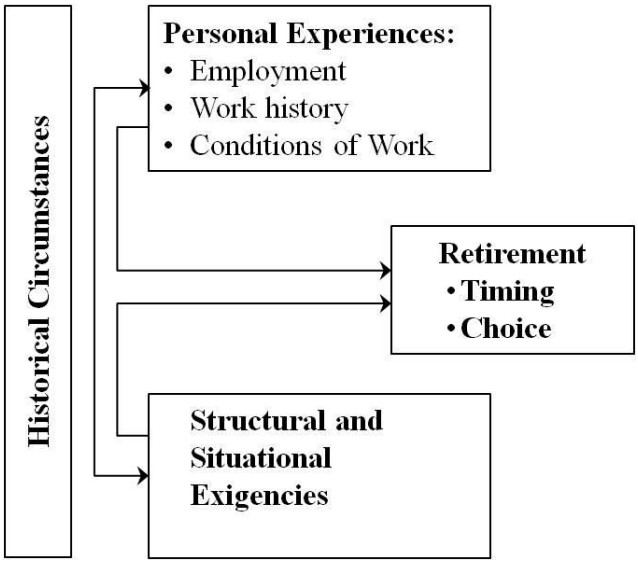


Figure 4: Flow Diagram for the Systematic Scoping Review (Adapted from PRISMA)

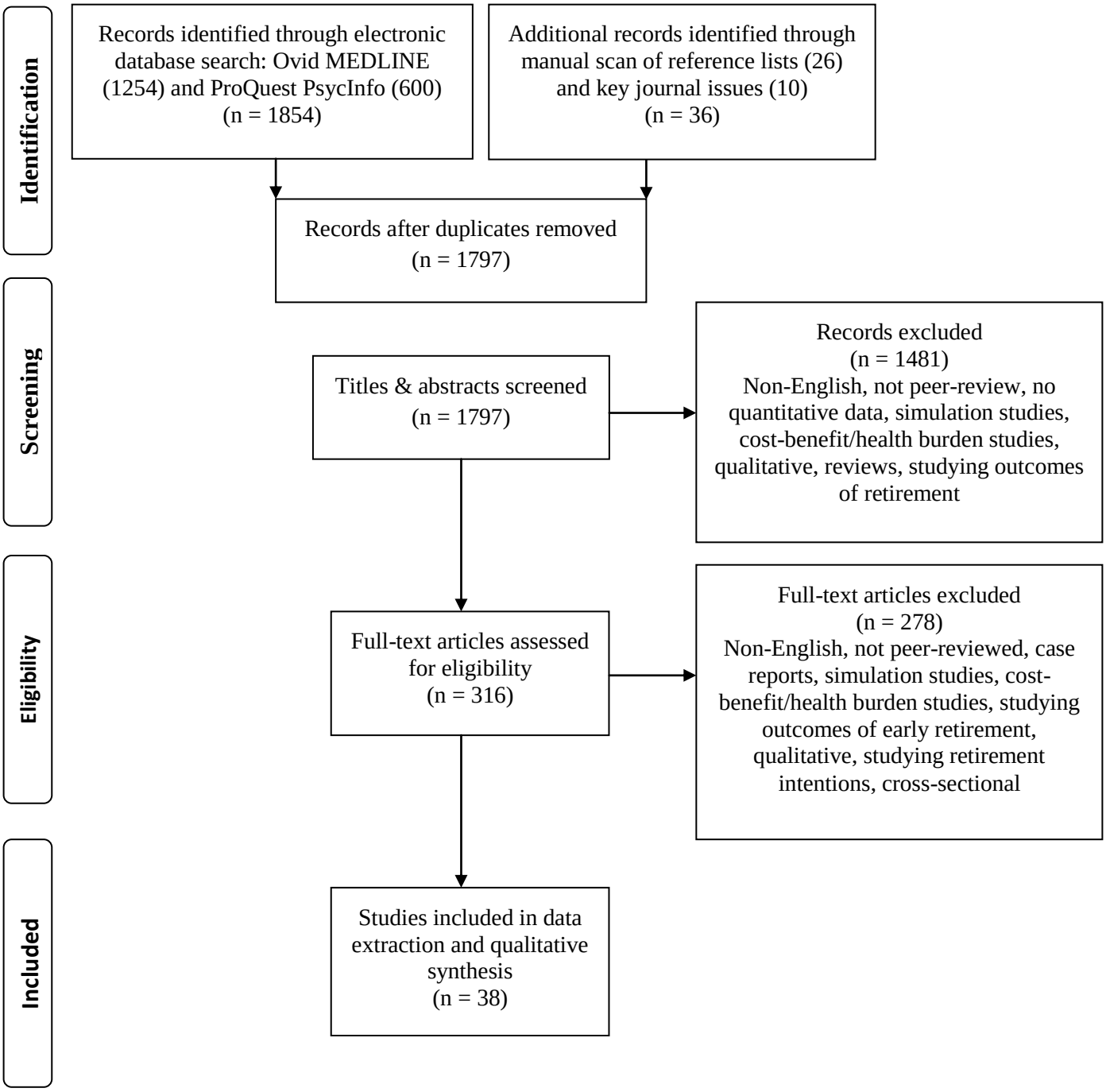


Figure 5: Study cohort selection using the National Population Health Survey (cycle 1 (1994/1995), cycle 2 (1996/1997), cycle 3 (1998/1999) and cycle 7 (2006/2007), cycle 8 (2008/2009), cycle 9 (2010/2011)

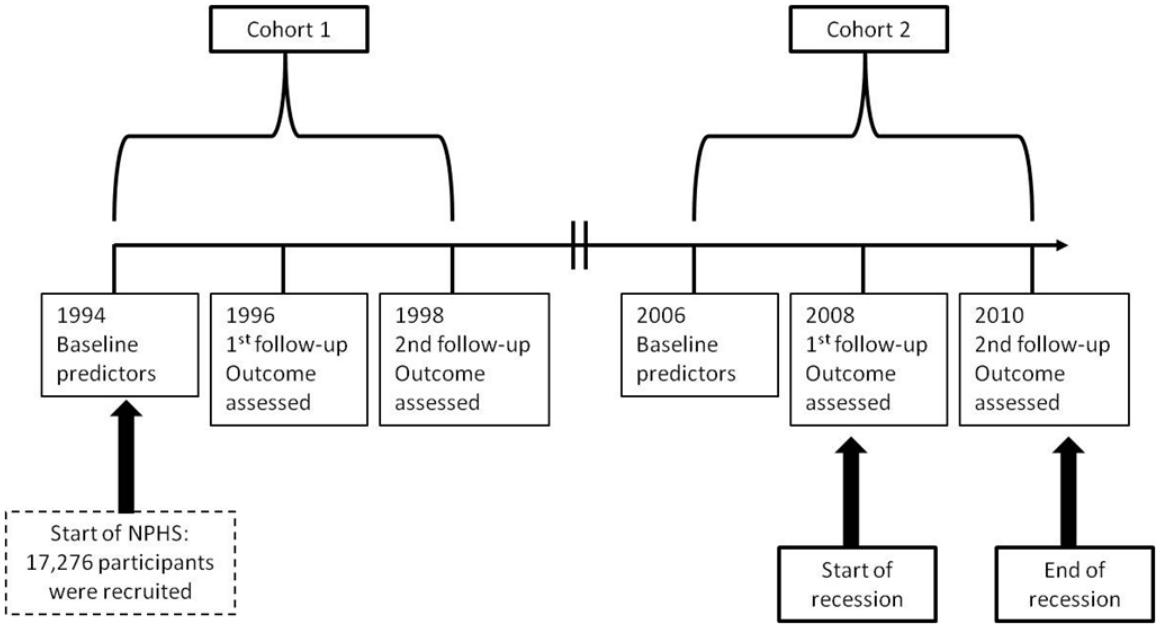


Figure 6a: Study Flow Chart of Sample Selection for the Analysis – Cohort 1

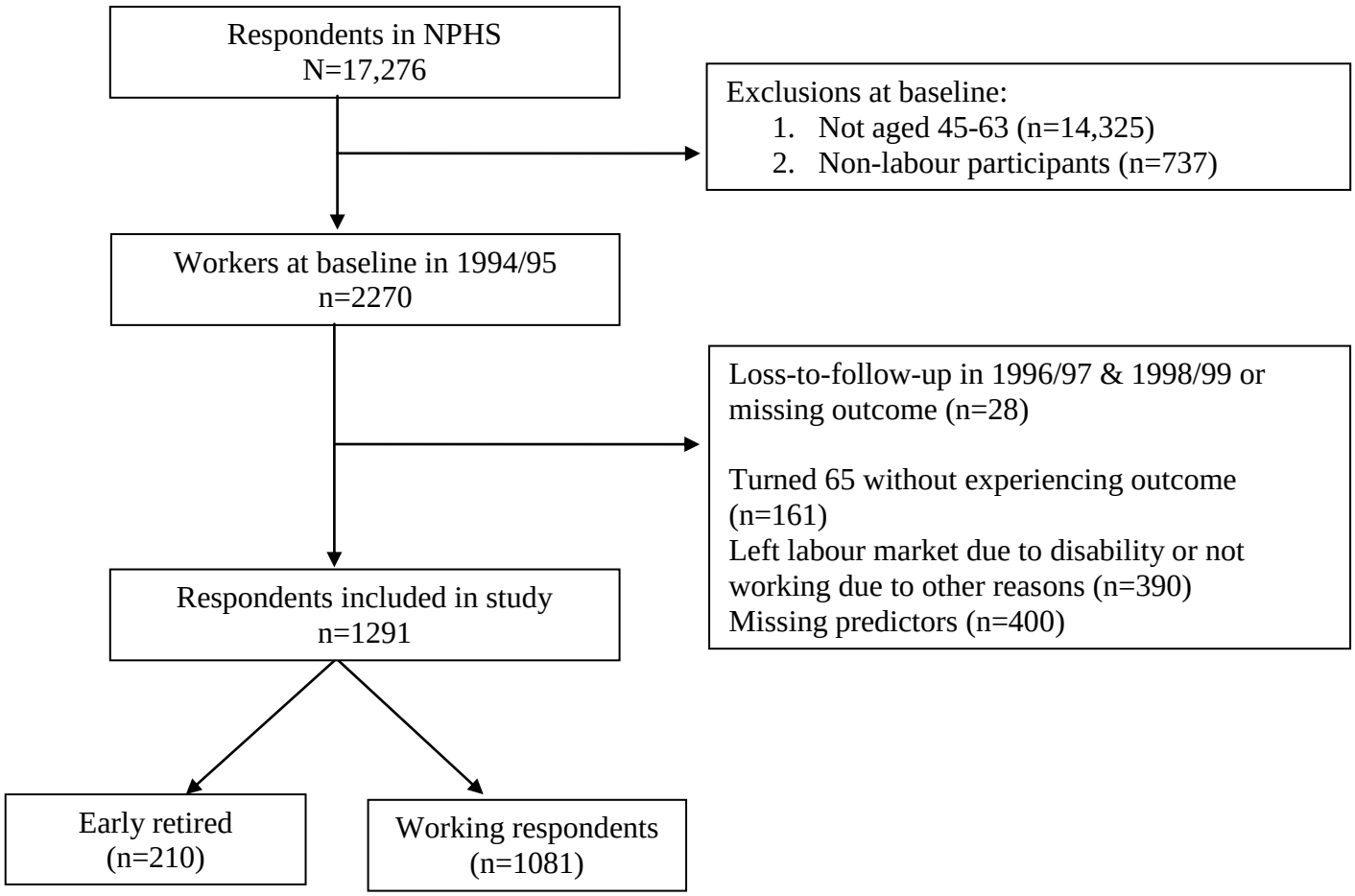


Figure 6b: Study Flow Chart of Sample Selection for the Analysis – Cohort 2

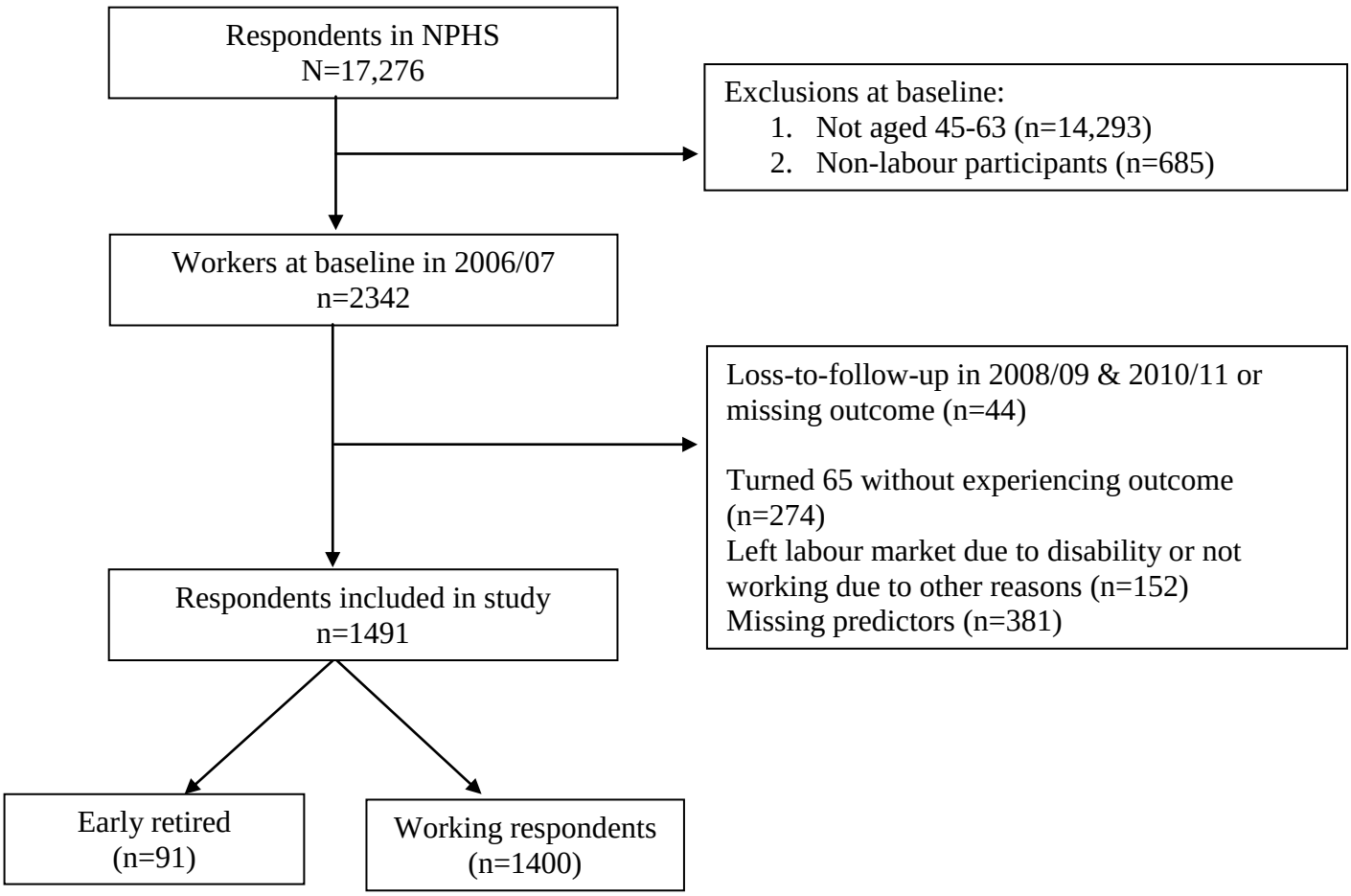
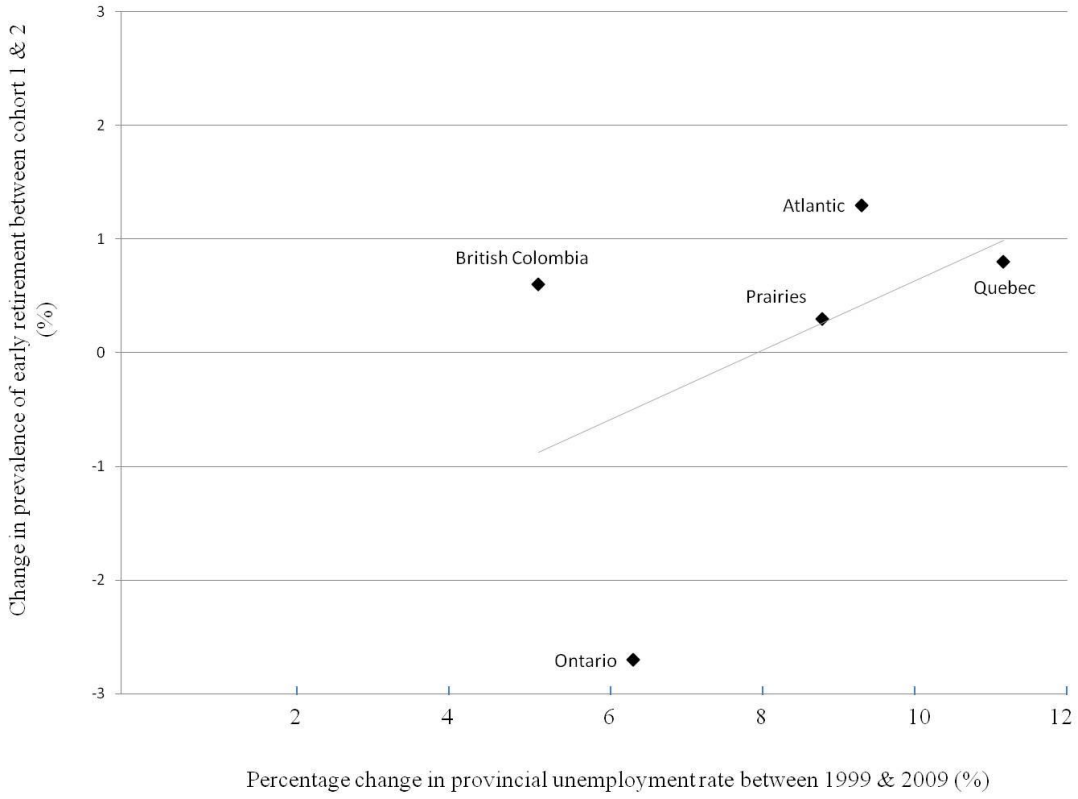
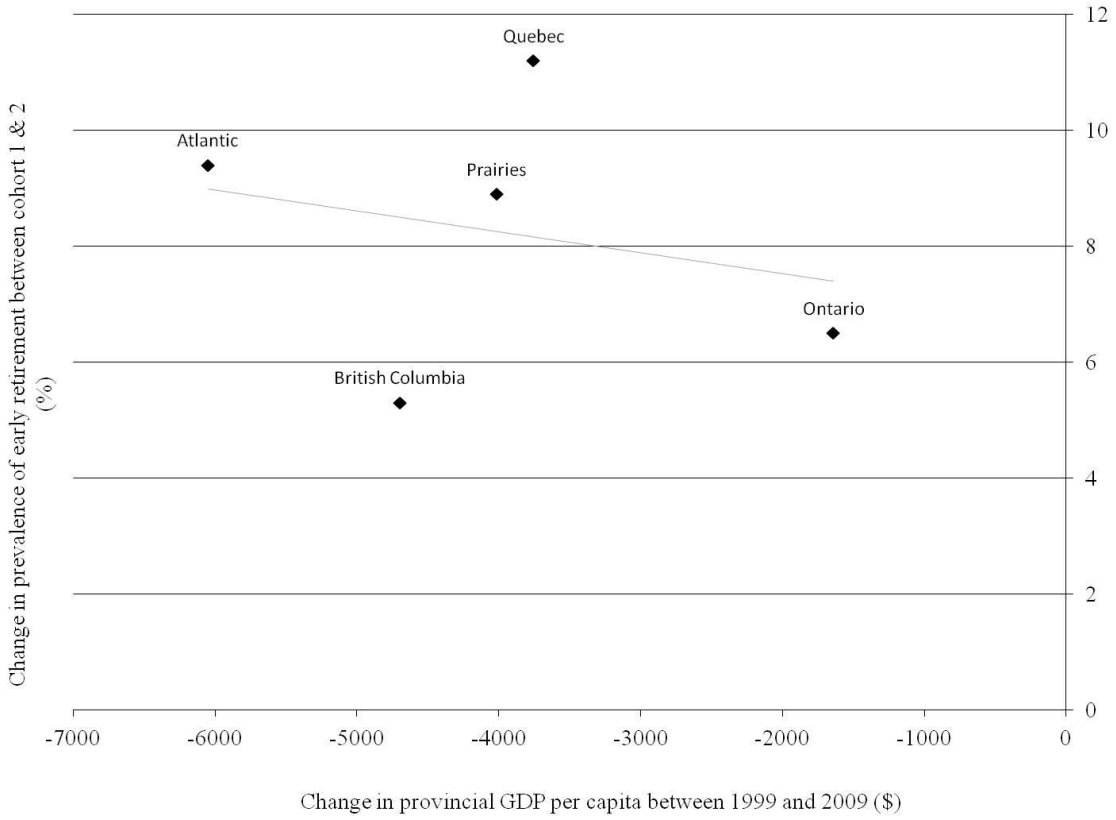


Figure 7: Change in prevalence of early retirement by province between cohort 1 and 2 in relation to change in provincial unemployment rate between 1999 (non-recession) and 2009 (recession)



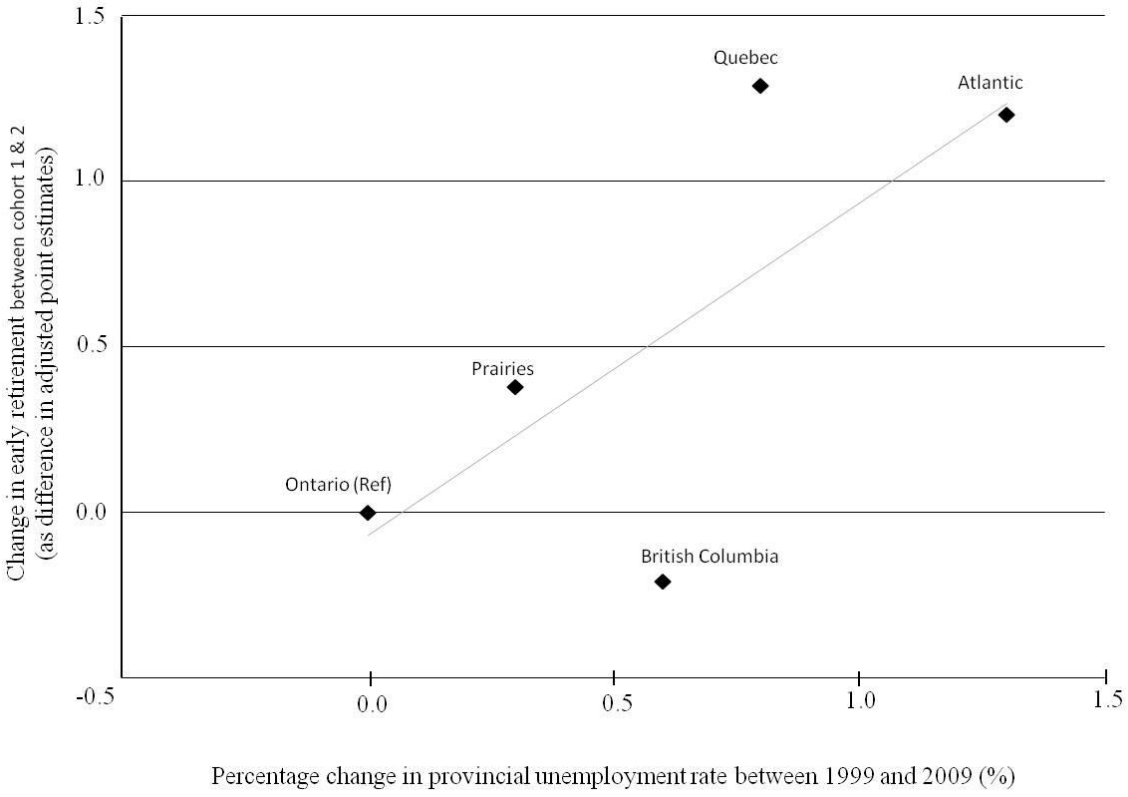
Source: Statistics Canada Labour Force Survey CANSIM II Tables

Figure 8: Change in prevalence of early retirement by province between cohort 1 and 2 in relation to change in provincial gross domestic product (GDP) per capita between 1999 (non-recession) and 2009 (recession)



Source: Statistics Canada CANSIM II Tables

Figure 9: Change in odds of early retirement by province between cohort 1 and 2 (calculated as difference in adjusted odds ratios between cohorts) in relation to change in provincial unemployment rate between 1999 (non-recession) and 2009 (recession)



Source: Statistics Canada Labour Force Survey CANSIM II Tables

Table 1: Study characteristics of included studies (n = 38). *indicates concepts included in study as comparable variable(s).

Author, year, country, reference	**Study design, Follow-up period**	**Study population (sample size)**	**Outcome**	**Significant Determinants**
Ahituv and Zeira, 2011, United States	Retrospective (1992, 1994, 1996)	Population sample of workers aged 50-64 (n=5,217)	Early retirement	1. Years of schooling* 2. Total Net Wealth* 3. Pension Plan 4. Health problems*
Biefang et al, 1998, Germany	Longitudinal (1975/76, 1992-93)	Population sample of workers aged 40-60 (n=1,794)	Early retirement	For men: 1. Signs of ECG infarction* 2. Signs of ECG hypertrophy* 3. Max flow velocity 4. Blood fat increase 5. Dyspnoea* 6. Muscle pain/arthralgia* 7. Tranquillizers use 8. Job satisfaction* 9. Shift work* For women: 1. Angina pectoris diagnosis* 2. Tranquillizers use 3. Purgatives use 4. Job monotony* 5. Vocational training* 6. University degree*
Cardano et al, 2004, Italy	Longitudinal, 10-yr follow-up (1981, 1991)	Population sample of workers aged 25-49 (n=127,384)	Early retirement	1. Gender* 2. Educational level* 3. Place of birth* 4. Hospital admission
Coile and Levine, 2011, United States	Longitudinal, 1-yr follow-up (1980-2008)	Population sample of workers aged 55-61 (n=210,807)	Complete labor force withdrawal	1. Change in stock market value (S&P 500 Index)
Damman et al, 2011, Netherlands	Longitudinal, prospective (2001, 2006-07)	Male private sector workers and civil servants aged 50-64 (n=1,229)	Early retirement	1. Additional work training 2. Part-time work* 3. No children* 4. No perceived pension shortage

				5. Financially dependent children 6. Perceived work challenge 7. Self-perceived health*
de Wind et al, 2014, Netherlands	Longitudinal, 1-yr follow-up (2010, 2011)	Population sample of workers aged 59-63 (n=2,317)	Non-disability early retirement	1. Age* 2. Gender* 3. Health status* 4. Appreciation at work 5. Developmental productivity 6. Partner's attitude to early retirement 7. Presence of partner* 8. Financially possible to stop working
Friis et al, 2007, Denmark	Longitudinal, prospective (1993-2002)	Female nurses aged 51-59 (n=5,538)	Early retirement scheme	1. Self-reported health* 2. Working schedule* 3. Shift work* 4. Work setting / areas (for nursing) 5. Pressure of work / work speed* 6. Influence at work 7. Physical demands at work* 8. Leisure-time physical activity* 9. Body Mass Index (BMI) * 10. Marital status* & spouse's socioeconomic status 11. Own gross income* 12. Place of residence*
Gørtz , 2012, Denmark	Longitudinal, prospective (1996-2006)	Female daycare teachers aged 60-64 (7,000 observations)	Early retirement scheme	1. Number of GP visits x teaching preschool 2. Number of GP visits x post-2002 ER x teaching preschool 3. Share of trained teachers as colleagues 4. Having a partner* 5. Partner is retired 6. Teaching experience 7. Compensation rate*
Gruber and Madrian, 1995, United States	Longitudinal, 1-yr follow-up (1980-1990)	Population sample of men aged 55-64 (n=5,000)	Transition into retirement	1. One year continuation of post-ER health insurance
Hardy and Hazelrigg, 1999, United States	Longitudinal, retrospective (1987-1989)	Male assembly-line autoworkers aged 50+ (n=1,721)	Early retirement program	1. Age* 2. Marital status* 3. Service years

				4. 30+ years of service 5. Age x 30+ years of service 6. Wage rate* 7. Skilled worker 8. Working overtime 9. Household income* 10. Value of retirement entitlement 11. Education attainment* 12. African American 13. Experienced layoff in recent years 14. Plant scheduled to close 15. Worker solidarity
Helvik et al, 2013, Norway	Longitudinal, 11-yr follow-up (1984-86, 1995-97)	County sample aged 20-54 (n=22,164)	Early retirement	For men: 1. Low-frequency hearing loss
Henkens and Tazelaar, 1997, Netherlands	Longitudinal, 3-yr follow-up (1991, 1994)	Civil servants aged 59-64 (n=1,015)	Early retirement	1. Perceived attitude of partner toward retirement 2. No partner* 3. Retirement intention
Herquelot et al, 2011, France	Longitudinal, prospective (1989-2007)	Employees of electrical and gas company aged 35-60 (n=3,036)	Early retirement	1. Self-reported diabetes*
Herrbach et al, 2009, France	Longitudinal, 2.5-yr follow-up (1967-1977)	Late-career managers aged 50-64 (n=514)	Voluntary early retirement	1. Perceived HR training 2. Perceived HR new roles 3. Perceived HR encouragement to early retire 4. Organizational commitment
Houston et al, 2009, United States	Longitudinal, 3-yr follow-up (1987-2001)	Community sample aged 45-64 (n=6,483)	Early retirement	For women: 1. Overweight or obese at age 25 (>=25BMI)* For men: 1. Overweight or obese at age 25 (>=25BMI)* 2. Obese at age 45-55 (>=30 BMI)*
Jensen et al, 2012, Denmark	Longitudinal, 15-yr follow-up (1993-2008)	Nurses' aides aged <65 (n=3,332)	Voluntary early retirement	1. Education grade level* 2. Vocational status of spouse 3. Marital status* 4. High job demand* 5. 1+ days of Low Back Pain (LBP) in last year* 6. Cardiovascular disease* 7. Skin diseases*

				8. Rheumatologic inflammatory diseases* 9. Smoker*
Jones et al, 2010, UK	Longitudinal, prospective (1991-2002)	Population sample aged 50-64 (n=1,135)	Self-reported early retirement	For men: 1. Health shocks 2. Employed partner 3. Private pension entitlement 4. Working in civil/local government sector* For women: 1. Health shocks 2. Private pension entitlement 3. Working in private sector* 4. Working in civil/local government sector*
Kerkhofs et al, 1999, Netherlands	Longitudinal, 2-yr follow-up (1993, 1995)	Population sample aged 43-63 (n=2,560)	Early retirement scheme	1. Health limits work 2. ER wage replacement rate
Kim, 2003, United States	Retrospective, 3-yr and 15-yr follow-up (1976-1990, 1978-1992, 1979-1993)	University faculty aged <65 (n=1,788)	Early retirement program	1. Publication productivity 3-yr avg before ER 2. Declining publishing productivity
Kubicek et al, 2010, United States	Longitudinal, 11-yr follow-up (1993, 2004)	High school graduates in 1957 working in 1993 aged 51-56 (n=2,499)	Early retirement	1. Employer-sponsored early pension plan 2. Employer-provided health insurance 3. Spouse's pension plan 4. Job satisfaction* 5. Educational attainment* 6. Marital satisfaction
Kuhlman et al, 2014, Denmark	Longitudinal, prospective (1999-2011)	Hospital patients admitted for 3+ days between 1999-2007 aged 18-64 (n=1,722)	Voluntary early retirement	1. Age* 2. Injury Severity Score (degree of traumatic anatomical injuries)
Lund and Villadsen, 2005, Denmark	Longitudinal, 4-yr follow-up (2000-2004)	Population sample of workers aged 57-62 (n=365)	Early retirement pension	1. Age* 2. Socioeconomic position* 3. High conflict at work 4. Extreme bending / twisting of neck / back 5. Working mainly standing/squatting
Lund et al, 2001, Denmark	Longitudinal, 2.5 yr follow-up (1994, 1997)	Male waster collectors and municipal workers aged (n=2,618)	Early retirement pension	1. Marital status* 2. Extreme bending of the back

Mein et al, 2000, UK	Longitudinal, 7-yr follow-up (1988-1995)	Civil servants aged 50-60 (n=2,532)	Early retirement	For men: 1. Age* 2. Years of service employment 3. Employment grade 4. Marital status* 5. Material problems 6. Long-term illnesses* 7. Perceived health* 8. General Health Questionnaire score* 9. Job satisfaction* For women: 1. Age* 2. Years of service employment 3. Marital status* 4. Job satisfaction*
Pfleger et al, 2010, Denmark	Longitudinal, prospective (1980-1989 to 2004)	Patients with multiple sclerosis aged <64 (n=2,538)	Early retirement pension	1. Multiple sclerosis x gender 2. Multiple sclerosis x physical work
Raymo et al, 2011, United States	Longitudinal, 11-yr follow-up (1993, 2004)	High school graduates in 1957 working in 1993 <64 (n=8,718)	Early retirement	For men: 1. Age* 2. Educational attainment* 3. Marital status* 4. Experienced involuntary job exit in the past 5. Proportion of years w/o access to private pension 6. Proportion of years in low earning occupation 7. Belonged to a labour union 8. Net worth* 9. Eligibility for private pension benefits 10. Occupational sector* 11. Number of years in last employment 12. Occupational education 13. Diabetes diagnosis* 14. Cancer diagnosis* 15. Stroke diagnosis*

				For women: 1. Age* 2. Educational attainment* 3. Marital status* 4. Proportion of years in low earning occupation 5. Belonged to a labour union 6. Net worth* 7. Eligibility for private pension benefits 8. Occupational sector* 9. Number of years in last employment 10. Occupational education 11. Diabetes diagnosis* 12. Heart disease diagnosis* 13. Cancer diagnosis*
Renna and Thakur, 2010, United States	Longitudinal, 10-yr follow-up (1992, 2002)	Population sample of workers aged 55-64 (n=1,776)	Early retirement	For men: 1. Underweight* 2. Heart condition* For women: 1. Upper body impairment 2. Arthritis*
Roberts et al, 2010, Germany and UK	Longitudinal, prospective (1991-2002)	Population sample of male workers aged 50-64 (UK n=2,138; Germany n=5,306)	Early retirement transition	For UK men: 1. Age* 2. Self-assessed health* 3. Spouse employed 4. Household income* 5. Private pension 6. Civil service / Local government sector* For German men: 1. Age* 2. Household income* 3. Origin (Foreigner)* 4. Marital status*
Robroek et al, 2013, 11 European countries	Longitudinal, 4-yr follow-up (2004/05, 2008/09)	Population sample of workers aged >50 (n=4,923)	Early retirement	1. Excessive alcohol intake* 2. Low job control*

Schils, 2008, UK, Germany, Netherlands	Longitudinal, UK (1991-2004), Germany (1990-2005), Netherlands (1990-2001)	Population sample of workers aged 50-64 (UK, n=3,629; Germany, n=5,150; Netherlands, n=1,580)	Early retirement	For UK: 1. Age* 2. Gender* 3. Self-reported health* 4. Partner employed 5. Having dependents 6. Household income* 7. Level of education* 8. Tenure 9. Hourly wage* 10. Employment sector* 11. Hours worked* 12. Unemployment rate For Germany: 1. Age* 2. Self-reported health* 3. Marital status* 4. Partner employed 5. Having dependents 6. Tenure 7. Hourly wage* 8. Employment sector* 9. Hours worked* For Netherlands: 1. Age* 2. Gender* 3. Household income* 4. Hourly wage* 5. Employment sector*
Schuring et al, 2007, European Union	Longitudinal, prospective (1994-1998)	Population sample of workers aged >55 (n=4,679)	Early retirement transition	1. Perceived health* 2. Chronic health problem*
Schuring et al, 2013, Netherlands	Longitudinal, prospective (1999-2008)	Population sample of workers aged 45-64 (n=3,751)	Early retirement	1. Age* 2. Perceived poor health* 3. Educational level*

				4. Personal income* 5. Personal share of household income
Seitsamo, 2005, Finland	Longitudinal, prospective (1981, 1992-1997)	Municipal workers aged 45-58 (n=3,815)	Early retirement pension	1. Age* 2. Gender* 3. Spouse's occupational status 4. Daily functioning 5. Activity level 6. Morbidity (number of diseases)* 7. Type of work* 8. Possibilities for development / influence at work 9. Responsibility for others at work 10. Satisfaction with the work time system 11. Meaning of work
Sell et al, 2009, Denmark	Longitudinal, prospective (2000-2005)	Population sample of workers aged 18-59 (n=4,743)	Early retirement pension	1. Age* 2. Cohabiting* 3. Monthly wages after tax* 4. Physical activity level in leisure* 5. Work ability scale
Siddiqui, 1997, Germany	Longitudinal, prospective (1984-1991)	Population sample of male workers <=58 (n=419)	Early retirement	1. Degree of disability 2. Presence of chronic complaints* 3. Educational achievement* 3. Public sector employee*
Strumpf, 2010, United States	Longitudinal, prospective (1992-2006)	Population sample of workers aged 51-61 (n=18,586)	Early retirement	1. Household income* 2. Self-reported health* 3. Employer-sponsored health insurance
Vaillant et al, 2006, United States	Longitudinal, prospective (1940-1944, 1998, 2000, 2002)	Sample of socioeconomically disadvantaged inner city men & sample of socioeconomically advantaged male college graduates aged 50-62 (n=724)	Early retirement	1. Physical health* 2. Global Assessment of Functioning Scale score
van den Berg et al, 2010, 11 European countries	Longitudinal, 2-yr follow-up (2004, 2006)	Population sample of workers aged 50-63 (n=4,611)	Early retirement	1. Perceived health* 2. Chronic disease*

Table 2. Prevalence of working, early retirement, and not working due to other reasons by age group at follow-up, National Population Health Survey (follow-up at 1998/09 & 2000/01; and 2008/09 & 2010/11)

	Cohort 1						**Cohort 2**					
	1996/97 follow-up			1998/99 follow-up			2008/09 follow-up			2010/11 follow-up		
	Working	Early Retired	Not working due to other reasons	Working	Early Retired	Not working due to other reasons	Working	Early Retired	Not working due to other reasons	Working	Early Retired	Not working due to other reasons
Age group												
60-64	123 (54%)	74 (33%)	30 (13%)	230 (51%)	150 (34%)	68 (15%)	206 (75%)	29 (11%)	40 (14%)	326 (69%)	30 (6%)	115 (25%)
45-59	1609 (87%)	89 (5%)	155 (8%)	1363 (83%)	110 (7%)	159 (10%)	1683 (92%)	33 (2%)	119 (6%)	1454 (89%)	24 (1%)	160 (10%)

Notes: Percentages in the table are weighted using Statistics Canada survey weights which account for probability of selection into the sample and initial survey non-response. For the purpose of this analysis, the baseline cohorts were made up of those currently working.

Table 3a. Sample characteristics for cohort 1 at baseline by early retirement versus working, National Population Health Survey (1994/95) (n=1291)

	All Cohort 1			**Working**			**Early retired**			
	n (%)		Mean (SD)	n (%)		Mean (SD)	n (%)		Mean (SD)	p-value
Socio-demographic characteristics										
Age (45-64 years)			51.0 (4.4)			50.2 (4.1)			55.7 (3.5)	**<0.0001**
Gender										
Male	720	56%		637	49%		83	6%		**0.004**
Female	571	44%		473	37%		98	8%		
Marital status										
Married/ Common-law/ Partnered	1067	83%		920	71%		147	11%		0.52
Single/ Separated/ Widow	224	17%		190	15%		34	3%		
Immigration status										
Canadian-born	973	75%		825	64%		148	11%		**0.02**
Immigrated to Canada	318	25%		286	22%		32	3%		
Highest education level completed										
Master's degree or higher completed	309	24%		246	19%		63	5%		**0.006**
Bachelor's degree completed	475	37%		417	32%		58	4%		
College/trade school diploma/certificate	227	18%		199	15%		28	2%		
Secondary school completed	198	15%		175	14%		23	2%		
Secondary school not completed	82	6%		74	6%		8	1%		
Population density of residence										
Urban	972	75%		837	65%		135	10%		0.85
Rural/ Suburban	319	25%		273	21%		46	4%		
Province of residence										
Ontario	557	43%		485	38%		72	6%		0.44
Atlantic (Nfld, NS, PEI, NB)	91	7%		77	6%		14	1%		
Quebec	236	18%		194	15%		42	3%		
Alberta/Manitoba/Saskatchewan	229	18%		200	15%		29	2%		
British Columbia	178	14%		154	12%		24	2%		

Personal estimated annual income										
$60,000+	578	45%		517	40%		61	5%		**0.004**
$40,000 - $59,999	356	27%		291	23%		65	5%		
<$39,999	357	28%		303	23%		54	4%		
Household income adequacy										
Highest income	407	32%		354	27%		53	4%		0.64
Upper middle income	572	44%		486	38%		86	7%		
Lower middle/lowest income	312	24%		270	21%		42	3%		
Physical and Mental Health Characteristics										
Self-rated health										
Excellent	368	28%		325	25%		43	3%		**0.02**
Very good	499	39%		439	34%		60	5%		
Good	349	27%		286	22%		63	5%		
Fair/Poor	75	6%		60	5%		15	1%		
Health Utility Index (HUI3)			0.6 (0.08)			0.6 (0.07)			0.6 (0.09)	**0.007**
Chronic Health Conditions										
No chronic conditions	573	44%		503	39%		70	5%		0.13
1 chronic condition present	413	32%		357	28%		56	4%		
2 chronic conditions present	165	13%		136	11%		29	2%		
3+ chronic condition present	140	11%		114	9%		26	2%		
Psychological Distress			2.5 (2.8)			2.5 (2.8)			2.6 (3.0)	0.44
Major Depressive episode			0.03 (0.2)			0.03 (0.2)			0.03 (0.2)	0.86
Health Behaviours										
Alcohol consumption										
Never drank/ Former drinker	210	16%		187	14%		23	2%		0.24
Occasional drinker	240	19%		201	16%		39	3%		
Regular drinker	841	65%		722	56%		119	9%		
Smoking status										
Never smoked	477	37%		411	32%		66	5%		0.98
Former smoker	484	37%		417	32%		67	5%		
Regular smoker	330	26%		283	22%		47	4%		

Body Mass Index										
Normal weight	487	38%		416	32%		71	5%		0.66
Overweight/Obese	804	62%		694	54%		110	9%		
Leisure Time Physical Activity										
Active	183	14%		155	12%		28	2%		0.82
Moderate	260	20%		226	18%		34	3%		
Inactive	848	66%		729	56%		119	9%		
Sense of mastery			20.1 (4.2)			20.0 (4.2)			19.3 (4.4)	**0.009**
Work characteristics										
Skill discretion			4.7 (2.3)			4.6 (2.2)			5.3 (2.3)	**<0.0001**
Decision authority			2.3 (1.8)			2.3 (1.9)			2.5 (1.6)	0.17
Psychological demands			4.5 (1.8)			4.5 (1.8)			4.2 (1.8)	**0.02**
Social support at work			3.8 (2.0)			3.9 (2.1)			3.7 (1.8)	0.37
Job security			1.2 (1.3)			1.3 (1.2)			1.1 (1.0)	0.14
Physical exertion			2.0 (1.3)			2.0 (1.3)			2.0 (1.2	0.92
Job satisfaction										
Very satisfied	763	59%		650	50%		113	9%		0.10
Somewhat satisfied	446	35%		380	29%		66	5%		
Not too/Not at all satisfied	82	6%		62	5%		20	2%		
Work hours										
Full-time (>=30 hours per week)	1091	85%		964	75%		127	10%		**<0.0001**
Part-time (<30 hours per week)	200	15%		147	11%		53	4%		
Work schedule										
Regular daytime/ evening shifts	1025	79%		882	68%		143	11%		0.93
Rotating/Irregular shifts	266	21%		228	18%		38	3%		
Industry										
Retail trade	123	10%		103	8%		20	2%		0.48
Goods industries	388	30%		336	26%		52	4%		
Service industries	363	28%		316	24%		47	4%		
Educational services	177	14%		157	12%		20	2%		
Health care and social assistance	146	11%		120	9%		26	2%		
Public Administration	94	7%		78	6%		16	1%		

Occupation										
Management/Business/Administration	361	28%		314	24%		47	4%		0.38
Natural and Applied Sciences	54	4%		48	4%		6	<1%		
Health care	86	7%		76	6%		10	1%		
Social Science, Education, Government	158	12%		136	11%		22	2%		
Art / Recreation / Sales	291	23%		238	18%		53	4%		
Trades, Manufacturing, Primary Industry	341	26%		296	23%		45	3%		

Note: Percentages in the table are weighted using Statistics Canada survey weights which account for probability of selection into the sample and initial survey non-response. Bold indicates chi-square for categorical variables and general linear model for continuous variables is statistically significant at the $p<0.05$ level.

Table 3b. Sample characteristics for cohort 2 at baseline by early retirement versus working, National Population Health Survey (2006/07) (n=1491)

	All Cohort 2			**Working**			**Early retired**			
	n (%)		Mean (SD)	n (%)		Mean (SD)	n (%)		Mean (SD)	p-value
Socio-demographic characteristics										
Age (45-64 years)			51.5 (4.4)			51.2 (4.4)			55.6 (3.5)	**<0.0001**
Gender										
Male	836	56%		794	53%		42	3%		**0.03**
Female	655	44%		605	41%		50	3%		
Marital status										
Married/ Common-law/ Partnered	1215	81%		1139	76%		76	5%		0.66
Single/ Separated/ Widow	276	19%		261	18%		15	1%		
Immigration status										
Canadian-born	1247	84%		1166	78%		81	5%		0.25
Immigrated to Canada	244	16%		233	16%		11	1%		
Highest education level completed										
Master's degree or higher completed	114	8%		105	7%		9	1%		0.07
Bachelor's degree completed	612	41%		577	39%		35	2%		
College/trade school diploma/certificate	331	22%		319	21%		12	1%		
Secondary school completed	311	21%		283	19%		28	2%		
Secondary school not completed	123	8%		116	8%		7	<1%		
Population density of residence										
Urban	1281	86%		1207	81%		74	5%		0.15
Rural/ Suburban	210	14%		192	13%		18	1%		
Province of residence										
Ontario	518	35%		485	33%		33	2%		0.38
Atlantic (Nfld, NS, PEI, NB)	117	8%		110	7%		7	<1%		
Quebec	408	27%		381	26%		27	2%		
Alberta/Manitoba/Saskatchewan	265	18%		255	17%		10	1%		
British Columbia	183	12%		168	11%		15	1%		

Personal estimated annual income										
$60,000+	1161	78%		1091	73%		70	5%		0.46
$40,000 - $59,999	204	14%		188	13%		16	1%		
<$39,999	126	8%		120	8%		6	<1%		
Household income adequacy										
Highest income	1025	69%		960	64%		65	4%		0.79
Upper middle income	378	25%		355	24%		23	2%		
Lower middle/lowest income	88	6%		84	6%		4	<1%		
Physical and Mental Health Characteristics										
Self-rated health										
Excellent	309	21%		284	19%		25	2%		0.25
Very good	645	43%		612	41%		33	2%		
Good	454	30%		427	29%		27	2%		
Fair/Poor	83	6%		76	5%		7	<1%		
Health Utility Index (HUI3)			0.7 (0.08)			0.7 (0.08)			0.7 (0.08)	0.91
Chronic Health Conditions										
No chronic conditions	362	24%		347	23%		15	1%		0.18
1 chronic condition present	456	31%		425	29%		31	2%		
2 chronic conditions present	328	22%		309	21%		19	1%		
3+ chronic condition present	345	23%		318	21%		27	2%		
Psychological Distress			2.2 (3.7)			2.2 (3.8)			2.2 (2.7)	0.69
Major Depressive episode			0.04 (0.2)			0.04 (0.2)			0.04 (0.2)	0.84
Health Behaviours										
Alcohol consumption										
Never drank/ Former drinker	171	11%		158	11%		13	1%		0.58
Occasional drinker	194	13%		184	12%		10	1%		
Regular drinker	1126	76%		1059	71%		67	4%		
Smoking status										
Never smoked	504	34%		469	31%		35	2%		0.63
Former smoker	722	48%		681	46%		41	3%		
Regular smoker	265	18%		250	17%		15	1%		

Body Mass Index										
Normal weight	481	32%		450	30%		31	2%		0.76
Overweight/Obese	1010	68%		949	64%		61	4%		
Leisure Time Physical Activity										
Active	393	26%		364	24%		29	2%		0.49
Moderate	425	29%		400	27%		25	2%		
Inactive	673	45%		636	43%		37	2%		
Sense of mastery			20.1 (3.8)			20.2 (3.8)			19.5 (3.9)	0.64
Work characteristics										
Skill discretion			4.5 (2.0)			4.6 (2.0)			4.4 (1.8)	0.14
Decision authority			2.5 (1.5)			2.5 (1.6)			2.6 (1.4)	0.90
Psychological demands			4.6 (1.7)			4.6 (1.7)			4.6 (1.8)	0.72
Social support at work			4.1 (1.9)			4.1 (1.9)			4.1 (1.7)	0.97
Job security			1.2 (1.0)			1.2 (1.0)			1.1 (1.0)	0.72
Physical exertion			1.7 (1.2)			1.7 (1.2)			1.5 (1.0)	**0.02**
Job satisfaction										
Very satisfied	759	51%		716	48%		43	3%		0.16
Somewhat satisfied	637	43%		600	40%		37	2%		
Not too/Not at all satisfied	95	6%		85	6%		10	1%		
Work hours										
Full-time (>=30 hours per week)	1349	90%		1275	86%		74	5%		**0.0008**
Part-time (<30 hours per week)	142	10%		124	8%		18	1%		
Work schedule										
Regular daytime/ evening shifts	1253	84%		1169	78%		84	6%		0.05
Rotating/Irregular shifts	238	16%		230	15%		8	1%		
Industry										
Retail trade	113	8%		107	7%		6	<1%		0.06
Goods industries	451	30%		429	29%		22	1%		
Service industries	440	30%		416	28%		24	2%		
Educational services	151	10%		133	9%		18	1%		
Health care and social assistance	186	12%		177	12%		9	1%		
Public Administration	150	10%		140	9%		10	1%		

Occupation										
Management/Business/Administration	503	34%		468	31%		37	2%		**0.03**
Natural and Applied Sciences	114	8%		103	7%		11	1%		
Health care	111	7%		106	7%		5	<1%		
Social Science, Education, Government	179	12%		164	11%		15	1%		
Art / Recreation / Sales	276	18%		263	18%		11	1%		
Trades, Manufacturing, Primary Industry	308	21%		296	20%		12	1%		

Note: Percentages in the table are weighted using Statistics Canada survey weights which account for probability of selection into the sample and initial survey non-response. Bold indicates chi-square for categorical variables and general linear model for continuous variables is statistically significant at the $p<0.05$ level.

Table 4a. Predictors of early retirement for cohort 1 using logistic regression analyses presented as odds ratios (OR) with 95% confidence intervals (CI) of early retirement versus working, National Population Health Survey (in 1994/95 with 2- and 4-year follow-up) (n=1291)

	Univariate		**Multivariate per domain**		**Final Multivariate**	
	Unadjusted OR	95% CI	Adjusted OR per domain	95% CI	Fully adjusted OR	95% CI
Socio-demographic characteristics						
Age (45-64 years)	1.37**	1.30-1.43	1.42**	1.34-1.49	1.42**	1.34-1.50
Gender						
Male (ref)	1.00		1.00		1.00	
Female	0.63**	0.46-0.87	0.55**	0.38-0.80	0.59**	0.37-0.96
Marital status						
Married/ Common-law/ Partnered (ref)	1.00					
Single/ Separated/ Widow	1.14	0.76-1.71				
Immigration status						
Canadian-born (ref)	1.00		1.00		1.00	
Immigrated to Canada	0.63**	0.42-0.94	0.56**	0.34-0.92	0.57**	0.33-0.97
Highest education level completed						
Master's degree or higher completed (ref)	1.00		1.00		1.00	
Bachelor's degree completed	1.38	0.58-3.26	1.48	0.55-4.01	1.45	0.48-4.34
College/trade school diploma/certificate	1.38	0.59-3.21	1.64	0.61-4.41	1.80	0.56-5.82
Secondary school completed	1.35	0.61-3.01	1.53	0.60-3.89	1.51	0.49-4.69
Secondary school not completed	2.52**	1.13-5.61	1.51	0.58-3.94	1.58	0.48-5.24
Population density of residence						
Urban (ref)	1.00		1.00		1.00	
Rural/ Suburban	1.04	0.72-1.49	1.08	0.69-1.68	1.66	0.72-1.89
Province of residence						
Ontario (ref)	1.00		1.00		1.00	
Atlantic (Nfld, NS, PEI, NB)	1.27	0.69-2.35	1.81*	0.86-3.84	2.09*	0.95-4.57
Quebec	1.45*	0.96-2.20	2.47**	1.48-4.13	2.26**	1.30-3.95
Alberta/Manitoba/Saskatchewan	0.99	0.62-1.57	0.94	0.54-1.63	0.91	0.51-1.64
British Columbia	1.06	0.65-1.74	0.96	0.53-1.71	0.94	0.51-1.73

Personal annual income						
$60,000+ (ref)	1.00		1.00		1.00	
$40,000 - $59,999	1.88**	1.29-2.74	1.39*	0.89-2.17	1.23	0.75-2.00
<$39,999	1.51**	1.02-2.24	0.70*	0.42-1.15	0.58*	0.33-1.01
Household income adequacy						
Highest income (ref)	1.00					
Upper middle income	1.18	0.82-1.71				
Lower middle/lowest income	1.04	0.67-1.61				
Physical and Mental Health Characteristics						
Self-rated health						
Excellent (ref)	1.00		1.00		1.00	
Very good	1.02	0.67-1.55	1.08	0.67-1.74	1.15	0.68-1.95
Good	1.64**	1.08-2.49	1.21	0.74-2.00	1.33	0.75-2.33
Fair/Poor	1.83*	0.95-3.51	1.18	0.54-2.60	1.20	0.50-2.86
Chronic Health Conditions						
No chronic conditions (ref)	1.00		1.00		1.00	
1 chronic condition present	1.12	0.77-1.63	0.79	0.51-1.21	0.83	0.52-1.34
2 chronic conditions present	1.51*	0.94-2.43	1.05	0.60-1.83	1.00	0.54-1.85
3+ chronic condition present	1.64**	1.00-2.69	0.88	0.48-1.63	0.90	0.45-1.81
Psychological Distress	1.02	0.97-1.08				
Major Depressive episode	1.10	0.42-2.89				
Health Behaviours						
Alcohol consumption						
Never drank/ Former drinker (ref)	1.00		1.00		1.00	
Occasional drinker	1.61*	0.93-2.80	2.11**	1.13-3.95	2.56**	1.29-5.09
Regular drinker	1.35	0.84-2.17	2.31**	1.34-4.01	2.32**	1.27-4.23
Smoking status						
Never smoked (ref)	1.00					
Former smoker	1.00	0.70-1.45				
Regular smoker	1.04	0.70-1.56				
Body Mass Index						
Normal weight (ref)	1.00					

Overweight/Obese	0.93	0.67-1.28				
Leisure Time Physical Activity						
Active (ref)	1.00					
Moderate	0.84	0.49-1.44				
Inactive	0.91	0.58-1.42				
Sense of mastery	0.95**	0.92-0.99	0.98	0.94-1.03		
Work characteristics						
Skill discretion	1.15**	1.07-1.23	1.04	0.95-1.15	1.06	0.96-1.17
Decision authority	1.06*	0.98-1.15	1.05	0.93-1.18		
Psychological demands	0.91**	0.83-0.99	1.00	0.90-1.12	0.99	0.89-1.11
Social support at work	0.96	0.89-1.04				
Job security	0.90*	0.78-1.04	0.76**	0.63-0.92	0.73**	0.60-0.90
Physical exertion	1.01	0.89-1.14	0.94	0.80-1.12		
Job satisfaction						
Very satisfied (ref)	1.00		1.00		1.00	
Somewhat satisfied	0.94	0.67-1.32	1.04	0.68-1.59	1.08	0.69-1.68
Not too/Not at all satisfied	1.76*	0.99-3.11	2.47**	1.14-5.38	3.42**	1.49-7.85
Work hours						
Full-time (>=30 hours per week) (ref)	1.00		1.00		1.00	
Part-time (<30 hours per week)	2.74**	1.91-3.94	2.01**	1.22-3.31	2.16**	1.27-3.67
Work schedule						
Regular daytime/ evening shifts (ref)	1.00		1.00		1.00	
Rotating/Irregular shifts	1.02	0.69-1.50	0.84	0.52-1.35	0.88	0.53-1.47
Industry						
Retail trade (ref)	1.00		1.00		1.00	
Goods industries	0.78	0.44-1.37	1.58	0.68-3.64	1.39	0.57-3.37
Service industries	0.76	0.43-1.35	1.04	0.52-2.09	1.21	0.56-2.58
Educational services	0.65	0.33-1.27	0.78	0.29-2.13	0.80	0.27-2.36
Health care and social assistance	1.11	0.59-2.12	2.48*	0.97-6.35	2.38*	0.86-6.60
Public Administration	1.01	0.49-2.11	2.61**	1.02-6.70	2.77**	1.02-7.52
Occupation						
Management/Business/Admin (ref)	1.00		1.00		1.00	

Natural and Applied Sciences	0.81	0.32-2.03	0.84	0.28-2.53	1.06	0.34-3.34
Health care	0.80	0.38-1.71	0.49	0.16-1.49	0.50	0.15-1.66
Social Science, Education, Government	1.09	0.63-1.88	1.67	0.70-4.00	1.86	0.71-4.88
Art / Recreation / Sales	1.47*	0.96-2.26	1.49*	0.82-2.71	1.34	0.73-2.48
Trades, Manufacturing, Primary Industry	1.05	0.68-1.63	1.04	0.53-2.07	1.01	0.51-2.00

Note: Percentages in the table are weighted using Statistics Canada survey weights which account for probability of selection into the sample and initial survey non-response. *Significant at the p<0.20 level. **Significant at the p<0.05 level. Ref.: reference category. Hosmer and Lemeshow Goodness-of-Fit Test p=0.12. Pseudo R-square=0.23.

Table 4b. Predictors of early retirement for cohort 2 using logistic regression analyses presented as odds ratios (OR) with 95% confidence intervals (CI) of early retirement versus working, National Population Health Survey (in 2006/07 with 2- and 4-year follow-up) (n=1491)

	Univariate		**Multivariate per domain**		**Final Multivariate**	
	Unadjusted OR	95% CI	Adjusted OR per domain	95% CI	Fully adjusted OR	95% CI
Socio-demographic characteristics						
Age (45-64 years)	1.27**	1.20-1.34	1.30**	1.23-1.39	1.31**	1.23-1.40
Gender						
Male (ref)	1.00		1.00		1.00	
Female	0.63**	0.41-0.96	0.52**	0.33-0.82	0.56*	0.31-1.02
Marital status						
Married/ Common-law/ Partnered (ref)	1.00					
Single/ Separated/ Widow	0.88	0.50-1.55				
Immigration status						
Canadian-born (ref)	1.00		1.00		1.00	
Immigrated to Canada	0.69	0.36-1.31	0.47**	0.23-0.94	0.48*	0.22-1.02
Highest education level completed						
Master's degree or higher completed (ref)	1.00		1.00		1.00	
Bachelor's degree completed	1.65	0.70-3.89	2.23*	0.90-5.52	2.21*	0.84-5.79
College/trade school diploma/certificate	0.64	0.25-1.67	0.83	0.30-2.27	1.19	0.40-3.57
Secondary school completed	1.02	0.44-2.35	1.13	0.46-2.74	1.51	0.56-4.10
Secondary school not completed	1.44	0.52-4.00	0.88	0.29-2.72	1.72	0.47-6.33
Population density of residence						
Urban (ref)	1.00		1.00		1.00	
Rural/ Suburban	1.49*	0.87-2.56	1.99**	1.08-3.66	1.90**	1.00-3.63
Province of residence						
Ontario (ref)	1.00		1.00		1.00	
Atlantic (Nfld, NS, PEI, NB)	0.98	0.42-2.24	0.88	0.36-2.14	0.89*	0.35-2.27
Quebec	1.05	0.62-1.78	0.98	0.55-1.74	0.97	0.52-1.81
Alberta/Manitoba/Saskatchewan	0.57*	0.27-1.18	0.54*	0.25-1.15	0.53	0.24-1.20
British Columbia	1.31	0.69-2.48	1.44	0.73-2.85	1.15*	0.54-2.46

Personal annual income						
$60,000+ (ref)	1.00		1.00		1.00	
$40,000 - $59,999	1.33	0.76-2.34	0.95	0.50-1.81	1.06	0.53-2.12
<$39,999	0.76	0.32-1.80	0.45*	0.18-1.13	0.42*	0.15-1.16
Household income adequacy						
Highest income (ref)	1.00					
Upper middle income	0.92	0.56-1.51				
Lower middle/lowest income	0.72	0.26-1.99				
Physical and Mental Health Characteristics						
Self-rated health						
Excellent (ref)	1.00		1.00		1.00	
Very good	0.62*	0.36-1.06	0.60*	0.34-1.07	0.56*	0.30-1.04
Good	0.74	0.42-1.30	0.62*	0.33-1.14	0.54*	0.27-1.06
Fair/Poor	1.11	0.47-2.62	0.68	0.27-1.72	0.79	0.29-2.20
Chronic Health Conditions						
No chronic conditions (ref)	1.00		1.00		1.00	
1 chronic condition present	1.76*	0.93-3.34	1.80*	0.92-3.53	1.74*	0.85-3.58
2 chronic conditions present	1.47	0.73-2.95	1.63*	0.78-3.43	1.70*	0.77-3.77
3+ chronic condition present	2.02**	1.05-3.88	1.97*	0.96-4.08	1.96*	0.89-4.29
Psychological Distress	1.00	0.95-1.06				
Major Depressive episode	1.06	0.31-3.55				
Health Behaviours						
Alcohol consumption						
Never drank/ Former drinker (ref)	1.00		1.00		1.00	
Occasional drinker	0.65	0.28-1.52	0.57	0.24-1.37	0.63	0.24-1.64
Regular drinker	0.77	0.42-1.41	0.95	0.50-1.81	0.81	0.40-1.66
Smoking status						
Never smoked (ref)	1.00					
Former smoker	0.80	0.51-1.28				
Regular smoker	0.82	0.44-1.52				
Body Mass Index						
Normal weight (ref)	1.00					

Overweight/Obese	0.93	0.60-1.46				
Leisure Time Physical Activity						
Active (ref)	1.00					
Moderate	0.80	0.46-1.39				
Inactive	0.74	0.45-1.22				
Sense of mastery	0.96*	0.91-1.01	0.98	0.93-1.04		
Work characteristics						
Skill discretion	0.96	0.86-1.07	0.92*	0.80-1.05	0.93	0.81-1.07
Decision authority	1.05	0.91-1.19	0.99	0.84-1.16		
Psychological demands	1.03	0.91-1.17	1.13*	0.98-1.31	1.08	0.93-1.26
Social support at work	0.99	0.88-1.10				
Job security	0.98	0.78-1.22	0.93	0.71-1.21	0.96	0.72-1.28
Physical exertion	0.84*	0.70-1.02	1.01	0.79-1.29		
Job satisfaction						
Very satisfied (ref)	1.00		1.00		1.00	
Somewhat satisfied	1.10	0.70-1.72	1.51*	0.90-2.54	1.62*	0.95-2.78
Not too/Not at all satisfied	2.00*	0.97-4.11	2.86**	1.18-6.94	3.33**	1.40-7.90
Work hours						
Full-time (>=30 hours per week) (ref)	1.00		1.00		1.00	
Part-time (<30 hours per week)	2.48**	1.43-4.28	2.80**	1.39-5.64	2.26**	1.06-4.80
Work schedule						
Regular daytime/ evening shifts (ref)	1.00		1.00		1.00	
Rotating/Irregular shifts	0.49*	0.24-1.02	0.51*	0.23-1.14	0.56*	0.24-1.29
Industry						
Retail trade (ref)	1.00		1.00		1.00	
Goods industries	0.94	0.38-2.33	1.19	0.40-3.56	0.92	0.28-2.99
Service industries	1.01	0.41-2.50	0.90	0.32-2.47	0.86	0.29-2.51
Educational services	2.36*	0.92-6.09	2.04	0.62-6.72	2.22	0.61-8.06
Health care and social assistance	0.92	0.32-2.61	0.73	0.20-2.75	0.81	0.20-3.31
Public Administration	1.28	0.46-3.57	1.00	0.31-3.24	0.97	0.28-3.39
Occupation						
Management/Business/Admin (ref)	1.00		1.00		1.00	

Natural and Applied Sciences	1.26	0.63-2.55	2.19*	0.96-4.99	2.02*	0.85-4.85
Health care	0.46*	0.16-1.30	0.56	0.13-2.34	0.50	0.11-2.22
Social Science, Education, Government	1.08	0.58-2.01	0.67	0.28-1.61	0.59	0.23-1.51
Art / Recreation / Sales	0.49**	0.25-0.98	0.60	0.27-1.32	0.54*	0.24-1.27
Trades, Manufacturing, Primary Industry	0.48**	0.24-0.93	0.69	0.29-1.62	0.72	0.30-1.73

Note: Percentages in the table are weighted using Statistics Canada survey weights which account for probability of selection into the sample and initial survey non-response. *Significant at the p<0.20 level. **Significant at the p<0.05 level. Ref.: reference category. Hosmer and Lemeshow Goodness-of-Fit Test p=0.13. Pseudo R-square=0.12.

Table 5. Final models predicting early retirement for cohort 1 and cohort 2 using logistic regression analyses presented as odds ratios (OR) with 95% confidence intervals (CI) of early retirement versus working and Wald chi-square test for difference using comparison of regression estimates, National Population Health Survey (1994/95 with 2- and 4-year follow-up and 2006/07 with 2- and 4-year follow-up)

	Cohort 1 (n=1291)		**Cohort 2 (n=1491)**		**Test for difference**	
	Fully adjusted OR	95% CI	Fully adjusted OR	95% CI	Wald chi-square	p-value
Socio-demographic characteristics						
Age (45-64 years)	1.42**	1.34-1.50	1.31**	1.23-1.40	3.41	0.07
Gender						
Male (ref)	1.00		1.00			
Female	0.59**	0.37-0.96	0.56*	0.31-1.02	0.02	0.89
Immigration status						
Canadian-born (ref)	1.00		1.00			
Immigrated to Canada	0.57**	0.33-0.97	0.48*	0.22-1.02	0.13	0.72
Highest education level completed						
Master's degree or higher completed (ref)	1.00		1.00			
Bachelor's degree completed	1.45	0.48-4.34	2.21*	0.84-5.79	0.32	0.57
College/trade school diploma/certificate	1.80	0.56-5.82	1.19	0.40-3.57	0.26	0.61
Secondary school completed	1.51	0.49-4.69	1.51	0.56-4.10	0.01	0.99
Secondary school not completed	1.58	0.48-5.24	1.72	0.47-6.33	0.01	0.93
Population density of residence						
Urban (ref)	1.00		1.00			
Rural/ Suburban	1.66	0.72-1.89	1.90**	1.00-3.63	0.06	0.80
Province of residence						
Ontario (ref)	1.00		1.00			
Atlantic (Nfld, NS, PEI, NB)	2.09*	0.95-4.57	0.89*	0.35-2.27	1.88	0.17
Quebec	2.26**	1.30-3.95	0.97	0.52-1.81	3.96	**0.04**
Alberta/Manitoba/Saskatchewan	0.91	0.51-1.64	0.53	0.24-1.20	1.17	0.28
British Columbia	0.94	0.51-1.73	1.15*	0.54-2.46	0.17	0.68

Personal annual income						
$60,000+ (ref)	1.00		1.00			
$40,000 - $59,999	1.23	0.75-2.00	1.06	0.53-2.12	0.12	0.73
<$39,999	0.58*	0.33-1.01	0.42*	0.15-1.16	0.29	0.59
Physical and Mental Health Characteristics						
Self-rated health						
Excellent (ref)	1.00		1.00			
Very good	1.15	0.68-1.95	0.56*	0.30-1.04	2.99	0.08
Good	1.33	0.75-2.33	0.54*	0.27-1.06	3.86	0.05
Fair/Poor	1.20	0.50-2.86	0.79	0.29-2.20	0.38	0.54
Chronic Health Conditions						
No chronic conditions (ref)	1.00		1.00			
1 chronic condition present	0.83	0.52-1.34	1.74*	0.85-3.58	2.88	0.09
2 chronic conditions present	1.00	0.54-1.85	1.70*	0.77-3.77	1.07	0.30
3+ chronic condition present	0.90	0.45-1.81	1.96*	0.89-4.29	2.11	0.15
Health Behaviours						
Alcohol consumption						
Never drank/ Former drinker (ref)	1.00		1.00			
Occasional drinker	2.56**	1.29-5.09	0.63	0.24-1.64	5.39	**0.02**
Regular drinker	2.32**	1.27-4.23	0.81	0.40-1.66	4.94	**0.03**
Work characteristics						
Skill discretion (range: 0-12)	1.06	0.96-1.17	0.93	0.81-1.07	2.28	0.13
Psychological demands (range: 0-8)	0.99	0.89-1.11	1.08	0.93-1.26	0.86	0.35
Job insecurity (range: 0-4)	0.73**	0.60-0.90	0.96	0.72-1.28	2.38	0.12
Job satisfaction						
Very satisfied (ref)	1.00		1.00			
Somewhat satisfied	1.08	0.69-1.68	1.62*	0.95-2.78	1.30	0.25
Not too/Not at all satisfied	3.42**	1.49-7.85	3.33**	1.40-7.90	0.01	0.97
Work hours						
Full-time (>=30 hours per week) (ref)	1.00		1.00			
Part-time (<30 hours per week)	2.16**	1.27-3.67	2.26**	1.06-4.80	0.01	0.92

Work schedule						
Regular daytime/ evening shifts (ref)	1.00		1.00			
Rotating/Irregular shifts	0.88	0.53-1.47	0.56*	0.24-1.29	0.80	0.37
Industry						
Retail trade (ref)	1.00		1.00			
Goods industries	1.39	0.57-3.37	0.92	0.28-2.99	0.30	0.59
Service industries	1.21	0.56-2.58	0.86	0.29-2.51	0.25	0.62
Educational services	0.80	0.27-2.36	2.22	0.61-8.06	1.40	0.24
Health care and social assistance	2.38*	0.86-6.60	0.81	0.20-3.31	1.49	0.22
Public Administration	2.77**	1.02-7.52	0.97	0.28-3.39	1.66	0.20
Occupation						
Management/Business/Admin (ref)	1.00		1.00			
Natural and Applied Sciences	1.06	0.34-3.34	2.02*	0.85-4.85	0.78	0.38
Health care	0.50	0.15-1.66	0.50	0.11-2.22	0.01	0.99
Social Science, Education, Government	1.86	0.71-4.88	0.59	0.23-1.51	2.79	0.10
Art / Recreation / Sales	1.34	0.73-2.48	0.54*	0.24-1.27	3.09	0.08
Trades, Manufacturing, Primary Industry	1.01	0.51-2.00	0.72	0.30-1.73	0.36	0.55

Note: Percentages in the table are weighted using Statistics Canada survey weights which account for probability of selection into the sample and initial survey non-response. *Significant at the p<0.20 level. **Significant at the p<0.05 level, Bold indicates statistical significance at the p<0.05 level. Ref.: reference category.

Table 6. Sensitivity Analyses: Sample characteristics for early retirees by early retirement and very early retirement, National Population Health Survey (1994/95 with 2- and 4-year follow-up and 2006/07 with 2- and 4-year follow-up) (n=301)

	Early retirement (aged 60-64)			**Very early retirement (aged 45-59)**			
	n (%)		Mean (SD)	n (%)		Mean (SD)	p-value
Socio-demographic characteristics							
Age (45-64 years)*			58.6 (1.7)			52.7 (2.5)	**<0.0001**
Gender							
Male	74	25%		64	21%		0.34
Female	79	26%		84	28%		
Marital status							
Married/ Common-law/ Partnered	128	43%		118	39%		0.46
Single/ Separated/ Widow	25	8%		30	10%		
Immigration status							
Canadian-born	120	40%		133	44%		**0.007**
Immigrated to Canada	33	11%		15	5%		
Highest education level completed							
Master's degree or higher completed	58	19%		20	7%		**<0.0001**
Bachelor's degree completed	44	15%		59	20%		
College/trade school diploma/certificate	19	6%		25	8%		
Secondary school completed	24	8%		34	11%		
Secondary school not completed	9	3%		9	3%		
Population density of residence							
Urban	119	40%		112	37%		0.75
Rural/ Suburban	34	11%		36	12%		
Province of residence							
Ontario	64	21%		51	17%		0.16
Atlantic (Nfld, NS, PEI, NB)	9	3%		15	5%		
Quebec	37	12%		39	13%		
Alberta/Manitoba/Saskatchewan	26	9%		17	6%		
British Columbia	18	6%		25	8%		
Personal annual income							
$60,000+	61	20%		87	29%		**0.0003**
$40,000 - $59,999	47	16%		41	14%		
<$39,999	46	15%		19	6%		
Household income adequacy							
Highest income	55	18%		78	26%		**0.008**
Upper middle income	64	21%		54	18%		
Lower middle/lowest income	33	11%		17	6%		
Physical and Mental Health Characteristics							
Self-rated health							
Excellent	40	13%		36	12%		0.16
Very good	43	14%		59	20%		

Good	56	19%		43	14%		
Fair/Poor	15	5%		9	3%		
Health Utility Index (HUI3)			0.6 (0.09)			0.6 (0.09)	0.71
Chronic Health Conditions							
No chronic conditions	43	14%		49	16%		0.10
1 chronic condition present	56	19%		40	13%		
2 chronic conditions present	21	7%		32	11%		
3+ chronic condition present	34	11%		26	9%		
Psychological Distress			2.2 (2.8)			2.7 (3.2)	0.17
Major Depressive episode			0.02 (0.1)			0.05 (0.2)	0.08
Health Behaviours							
Alcohol consumption							
Never drank/ Former drinker	25	8%		14	5%		0.13
Occasional drinker	23	8%		31	10%		
Regular drinker	105	35%		103	34%		
Smoking status							
Never smoked	58	19%		54	18%		0.96
Former smoker	61	20%		59	20%		
Regular smoker	34	11%		35	12%		
Body Mass Index							
Normal weight	53	18%		55	18%		0.63
Overweight/Obese	96	32%		97	32%		
Leisure Time Physical Activity							
Active	34	11%		30	10%		0.76
Moderate	32	11%		34	11%		
Inactive	87	29%		84	28%		
Sense of mastery			18.9 (4.6)			19.9 (4.2)	0.06
Work characteristics							
Skill discretion			5.5 (2.4)			4.4 (2.0)	**<0.0001**
Decision authority			2.5 (1.5)			2.5 (1.7)	0.94
Psychological demands			4.1 (1.9)			4.6 (1.8)	**0.03**
Social support at work			3.8 (1.8)			3.9 (1.9)	0.43
Job security			1.3 (1.2)			0.9 (0.8)	**0.0008**
Physical exertion			1.8 (1.2)			1.8 (1.2)	0.75
Job satisfaction							
Very satisfied	88	29%		73	24%		0.18
Somewhat satisfied	48	16%		62	21%		
Not too/Not at all satisfied	17	6%		13	4%		
Work hours							
Full-time (>=30 hours per week)	105	35%		118	39%		0.02
Part-time (<30 hours per week)	48	16%		30	10%		
Work schedule							
Regular daytime/ evening shifts	123	41%		129	43%		0.12
Rotating/Irregular shifts	30	10%		19	6%		
Industry							
Retail trade	19	6%		9	3%		0.003

Goods industries	47	16%		36	12%		
Service industries	42	14%		38	13%		
Educational services	15	5%		28	9%		
Health care and social assistance	24	8%		15	5%		
Public Administration	7	2%		21	7%		
Occupation**							
Management/Business/Administration	44	15%		52	17%		0.09
Natural and Applied Sciences, Trades, Manufacturing, Primary Industry	46	15%		35	12%		
Health care	16	5%		25	8%		
Art/Recreation /Sales/Social Science, Education, Government	48	16%		35	12%		

Note: Percentages in the table are weighted using Statistics Canada survey weights which account for probability of selection into the sample and initial survey non-response.
Bold indicates statistical significance at the $p<0.05$ level.
*This is the mean age of the respondents at base line and retirement was assessed 2- and 4-years later.
**Occupation categories were collapsed due to small sample sizes.

Table 7. Predictors of very early retirement using logistic regression analyses presented as adjusted odds ratios (OR) with 95% confidence intervals (CI), National Population Health Survey (1994/95 & 2006/07 with 2- and 4-year follow-up) (n=301)

	Final Multivariate	
	Fully adjusted OR	95% CI
Gender		
Male (ref)	1.00	
Female	1.14	0.62-2.08
Marital status		
Married/ Common-law/ Partnered (ref)	1.00	
Single/ Separated/ Widow	1.00	0.50-2.01
Immigration status		
Canadian-born (ref)	1.00	
Immigrated to Canada	2.45*	1.11-5.39
Highest education level completed		
Master's degree or higher completed (ref)	1.00	
Bachelor's degree completed	0.64	0.18-2.30
College/trade school diploma/certificate	0.45	0.10-1.97
Secondary school completed	0.49	0.12-1.91
Secondary school not completed	1.66	0.37-7.44
Province of residence		
Ontario (ref)	1.00	
Atlantic (Nfld, NS, PEI, NB)	0.64	0.23-1.75
Quebec	0.81	0.41-1.60
Alberta/Manitoba/Saskatchewan	1.57	0.69-3.54
British Columbia	0.67	0.30-1.49
Household income adequacy		
Highest income (ref)	1.00	
Upper middle income	1.27	0.69-2.33
Lower middle/lowest income	1.65	0.68-3.97
Industry		
Retail trade (ref)	1.00	
Goods industries	0.46	0.13-1.56
Service industries	0.48	0.16-1.38
Educational services	0.32	0.06-1.68
Health care and social assistance	0.97	0.24-3.89
Public Administration	0.18*	0.05-0.69
Occupation		
Management/Business/Admin (ref)	1.00	
Natural and Applied Sciences	1.31	0.41-4.13
Health care	0.77	0.17-3.56
Social Science, Education, Government	1.04	0.26-4.07
Art / Recreation / Sales	0.88	0.39-2.01
Trades, Manufacturing, Primary Industry	1.28	0.47-3.48

Note: Percentages in the table are weighted using Statistics Canada survey weights - response. *Significant at the $p<0.05$ level. Ref.: reference category.

APPENDICES

APPENDIX 1: Search Strategy for Systematic Scoping Review by Database

Database: Ovid MEDLINE(R) <1946 to November 4 2014>

Search Strategy:

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1 Retirement/ (7596)

2 retire$.ti,ab. (12459)

3 retiring.ti,ab. (607)

4 Pensions/ (3241)

5 pension?.mp. (5336)

6 Old Age Assistance/ (410)

7 old age benefit?.ti,ab. (21)

8 late life transition$.ti,ab. (4)

9 elder$ benefit?.ti,ab. (45)

10 labo?r market exit.ti,ab. (8)

11 (exit$ adj3 labo?r market).ti,ab. (16)

12 (leave$ adj3 labo?r market).ti,ab. (5)

13 (withdraw$ adj3 labo?r market).ti,ab. (11)

14 or/1-13 (19906)

15 early.ti,ab. (974077)

16 14 and 15 (1739)

17 animals/ not humans/ (3847510)

18 16 not 17 (1697)

19 limit 18 to yr="1995 -Current" (1254)

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Database: PsycINFO <1806 to November 4 2014>

Search Strategy:

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1 retirement/ (3404)

2 retire$.mp. (10052)

3 employee pension plans/ (318)

4 pension?.ti,ab. (1385)

5 old age security.ti,ab. (37)

6 old age benefit?.ti,ab. (11)

7 late life transition$ti.ab. (0)

8 elder$ benefit?.ti,ab. (15)

9 labo?r market exit.ti,ab. (13)

10 exit from work$.ti,ab. (30)

11 or/1-10 (11068)

12 early.ti,ab. (202533)

13 11 and 12 (1130)

14 limit 13 to yr="1995 -Current" (887)

15 limit 14 to (peer reviewed journal and human and English language) (600)

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APPENDIX 2: Potential List of Covariates for the Model

Variable	**Categorization of Potential Responses**	**Level of Measurement**
Socio-demographic characteristics		
Gender	Male (ref) Female	Nominal
Age	Range: 45-64 years of age	Interval (continuous)
Marital Status	Married/ Common-law/ Partnered (ref) Single/ Separated/ Widow	Nominal
Immigration	Canadian-born (ref) Immigrated to Canada	Nominal
Highest Education Completed	Master's degree or higher completed (ref) Bachelor's degree completed College/trade school diploma/certificate completed Secondary school completed Secondary school not completed	Ordinal (categorical)
Population Density	Urban (ref) Rural/ Suburban	Nominal
Province	Ontario (ref) Atlantic (Nfld, Nova Scotia, PEI, New Brunswick) Quebec Alberta/Manitoba/Saskatchewan British Columbia	Nominal
Personal Annual Income	$60,000+ (ref) $40,000 - $59,999 >$39,999	Ordinal (categorical)
Household Income Adequacy	Highest income (>$60,000 if 1-2 people, >$80,000 if 3+ people) (ref) Upper middle income ($30,000-$59,999 if 1-2 people, $40,000-$79,999 if 3-4 people, $60,000-$79,999 if 5+ people) Lowest / Lower middle income (<$29,999 if 1-2 people in household, <$39,999 if 3-4 people; <$59,999 if 5+ people in household)	Ordinal (categorical)
Physical and Mental Health Characteristics		
Self-rated Health	Excellent (ref) Very Good Good Fair / Poor	Ordinal (categorical)

HUI3	Range: 0-1 (3 decimals)	Continuous
Chronic Health Conditions	No chronic conditions (ref) 1 chronic condition present 2 chronic conditions present 3+ chronic conditions present	Ordinal (categorical)
Psychological Distress	Range: 0-24	Interval (continuous)
Major Depressive Episode	Range: 0-1 (2 decimals)	Interval (continuous)
Health Behaviours		
Alcohol Consumption	Never drank / former drinker (ref) Occasional drinker Regular drinker	Nominal
Smoking	Never smoked (ref) Former smoker Regular smoker	Nominal
Body Mass Index	Normal Weight (<24 BMI) (ref) Overweight / Obese (>25 BMI)	Ordinal (categorical)
Leisure Time Physical Activity	Active (avg 3.0+ kcal/kg/day Energy Expenditure) (ref) Moderate (avg 1.5 - 2.9 kcal/kg/day EE) Inactive (avg below 1.5 kcal/kg/day EE)	Ordinal (categorical)
Sense of Mastery	Range: 0-28	Interval (continuous)
Work Characteristics		
Work Schedules	Regular daytime /regular evening shifts (ref) Rotating / Irregular shifts (on-call, changing, split shifts)	Nominal
Work Hours	Full-time (>=30 hours per week) (ref) Part-time (<30 hours per week)	Nominal
Skill Discretion	Range: 0-12	Ordinal
Decision Authority	Range: 0-8	Ordinal
Psychological Demands	Range: 0-8	Ordinal
Social Support at Work	Range: 0-12	Ordinal
Job Security	Range: 0-4	Ordinal
Physical exertion	Range: 0-4	Ordinal
Job Satisfaction	Very satisfied (ref) Somewhat satisfied Not too / Not at all satisfied	Ordinal (categorical)
Industry	Retail trade (ref) Goods industries Service industries	Nominal

	Educational and other services Health care and social assistance Public Administration	
Occupation	Management/Business/Administration occupations Natural and Applied Sciences occupations Health care occupations Social Science, Education, Government occupations Art / Recreation / Sales occupations Trades, Manufacturing and Primary Industry occupations	Nominal

APPENDIX 3: Survey Questions from Measurement Components of the National Population Health Survey

Psychological Distress survey questions from the National Population Health Survey (Statistics Canada, 1995).

Psychological distress was assessed using the following six questions:
During the past month, about how often did you feel:

- So sad that nothing could cheer you up?
- Nervous?
- Restless or fidgety?
- Hopeless?
- Worthless?
- That everything was an effort?

Valid responses were: All the time; most of the time; some of the time; a little of the time; none of the time; don't know. Responses were coded from 0 to 4 according to the frequency of the psychological response in the last month and then summed. Values of this measure ranged from 0 to 24.

Depression survey questions from the National Population Health Survey (Statistics Canada, 1995).

Depression was assessed using the following questions:

- During the past 12 months, was there ever a time when you felt sad, blue, or depressed for 2 weeks or more in a row?
- During the past 12 months, was there ever a time lasting 2 weeks or more when you lost interest in most things like hobbies, work, or activities that usually give you pleasure?

Respondents that answered "yes" were then asked to clarify:

- the length of duration for each symptom (all day, most of the day, about half the day, less than half the day, don't know); and
- the frequency (every day, almost every day, less often, don't know).

If respondents reported experiencing either dimension at least most of the day, almost every day, they were prompted to answer "yes" or "no" to the following symptoms:

- Did you lose interest in most things?
- Did you feel low on energy all the time?
- Did you gain, lose weight or stay about the same? How much did you gain/loose80?
- Did you have more trouble falling asleep than you usually do? How often (every night, nearly every night, less often, don't know)81?
- Did you have more trouble concentrating than usual?
- At these times people sometimes feel down on themselves, no good, or worthless. Did you feel this way?
- Did you think a lot about death -either your own, someone else's, or death in general?

Respondent's score on this short-form of the index ranged from 0-1 (two decimals). The measure was included as a continuous predictor.

Sense of Mastery (Pearlin and Schooler, 1978) from the National Population Health Survey.
▪ You have little control over what happens to you.
▪ There is really no way you can solve some of the problems you have.
▪ There is little you can do to change many of the important things in your life.
▪ You often feel helpless in dealing with problems in life.
▪ Sometimes you feel that you are being pushed around in life.
▪ What happens in the future mostly depends on you.
▪ You can do just about anything you really set your mind to.
All questions are coded on a five-point Likert scale: 1 = strongly agree, 2 = agree, 3 = neither agree or disagree, 4 = disagree, 5 = strongly disagree

Abbreviated Job Content Questionnaire (JCQ) (Karasek and Theorell, 1990) from the National Population Health Survey.	
Dimensions	
Skill discretion	▪ Your job requires you to learn new things. ▪ Your job requires a high level of skill. ▪ Your job requires that you do things over and over.
Decision Authority	▪ Your job allows you freedom to decide how you do your job. ▪ You have a lot to say about what happens in your job.
Social Support	▪ You are exposed to hostility or conflict from the people you work with. ▪ The people you work with are helpful in getting the job done. ▪ Your supervisor is helpful in getting the job done.
Physical Demands	▪ Your job requires a lot of physical effort.
Job Security	▪ Your job security is good.
Job Satisfaction	▪ How satisfied are you with your job?
All questions, except job satisfaction, are coded on a five-point Likert scale: 1 = strongly agree, 2 = agree, 3 = neither agree or disagree, 4 = disagree, 5 = strongly disagree. Job satisfaction is coded on a four-point scale: 1 = very satisfied, 2 = somewhat satisfied, 3 = not too satisfied, and 4 = not at all satisfied).	