

AN ANALYSIS OF THE IMPACT OF RETIREMENT ON WELL-
BEING OF THE AGING POPULATION IN CANADA

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Abstract

This dissertation investigates the effects of retirement on various dimensions of well-being, including psychological, general, physical, and mental health, among Canada's aging population. The primary objective of the study is to explore how retirement influences life satisfaction (psychological well-being), general health, physical health, and mental well-being. The dissertation is divided into three main parts: the first examines life satisfaction using the 2008–2009 Canadian Community Health Survey – Healthy Aging (CCHS), a cross-sectional dataset; the second explores life satisfaction using the longitudinal Canadian Longitudinal Study on Aging (CLSA); and the third focuses on the effects of retirement on general, physical, and mental health using CLSA data. To address self-selection, reverse causality, and unobserved heterogeneity, the research employs econometric techniques, including instrumental variables, fixed effects models, difference-in-differences analysis, and fuzzy regression discontinuity design (FRDD). These methods provide reliable causal estimates while controlling for factors such as age, gender, marital status, education, income, and health status. The findings show that retirement has a positive and significant effect on life satisfaction, after controlling for a wide set of socioeconomic and demographic factors, with this effect remaining robust across both cross-sectional and longitudinal data. Retirement also improves general and mental health, likely due to reduced work-related stress and increased opportunities for social engagement. However, physical activity levels decline after retirement, reflecting reduced occupational movement. These health effects vary by retirement type, voluntariness, and sociodemographic factors, with complete and voluntary retirement offering the most substantial benefits. General health improves in the short term, while mental health gains become more pronounced over time. Additional analysis highlights that men experience greater improvements in mental health, while women report better general health. Higher education levels amplify the positive effects of retirement across all health outcomes, including physical activity. Social support and engagement consistently enhance well-being, while household and regional factors play a minimal role. These findings carry important policy implications, highlighting the need for flexible retirement options and programs that promote physical activity and social engagement. As Canada's population ages, these insights can inform policies that foster healthy aging and improve retirees' overall quality of life.

Dedication

This dissertation is dedicated to my beloved parents, whose unwavering love, encouragement, and sacrifices have been the foundation of all my achievements; to my dear grandma, whose wisdom and warmth have always guided me; to my siblings, for their constant support and the joy they bring into my life; to my aunts and uncles, whose kindness and support have been a source of strength; to my late grandpa, whose memory continues to inspire me every day. His deep love for education and relentless pursuit of knowledge instilled in me a passion for learning and a belief in the power of knowledge to transform lives. To my cousin Osama, who was tragically taken from us, and whose spirit remains a source of resilience and courage; to my friends, who have stood by me with unwavering support and laughter through the ups and downs; and to my supervisors, whose invaluable guidance and mentorship have made this work possible.

I also dedicate this work to the people of Palestine, especially those in Gaza, whose strength, resilience, and unwavering hope in the face of unimaginable hardship continue to inspire the world. Your struggle for justice and freedom echoes deeply in my heart. May this work, in some small way, honor your enduring struggle for justice, dignity, and peace.

With deep gratitude and love, I dedicate this work to you all.

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Chapter 1: Introduction

Canada is undergoing a major demographic transition characterized by a sizeable increase in the share of its older population. The number of seniors—those aged 60 and over—has now surpassed the younger population and by 2050, nearly one in three Canadians will be 60 years old or older. This reflects a significant shift in the population's age structure that underscores a profound change in global population trends, driven by advancements in healthcare that have allowed people to live longer and healthier lives. As illustrated in [Table 1.1](#), the [United Nations \(2015\)](#) reported that 22.3% of Canadians were aged 60 or older in 2015. By 2030, this percentage is expected to rise to 29.4%, and by 2050, it could reach 32.4%.

Table 1.1: Percentage of Population Aged 60 and Over: Trends and Future Projections

	2015	2030	2050
Canada	22.3	29.4	32.4
USA	20.7	26.1	27.9
Europe	23.9	29.6	34.2
Northern Europe	23.4	28.0	30.7
Western Europe	26.0	32.7	35.2
Australia	20.4	24.6	28.3
High-Income Countries	22.1	27.7	31.9
World	12.3	16.5	21.5

Source: [United Nations \(2015\)](#)

This trend is not unique to Canada; similar patterns are emerging in other high-income nations. More broadly, recent data from the [United Nations \(2020\)](#) reveals that the global older population is growing at an unprecedented rate. Over the next three decades, the number of older people worldwide is projected to more than double, from 727 million in 2020 to over 1.5 billion by 2050. The share of the global population aged 65 years and over is expected to increase from 9.3% in 2020 to 16.0% by mid-century. According to the [United Nations \(2015\)](#), about 20.7% of the population in the United States was 60 or older in 2015, with projections indicating this figure could hit 27.9% by 2050. Europe is on a similar trajectory, with 23.9% of its population over 60 in 2015, expected to increase to 34.2% by 2050. This demographic transition, also termed as 'longevity revolution' by the [United Nations \(2015\)](#), has important fiscal, social, and welfare implications that include higher health care costs, unsustainable pension commitments, a smaller pool of working-age people, and demand shifts arising out of age-dependent preferences.

These implications cannot be ignored. Financially, governments will face increased healthcare costs and potentially unsustainable pension systems. Moreover, a shrinking workforce could slow economic growth. The shifts in consumer demand however—driven by the preferences of older

adults—might open new markets and opportunities for businesses. As Canada’s population continues to age, understanding the implications of these demographic shifts is crucial, particularly when considering the substantial life transition that is retirement.

Retirement marks a pivotal transition in the lives of the older population, often bringing a decrease in income while also providing relief from work-related stress and more time for leisure and social engagement. This transition has the potential to significantly affect physical and mental well-being. For many, retirement offers a chance to slow down and enjoy life after years of hard work, yet it can also present challenges, particularly for those who derive deep satisfaction and purpose from their work. The experience of retirement is not uniform; while some individuals thrive in their newfound freedom, others may encounter difficulties, including feelings of loss or a decline in health. Empirical evidence on the causal impact of retirement on well-being is essential for developing policies that address both the fiscal and welfare consequences of retirement. If findings suggest that retirement enhances well-being, this could justify adjustments in income support programs to promote earlier retirement. Conversely, if retirement is found to negatively impact well-being, there would be a strong case for policies that incentivize continued workforce participation beyond the traditional retirement age.

Given the importance of this transition, it is crucial to understand how retirement affects the health and well-being of older Canadians. This dissertation will explore these effects in detail, focusing on how retirement influences various dimensions of well-being. The research conducted is essential for informing Canadian policy, particularly in the design and reform of retirement-related programs. If retirement is found to improve well-being, policies might be adjusted to encourage earlier retirement. Conversely, if negative impacts are identified, a case may be built to support older individuals in continuing to work longer.

Objectives of the Study

This dissertation aims to provide a comprehensive examination of the effects of retirement on life satisfaction, physical health, and mental health, with a focus on Canada. Despite the growing interest in the impact of retirement on well-being, few studies have specifically addressed this issue within Canada. This gap in the literature is particularly evident when considering the endogeneity of the retirement decision to life satisfaction and health, which has been underexplored in Canadian studies. To address this, my study uses two primary datasets: the Canadian Community Health Survey (CCHS)

- Healthy Aging, which provides cross-sectional data, and the Canadian Longitudinal Study on Aging (CLSA), which offers a rich, longitudinal framework.

The CLSA data is unique in the sense that it helps me to address this issue in ways not possible by earlier studies. The data set contains a range of well-being and retirement indicators including a comprehensive list of reasons for retirement. This provides me with a unique opportunity to stratify my sample according to individuals who retired due to poor physical and mental well-being and those who did not. By excluding individuals who retired due to poor mental and physical well-being, I am able to reduce or eliminate the potential bias due to self-selection and endogeneity.

CLSA also contains data on several socioeconomic indicators that can help me to include an exhaustive set of controls to identify the causal relationship between retirement and well-being. In addition, it contains data on social engagement measures (such as social participation and social networks). Furthermore, the data set allows me to investigate the differential impact of retirement on well-being by gender, the education level of the retirees, type of employment, and the type of retirement itself (complete versus partial). The longitudinal characteristic of the CLSA data is also useful since it allows me to study the transition in well-being over time with and without retirement and helps me to control for unobserved individual level characteristics that might be related to both well-being and retirement. By utilizing advanced econometric techniques: such as fixed effects, instrumental variable approaches, difference-in-differences, and regression discontinuity design, I aim to provide more reliable estimates of the causal impacts of retirement on well-being. These methodologies enable more accurate assessments by addressing potential confounders like pre-existing health conditions or socio-economic status.

My study also explores the impact of different retirement experiences, such as voluntary vs. involuntary retirement, partial vs. complete retirement, and the motivations driving these decisions (e.g., health reasons, financial considerations), as these factors can significantly influence retirees' well-being outcomes. This distinction is crucial as it may significantly influence the well-being outcomes of retirees. Moreover, the study will examine how different motivations for retirement contribute to these outcomes. Understanding these factors is essential for developing policies that cater to the varied experiences of retirees.

In summary, this research fills critical gaps in the literature by providing unique insights into how retirement affects well-being in Canada. The findings reveal that voluntary retirement significantly enhances well-being, particularly life satisfaction, general health, and mental health, whereas involuntary retirement shows no significant effects. Additionally, complete retirement yields more

significant improvements in well-being compared to partial retirement, and retirees who transition directly into retirement experience better outcomes. These findings contribute significantly to public policy by providing evidence that can help guide the design of retirement-related programs to improve the quality of life for older adults. The research also lays the groundwork for future research, contributing to the development of policies tailored to the Canadian context.

Research Methodology and Sources of Data

Investigating the causal effects of retirement on physical and mental well-being presents certain challenges, particularly due to self-selection issues. Retirement may influence well-being, but well-being may also impact the decision to retire, as individuals may choose to retire due to poor mental and physical health (e.g., [Au et al., 2005](#); [Bélanger et al., 2016](#); [Chen, 2019](#); [Jones et al., 2010](#); [Park, 2010](#); [Uppal, 2010](#)). Previous studies have produced mixed results, with some finding positive effects of retirement on well-being, while others report negative or insignificant effects ([Charles, 2004](#); [Latif, 2012](#); [Belloni et al., 2016](#); [Bonsang and Klein, 2012](#)). These discrepancies may be due to variations in research methodologies, the specific contexts or countries studied, as well as differences in population demographics and the timing of data collection.

This dissertation uses two primary sources of data to address these challenges and provide a more nuanced understanding of retirement's impact on well-being: the Canadian Community Health Survey (CCHS) – Healthy Aging and the Canadian Longitudinal Study on Aging (CLSA). The CCHS collected by [Statistics Canada, \(2010\)](#) provides a cross-sectional snapshot of health and social factors at a specific point in time, while the [CLSA \(2015\)](#) is a longitudinal dataset that follows the same individuals over several years, providing a deeper understanding of changes over time. The richness of these datasets allows for detailed analyses of various socio-economic, demographic, and health factors, making them ideal for studying the causal relationship between retirement and well-being in the Canadian context.

To address these challenges, this dissertation employs various econometric techniques, including instrumental variable methods, which help to isolate the causal impact of retirement by using external instruments that are related to retirement but not directly to well-being. Additionally, I use difference-in-difference analysis and regression discontinuity designs. These methods will help ensure that the findings reflect the true causal relationship between retirement and well-being, contributing significantly to the existing literature.

Policy Implications and Future Directions for Research

The findings from this research will provide evidence-based insights that could significantly shape public policy in Canada, particularly in areas such as healthcare, pension systems, and workforce participation among older adults. By identifying the factors that contribute to a successful transition into retirement, policymakers can design initiatives to enhance the quality of life for older adults and address the challenges associated with an aging population. For instance, if early retirement is found to positively impact well-being, policies could be adjusted to offer more flexible retirement options or enhanced financial support for those who choose to retire earlier. Conversely, if retirement has adverse effects on health, this may prompt the development of policies aimed at promoting gradual or partial retirement, allowing older adults to stay engaged in the workforce while easing into retirement. The findings will also be relevant for individual who are planning to retire.

Beyond policy implications, this dissertation opens several avenues for future research. The study's focus on Canada provides a foundation for comparative studies in other countries, particularly those with different social welfare systems and cultural attitudes toward aging and retirement. Additionally, the longitudinal approach used in this research can be applied to other datasets and populations, allowing researchers to explore the long-term effects of retirement across diverse demographic groups.

Future research could further explore the nuances of retirement experiences, including the roles of social networks, community engagement, and healthcare access in shaping retirement outcomes. More specifically, future studies could examine the channels through which retirement affects physical and mental well-being. Moreover, this dissertation highlights the importance of considering voluntary versus involuntary retirement, suggesting that further exploration into the causes and consequences of involuntary retirement could provide valuable insights for both policymakers and individuals. As the population continues to age, emerging trends—such as the increasing prevalence of older adults who continue to work part-time or engage in gig economy jobs—should be examined. These trends could influence retirement experiences in ways not fully captured by traditional employment-retirement models.

Structure of the Dissertation

This dissertation consists of three main chapters, each addressing different aspects of how retirement impacts life satisfaction, physical health, and mental health among older Canadians. Chapter 2 sets the foundation by examining life satisfaction, which is then expanded in Chapter 3 to include long-term impacts using a different data set and a different econometric approach, followed by Chapter 4's focus on health outcomes.

Chapter 2 sets the foundation by examining life satisfaction, building on a published article co-authored with my co-supervisors, Ida Ferrara and Sadia M. Malik. The analysis employs data from the Canadian Community Health Survey—Healthy Aging (CCHS), collected by [Statistics Canada, \(2010\)](#), to examine the effect of retirement on life satisfaction, using a two-stage least squares approach. The CCHS dataset, collected by Statistics Canada in 2008–2009, includes information on general health, social engagement, physical activity, work, and retirement status, making it a valuable resource for this study. This chapter controls for factors such as age, gender, race, immigrant status, marital status, education level, household income, and province. The findings indicate that retirement positively and significantly impacts life satisfaction for older Canadians, with variations based on gender and other socio-demographic factors.

Chapters 3 and 4 utilize data from the Canadian Longitudinal Study on Aging ([CLSA, 2015](#)), a comprehensive longitudinal dataset that follows more than 51,000 Canadians aged 45–85 at baseline over at least 20 years or until death. The CLSA dataset is particularly suited for this research, as it contains a wealth of data focusing on older adults for a detailed examination of the long-term effects of retirement on life satisfaction, physical health, and mental health. The CLSA data is unique in the sense that it helps me to address this issue in ways not possible by earlier studies. The data set contains a range of well-being and retirement indicators including a comprehensive list of reasons for retirement. This provides me with a unique opportunity to stratify my sample according to individuals who retired due to poor physical and mental well-being and those who did not. By excluding individuals who retired due to poor mental and physical well-being, I intend to reduce or eliminate potential bias arising from self-selection and endogeneity.

Chapter 3 builds on the findings of Chapter 2 by adopting a longitudinal perspective to overcome the limitations of the cross-sectional analysis presented in the previous chapter. This chapter will employ fixed-effect models, random-effect models, fixed-effect instrumental variable models, and difference-in-difference models to explore the differences between partial and complete retirement, as well as

voluntary and involuntary retirement. Additionally, it will examine transitions from partial to complete retirement and from no retirement to complete retirement. The analysis will reveal that both partial and complete retirement can improve life satisfaction, though the effects vary based on whether retirement is voluntary or involuntary. Voluntary retirement tends to significantly boost life satisfaction, as individuals are more likely to feel in control of their transition and engage in activities they find fulfilling. In contrast, involuntary retirement, often prompted by factors such as health issues or job loss, may have a neutral or even negative impact on life satisfaction, as these retirees may struggle with the abrupt loss of their work identity and financial stability.

Chapter 4 shifts focus from life satisfaction to the broader effects of retirement on general health, physical and mental health. This analysis applies several robust econometric techniques to address endogeneity, measurement error, and reverse causality, including linear fixed effects models, fixed effects ordered logistic regression for ordinal health outcomes, and Generalized Estimating Equations (GEE) for continuous and skewed outcomes. Additionally, a fuzzy regression discontinuity design (FRDD) is employed to capture local treatment effects around retirement age thresholds. The findings indicate that retirement generally enhances general and mental health while reducing physical activity levels. The decision to retire itself plays the most significant role in health outcomes, with no additional benefits observed from transitioning from partial to complete retirement. Voluntary retirement leads to notable health improvements, while involuntary retirement has no significant impact on general or mental health. The analysis also reveals that retirement's influence on health evolves over time—general health benefits emerge in the short run, whereas mental health improvements become more pronounced in the long run. Age introduces further complexity, with initial improvements in health that diminish over time. Additionally, the findings highlight that widowed individuals experience the most adverse health effects, while social support consistently enhances well-being across various dimensions. Although household and regional factors exert minimal influence, social engagement contributes positively to general and functional health, yet it has no significant effect on mental health or physical activity levels.

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Chapter 2: The Effect of Retirement on Life Satisfaction in Canada: Evidence from the Canadian Community Health Survey on Healthy Aging¹

2.1 Introduction

Building on the demographic trends and policy considerations discussed in Chapter 1, this chapter delves into the relationship between retirement and life satisfaction, drawing on cross-sectional data from the Canadian Community Health Survey (CCHS). This analysis examines how retirement influences life satisfaction among older Canadians, offering valuable insights into this crucial aspect of well-being. However, given the limitations of cross-sectional data, which restrict my ability to assess long-term effects, this chapter lays the groundwork for future analyses in Chapter 3, where I will expand upon these findings using longitudinal data.

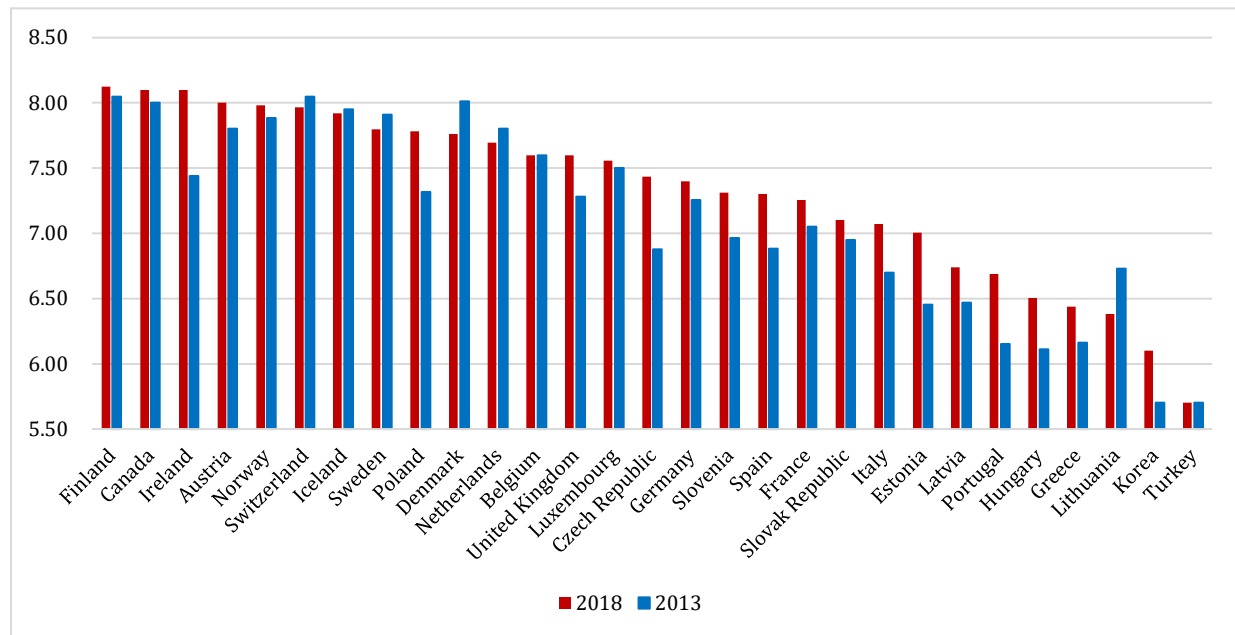
Life satisfaction, a key measure of subjective well-being, offers a comprehensive evaluation of an individual's overall life rather than just specific aspects such as income or health. As societies worldwide continue to age, understanding the determinants of life satisfaction becomes increasingly important, especially in the context of retirement, which represents a significant life transition that often brings substantial changes to daily experiences and outlook on life. Over time, life satisfaction has gained prominence not only as an individual metric but also as a critical policy target. It is increasingly adopted to complement more objective data on quality of life, helping to gauge progress in human well-being. The significance of this measure is evident in its growing prominence within national statistics and policy discussions across many countries (OECD, 2021). Economists' interest in this measure has also grown over time due to an increased awareness of the impact of non-traded goods (such as social interaction with friends and participation in clubs, religious bodies, political parties, unions, and civic and cultural organizations) on social welfare.

In global comparisons, Canada consistently ranks high in life satisfaction, as illustrated in [Figure 2.1](#). According to OECD data, Canada had the second-highest life satisfaction score in 2018 (8.10), just behind Finland, and it ranked fourth in 2013 (8.00), following Switzerland, Finland, and Denmark

¹ This chapter is largely based on a published article co-authored with my co-supervisors, Ida Ferrara and Sadia M. Malik, titled "The Effect of Retirement on Life Satisfaction in Canada: Evidence from the Canadian Community Health Survey on Healthy Aging, published in *Canadian Public Policy* (Adawi et al., 2023).

(OECD, 2022). The (survey) weight-adjusted scores come from the Gallup World Poll survey and are based on responses to a single question using an 11-point scale, known as the Cantril Ladder. This scale ranges from zero, representing the worst possible life, to ten, representing the best possible life. Canada’s strong performance in life satisfaction makes it an ideal setting for exploring how retirement affects this key aspect of well-being.

Figure 2.1: Life Satisfaction in Canada vis à vis OECD Countries



Source: OECD, 2022

However, while Canada’s high ranking in life satisfaction is positive and certainly noteworthy, the focus of this chapter is on life satisfaction within Canada and, most importantly, on how retirement causally impacts life satisfaction. Conceptually, retirement can influence life satisfaction in multiple ways. On one hand, the reduction in income that often accompanies retirement might lead to lower life satisfaction, as financial security is closely linked to overall well-being. Additionally, those who develop significant satisfaction from their work might experience a sense of loss or diminished purpose after retiring. On the other hand, retirement can also increase life satisfaction by freeing up time for leisure activities, enhancing social engagement, and reducing work-related stress, all of which can boost mental well-being and overall happiness. Ultimately, whether retirement has a positive or negative effect on life satisfaction is an empirical question that depends on which of these factors is more influential.

Research on the impact of retirement on well-being has produced mixed results. Some studies have found a positive effect on well-being (e.g., Belloni et al., 2016; Charles, 2004; Latif, 2012; Mein et al.,

2003; Olds et al., 2018), while others have reported negative effects (e.g., Bonsang et al., 2012; Dave et al., 2008; Nikolova and Graham, 2014; Szinovacz and Davey, 2004) and some studies have found no significant effect at all (e.g., Abolhassani and Alessie, 2013; Bonsang and Klein, 2012; Coe and Zamarro, 2011; Fonseca et al., 2017; Kesavayuth et al., 2016). These varying results likely reflect the complex and context-dependent nature of retirement's impact on life satisfaction, with differences in labour markets, health insurance, and social policies across countries playing a significant role. Therefore, drawing conclusions for Canada based on studies from other countries could be misleading.

In examining the causal impact of retirement on life satisfaction, my study closely relates to previous research that has employed cross-sectional data to investigate similar issues, particularly studies focusing on depression as a measure of well-being. For instance, Charles (2004) utilized U.S. data and capitalized on changes in laws affecting mandatory retirement and Social Security benefits to identify causal effects, while Coe and Zamarro (2011) employed cross-country variations in statutory retirement age as an identification strategy. These studies provide valuable insights into the methodological approaches that can be used to address endogeneity concerns, offering a precedent for my use of pension eligibility thresholds as an instrument in the Canadian context.

Moreover, identifying the causal effect of retirement on life satisfaction is challenging due to potential endogeneity issues. Retirement is often a voluntary decision, particularly in Canada, where there is no mandatory retirement age. Individuals might retire due to health problems that negatively impact life satisfaction, or they may choose to retire because they are already content with their life outside of work. In either case, retirement decisions are likely influenced by life satisfaction, making retirement endogenous to life satisfaction. Additionally, unobserved factors, such as personality traits, might simultaneously affect both retirement decisions and life satisfaction.

To tackle these endogeneity issues and accurately identify the effect of retirement on life satisfaction, I employ the instrumental variable approach, a method commonly used in the literature when dealing with endogenous explanatory variables. Specifically, I use the eligible age for accessing retirement benefits as an exogenous instrument for retirement. Instrumental variable regression, with pension eligibility thresholds as instruments, is a well-established method in empirical analyses of the effects of retirement on health and well-being.² While many studies rely on longitudinal data

² Other common techniques to address endogeneity (e.g., fixed effects, difference in differences) require panel data, and my dataset is cross-sectional. As a seeming alternative to the IV estimation, some studies (e.g., Eibich 2015; Johnston and Lee 2009; Rose 2020) use a fuzzy regression discontinuity (RD) design and implement a two-stage least squares (2SLS) strategy to derive RD estimates, so that, in practice, RD designs are not different from IV settings; in fact, the fuzzy RD design can be conceptualized as a local IV model, that is, an IV regression with weights that decline as observations move away from

(e.g., Belloni et al., 2016; Bonsang et al., 2012; Kesavayuth et al., 2016; Latif, 2011; Mazzonna and Peracchi, 2012), my study uses cross-sectional data, focusing on subjective measures of life satisfaction, similar to the approach taken by Charles (2004) and Coe and Zamarro (2011).

My findings suggest that retirement has a positive and significant impact on the life satisfaction of older Canadians. This effect remains robust even after accounting for various socio-demographic factors such as age, gender, marital status, education, household income, race, immigrant status, and provincial fixed effects. This study contributes to the limited body of research on the relationship between retirement and life satisfaction in Canada and is the first to explore this issue using data from the Canadian Community Health Survey (CCHS) – Healthy Aging. To my knowledge, only two large-scale longitudinal studies have previously addressed the endogeneity problem in examining the effects of retirement within the Canadian context: one focused on self-reported health (Latif, 2012) and the other on happiness or psychological well-being (Latif, 2011).³ Both studies relied on subjective measures of retirement.⁴ Therefore, no Canadian study to date has specifically investigated the impact of retirement on life satisfaction. Additionally, given the potential challenges with external validity and the conceptual ambiguity surrounding the direction of impact, it is not safe to assume that findings from other countries would necessarily apply to Canada. This makes a Canadian-focused study on life satisfaction both valuable and necessary. Furthermore, the CCHS – Healthy Aging dataset allows me to offer additional contributions by controlling for a broader range of economic and socio-demographic factors that may influence life satisfaction.

The richness of the CCHS – Healthy Aging data allows me to account for a variety of economic and socio-demographic factors, such as ethnic origin and race, which are often absent in previous studies but may significantly influence life satisfaction. I also test the robustness of my results by controlling for additional factors, such as household size, emotional well-being, and community engagement. To further validate the robustness of my findings, I use two measures of retirement: (i) subjective retirement, based on respondents' perceptions of whether they consider themselves retired; and (ii) objective retirement, defined according to Statistics Canada's standard definition.

pension eligibility cut-offs (see, e.g., Wooldridge 2010, pp. 957–959). Nonetheless, on the basis of its adoption to date, IV has a broader appeal to address endogeneity more generally, regardless of its source (omitted variables, simultaneity, selection of treatment, and measurement errors), whereas RD targets endogeneity from selection of treatment (see Hill et al. 2021).

³ The measure of psychological well-being is based on ordered responses about the extent of happiness, ranging from so *unhappy in life* (1) to *happy in life* (5).

⁴ The other two studies (Gall et al., 1997; Thériault, 1994) rely on very small samples (39 and 117) and do not account for the likely endogeneity of retirement.

The remainder of this chapter is structured as follows: Section 2.2 reviews the relevant literature, focusing on studies that have explored the relationship between retirement and life satisfaction. Section 2.3 describes the CCHS dataset and presents descriptive statistics that set the stage for the empirical analysis. Section 2.4 outlines the empirical strategy, including the specification of the instrumental variable model and the rationale for using eligibility age as an instrument. Section 2.5 presents the results of the analysis. Section 2.6 discusses the robustness checks conducted to validate the findings. Finally, Section 2.7 offers concluding remarks, discussing the implications of the findings for Canadian public policy and suggesting directions for future research.

2.2 Literature Review

Several studies have investigated the effect of retirement on various measures of subjective well-being, including physical health, mental health, psychological well-being, life satisfaction, and happiness. Since my study focuses on life satisfaction, I primarily review studies that use life satisfaction as an indicator of subjective well-being while also mentioning studies on mental health, psychological well-being, and happiness, which are closely related aspects. A comprehensive review of this literature suggests that there is no conclusive evidence on the relationship between retirement and subjective well-being. The findings cover the full range of possibilities—positive, negative, or negligible effects.

Among the studies reporting a positive effect, evidence comes from several parts of the world. In the U.K., for example, [Mein et al. \(2003\)](#) and [Fleischmann et al. \(2020\)](#) conducted longitudinal analyses of civil servants. They found a positive association between retirement and mental health improvement, especially among higher socio-economic groups and individuals retiring from jobs with higher psychosocial demands, lower decision authority, or lower work social support. [Johnston and Lee \(2009\)](#), using data from the Health Survey for England (HSE), added to this by finding a positive effect on one's sense of well-being along with improved mental health. [Rose \(2020\)](#) discovered that retirement raises life satisfaction and reduces depression in men, particularly after accounting for the time lag between retirement and the survey.

Beyond the U.K., other European studies provide similar insights. [Eibich \(2015\)](#), using data from the German Socio-Economic Panel Study (SOEP), supports the idea that retirement improves mental health. [Belloni et al. \(2016\)](#), using longitudinal data from the Survey on Health, Aging and Retirement in Europe (SHARE), found a positive effect of retirement on mental health during economic crises, particularly among blue-collar men working in the most severely affected areas.

In Australia, [Olds et al. \(2018\)](#) and [Tran and Zikos \(2019\)](#) confirm the positive impact of retirement on mental health. Olds et al. measured this in terms of depression, anxiety, and stress, while Tran and Zikos focused on general mental health. In the U.S., [Charles \(2004\)](#) and [Gorry et al. \(2018\)](#) used data from the Health and Retirement Study (HRS) to explore the effects of retirement on subjective well-being. Charles focused on depression and feelings of loneliness, while Gorry et al. examined mental health and life satisfaction, with both studies consistently suggesting that retirement improves subjective well-being. In Canada, [Latif \(2011\)](#) used longitudinal data from the 1994-2006 Canadian National Population Health Survey and found that retirement positively affects happiness as a measure of psychological well-being.

Evidence supporting a negative relationship between subjective well-being and retirement also comes from various countries. In the U.S., for example, [Dave et al. \(2008\)](#) used HRS data and found that retirement increases depression. Similarly, [Bonsang et al. \(2012\)](#) observed a worsening of cognitive functions after retirement. Although this decline is not immediate, it begins at the start of retirement. In Europe, [Mazzonna and Peracchi \(2012\)](#) examined the effect of retirement on cognitive functions using SHARE data. They concluded that people, regardless of gender, those who retire early (between 60 and 65 years of age) tend to have significantly lower cognitive test scores in the long run. Combining data from several European countries and the U.S. from the Gallup World Poll, [Nikolova and Graham \(2014\)](#) found that retirees had lower subjective well-being than late-life workers engaged in voluntary part-time or full-time work.

In addition to studies reporting positive or negative effects, some research finds no statistically significant effect of retirement on subjective well-being. Most of these studies are based on European data. For instance, [Bonsang and Klein \(2012\)](#) and [Abolhassani and Alessie \(2013\)](#) used the German Socio-Economic Panel (GSOEP) data and focused on life satisfaction. [Kesavayuth et al. \(2016\)](#) also considered the impact of retirement on life satisfaction, using data from the British Household Panel Survey. [Fonseca et al. \(2014\)](#) utilized three waves of SHARE data to investigate the effect of retirement on depression. Looking at both life satisfaction and depression, [Fonseca et al. \(2017\)](#) combined U.S. HRS data and SHARE data over the period from 1992 to 2012.

The differences in findings may be attributed to several factors, including differences in datasets, definitions of life satisfaction and retirement, and identification strategies. An important explanation could be the variations in socio-economic demographics and country-specific characteristics, such as cultural and institutional setups that govern social security incentives, as well as general welfare and

retirement policies. For example, [Cho and Lee \(2014\)](#) found that complete retirement led to higher life satisfaction in Korea but lower life satisfaction in Germany and Switzerland.

Some studies find that the effect of retirement on psychological well-being and life satisfaction are heterogeneous to factors such as education, gender, marital status, retirement duration, and whether retirement is voluntary. [Wetzel et al. \(2016\)](#) reported that the long-term effect of retirement on life satisfaction depends on retirees' educational status. More educated individuals can sustain their life satisfaction after retirement in the long run, while less educated individuals experience a progressive decline in life satisfaction. In the Netherlands, [Picchio and Ours \(2020\)](#) explored whether the mental health effects of retirement vary by gender and marital status. They concluded that retirement has no effect on single individuals or partnered women but improves the mental health of partnered men. [Zhu and He \(2015\)](#), analyzing Australian women, discovered that retirement leads to an immediate increase in life satisfaction, followed by a decrease as the duration of retirement lengthens. Similarly, [Kim and Moen \(2002\)](#) identified differences between the short- and long-term effects of retirement for male retirees in the U.S. They found that retirement boosts morale in the first two years, but prolonged retirement correlates with greater depressive symptoms. [Horner \(2014\)](#), examining data from 16 countries in Western Europe and the U.S., found that while the short-term effect of retirement on subjective well-being is positive and significant, it diminishes over a few years.

Mandatory retirement also has varying effects. Using GSOEP data, [Bonsang and Klein \(2012\)](#) found that while the overall effect of retirement on life satisfaction is inconclusive, involuntary retirement negatively impacts well-being. [Hershey and Henkens \(2014\)](#) confirmed these findings in the Netherlands, comparing the effects of voluntary and involuntary retirement on perceived well-being. The study found that voluntary retirement leads to improved well-being, whereas involuntary retirement worsens it. Similarly, [Szinovacz and Davey \(2004\)](#), using four waves of U.S. HRS data, discovered that depressive symptoms among older adults increase if retirement is abrupt and perceived as too early or imposed.

Building on the diverse findings from existing literature, my study contributes to understanding retirement's effect on subjective well-being in several ways. First, I exploit a rich dataset that differs from those used in existing studies, providing additional evidence on how retirement affects life satisfaction. Second, I employ a more comprehensive set of control variables, including race and immigrant status. Third, I focus on Canada and provide evidence relevant to the Canadian context, which is important since findings from other countries may not be generalizable. As noted earlier, the only other large-scale Canadian study ([Latif, 2011](#)) relied on a single-question measure of

happiness and subjective retirement. Fourth, I adopt a broader and widely used measure of subjective well-being, which relates to, but is distinct from, happiness (e.g., [Deaton, 2008](#)). Lastly, I verify the robustness of my results by using two different measures of retirement (objective and subjective), including a variety of other relevant controls such as emotional state and community engagement. I also address the endogeneity problem by removing respondents who report choosing retirement for health-related reasons or job elimination due to organizational restructuring.

2.3 Description of Data and Variables

The dataset I use in this study consists of cross-sectional data from the 2008-2009 Canadian Community Health Survey (CCHS) on Healthy Aging collected by [Statistics Canada](#). This comprehensive dataset includes information from 30,865 individuals aged 45 and older across the ten Canadian provinces. It covers 37 modules, in addition to entry and exit modules, and provides details on individual and household income levels as well as a wide range of socio-demographic variables such as immigrant status, country of birth, ethnic origin, and language. Other modules address general health and well-being, factors contributing to healthy aging, use of health care services, social engagement, and work and retirement transitions.

2.3.1 Outcome Variables

My primary focus in this study is life satisfaction that is measured using the Life Satisfaction Score (LSS). This score is derived from respondents' answers to five statements related to different dimensions of life satisfaction, included in the survey:

1. "In most ways, my life is close to my ideal."
2. "The conditions of my life are excellent."
3. "I am satisfied with my life."
4. "So far, I have gotten the important things in my life."
5. "If I could live over, I would change almost nothing."⁵

Survey respondents consider these statements after providing general information about their age and physical health but before answering questions about their mental health, use of health care

⁵ The CCHS Life Satisfaction Score, which is a derived variable Statistics Canada provides, is a more comprehensive measure of life satisfaction in comparison to the Gallup World Poll (GWP) measure; nonetheless, in both instances, the mean score in Canada is high, although, relative to the best possible scenario, Canada's CCHS mean score (27/35) is lower than the GWP mean score (8.1/10). The implication of this difference is that a more nuanced measure of life satisfaction, one that considers different aspects of life, may provide a less optimistic view.

services, lifestyle, and labour force participation. Respondents rate each statement on a scale from 1 to 7, where 1 indicates strong disagreement, 4 indicates indifference, and 7 indicates strong agreement.⁶ The LSS is the sum of the ratings across the five statements,⁷ which means that the minimum score is 5 and the maximum score is 35. A higher score indicates greater satisfaction with life. Because the LSS is a widely used measure of well-being and is already included as a derived variable in the dataset, I did not attempt to generate my own life satisfaction score via factor analysis. However, to validate the LSS, I summarize statistics on its components in [Table A.2.1](#) and provide correlation coefficients between the LSS and its components in

[Table A.2.2](#) As these tables show, all five components are positively correlated, with coefficients exceeding 0.7, indicating a strong positive linear relationship. The coefficients range from 0.75 to 0.84, supporting the use of the arithmetic average to derive the score.

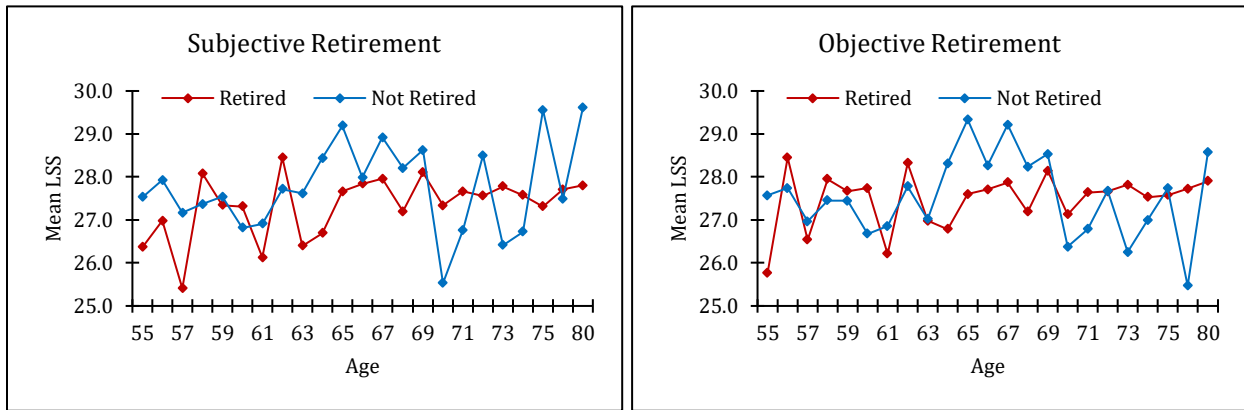
When examining the data, I find that the average LSS is 27.08 ([Table A.2.3](#)). According to [Pavot and Diener \(2013\)](#), this suggests that individuals in Canada are generally satisfied with their lives but may see opportunities for growth in at least one area. When I separate retired and non-retired respondents and condition the mean scores on age,⁸ I find that the average LSS tends to increase with age for both groups under subjective retirement and for the retired group under objective retirement, which may indicate an age effect on life satisfaction that is independent of retirement ([Figure 2.2](#)). Furthermore, regardless of how retirement is measured, there appears to be some age dependency in how life satisfaction compares between retired and non-retired individuals, with the caveat that these figures only represent average scores.

⁶ For the remaining values, 2 = *disagreement* and 3 = *slight disagreement*, while 5 = *slight agreement* and 6 = *agreement*.

⁷ A description of the psychometric properties of the scale is available in [Pavot and Diener \(2013\)](#).

⁸ Because of internal guidelines for releasing results based on Canadian microdata at Statistics Canada Research Data Centres, the last two average scores in [Figure 2.2](#) correspond to the age categories 76–79 years and 80–85 years.

Figure 2.2: Retired Vs Not Retired: Life Satisfaction Score by Age



The LSS is a widely employed measure of subjective well-being, known for its good psychometric properties and high test-retest reliability (i.e., consistency in results when the same participants complete the scale more than once), according to [Diener et al. \(1985\)](#). Research shows that it is reliable compared to other measures of life satisfaction ([Pavot et al., 1991](#); [Pavot and Diener, 2008](#)) and measures of happiness ([Lyubomirsky and Lepper, 1999](#)). It also correlates well with the meaning-of-life measure ([Steger et al., 2006](#)) and the Adult Trait Hope Scale ([Bailey and Snyder, 2007](#)). The only acknowledged shortcoming relates to the last statement in the measure (i.e., “if I could live my life over, I would change almost nothing”) because it may encourage respondents to reflect on their desire for change rather than their present sense of life satisfaction ([Pavot and Diener, 1993](#)). However, the correlation coefficients in

[Table A.2.2](#) do not indicate inconsistencies across the five components that would warrant concern over this potential shortcoming.

2.3.2 Treatment Variables

My main explanatory variable of interest is retirement status, measured both subjectively and objectively. This dual approach allows me to test whether the estimated effect of retirement holds regardless of how it is defined and to demonstrate that stated preferences are a reasonable approximation of revealed preferences in large datasets. The subjective measure is based on respondents’ self-perception, asking whether they consider themselves completely retired, partially retired, or not retired. Partial retirement includes (i) returning to work after retirement and (ii) still working but less than before or part-time. Although I briefly explore how partial retirement impacts life satisfaction compared to full retirement, I primarily use a binary measure of subjective retirement, combining the categories of no retirement and partial retirement for consistency with

the objective retirement measure, which only accounts for complete retirement. The objective measure of retirement is based on the standard Canadian definition, where a person is considered retired if they (i) are aged 55 years or older, (ii) are not in the labour force, and (iii) receive 50% or more of their income from retirement-like sources. To ensure consistency between the subjective and objective measures, I limit my analysis to respondents aged 55 to 85 years and exclude observations with missing data on key control variables such as income. My final dataset consists of 13,919 observations.

2.3.3 Other Explanatory Variables

In addition to retirement status, which I treat as endogenous and instrument it with eligible age for accessing retirement benefits, I include several control variables to account for economic, social, demographic, and contextual factors. Socio-demographic controls include gender (male and female), marital status (married or common law, widow or widower, divorced or separated, and single), age, education (less than secondary school graduation, secondary school graduation, some post-secondary education, and post-secondary degree or diploma), immigrant status, and whether the respondent is White. Household-level controls include income, which captures the economic dimension, and household size, which reflects contextual information that may influence both economic and social outcomes; both controls are categorical with four equally sized intervals and a final category that includes households at or above \$80,000 in the case of income and with 5 or more members in the case of size.

Furthermore, I incorporate additional variables in my full-sample model, such as physical health, indicated by the number of chronic conditions a respondent experiences,⁹ which other studies find to correlate with life satisfaction (e.g., hypertension in [Mojon-Azzi and Sousa-Poza, 2011](#)), and provincial indicators (with Ontario as the reference province) to control for potential inter-provincial variation in well-being and life satisfaction.

For robustness checks, I add variables measuring social support and social participation engagement. For the former, I include (i) positive social interaction, which measures the availability of people with whom to positively interact, and (ii) affection, which measures the presence of expressions of love and affection. In both cases, the value corresponds to the sum of frequency ranks (ranging from 0 =

⁹ These chronic conditions include asthma, arthritis, osteoporosis, back problems, hypertension, migraine headaches, chronic bronchitis, emphysema, chronic obstructive pulmonary disorder, diabetes, angina, cardiovascular diseases, cancer, stomach or intestinal ulcers, stroke, urinary incontinence, bowel disorder, cataracts, glaucoma, thyroid condition, mood disorder, and other physical or mental conditions.

never to 4 = *always*) across four questions in one case and three questions in the other case (hence, the maximum values are 16 and 12).¹⁰ For social participation, I include (i) a sense of belonging to the community, ranging from very weak to very strong, and (ii) the frequency of participation in community-level activities, which spans from no participation to weekly participation. My final control, as part of my robustness checks, is the Physical Activity Scale for the Elderly (PASE), which records the sum of the amounts of time spent in each of the 12 activities over the preceding week multiplied by the corresponding activity weights.¹¹ In terms of interaction variables, I include age interacting with marriage (legal or common law) to assess whether the effect of having a companion on life satisfaction varies with age, and household size interacting with household income to evaluate whether the impact of household income differs depending on the size of the household.

A complete list of the variables used in my analysis is available in the Appendix. [Table A.2.3](#) provides weighted summary statistics, and [Table A.2.4](#) describes the variables. The dataset's weights applied consistently throughout the empirical analysis, adjusted for household and person-level non-response, ensuring that the sample is representative of the Canadian population. Each respondent's weight corresponds to the number of people they represent in the population.

In [Table A.2.5](#), also in the Appendix, I present means and proportions for a subset of variables, distinguishing between retired and non-retired respondents. While there are no significant differences between the two groups, a few observations are worth noting: (i) retired respondents are more likely to be female and widowed, while non-retired respondents are more likely to be married or in common-law relationships; (ii) retired respondents are more likely to have less than secondary education and less likely to have post-secondary education; (iii) retired respondents tend to have more chronic conditions and spend less time on physical activities.

2.4 The Empirical Strategy: Framework and Motivation

My initial empirical strategy is based on the assumption that an individual j 's life satisfaction can be expressed in a reduced form as

¹⁰ The social support variables are based on the Medical Outcomes Study (MOS) Social Support Survey, which provides indicators of four categories of social support, including emotional or informational support and tangible social support, in addition to the two categories considered in this paper ([Sherbourne and Stewart, 1991](#)).

¹¹ The 12 activities are as follows: walking outside; light, moderate, and strenuous sport or recreational activities; muscle strength and endurance exercises; light and heavy housework; home repairs; lawn work or yard care; outdoor gardening; caring for another person; and work for pay or as a volunteer. For more information about PASE and the weights assigned to the activities, see [Washburn et al. \(1993\)](#).

$$LS_j = \alpha + \beta R_j + \boldsymbol{\gamma}' \mathbf{X}_j + e_j, \quad (2.1)$$

where LS denotes life satisfaction, R is a dummy variable that is equal to 1 if the individual is completely retired and zero otherwise, \mathbf{X} is a vector of exogenous control variables (including age, gender, race, immigrant status, marital status, education, physical health status, household size, income, and provincial dummies), e represents the zero-mean error term, and the subscript j denotes the individual. In this equation, β represents the causal effect of retirement on life satisfaction, which I estimate using the standard ordinary least squares (OLS) estimation procedure.

However, in my observational dataset, retirement status is not randomly assigned. It may be related to the other covariates I measure and account for in (2.1) or to unobservable factors that influence life satisfaction. This non-random assignment implies that individuals who retire may differ significantly from those who do not in both observable and unobservable ways, potentially violating the assumption that treatment assignment is independent of outcomes (ignorability assumption).

Formally, retirement is a dichotomous age-dependent decision (hence, an endogenous choice) resulting from a comparison of the expected utility from retiring, EU^R , with the expected utility from staying in the labour force, EU^{NR} . The decision to retire can be expressed as

$$R_j = EU_j^R - EU_j^{NR} = \alpha_R + \boldsymbol{\delta}'_R \mathbf{W}_j + e_{Rj}, \quad (2.2)$$

where \mathbf{W} is the vector of the observed determinants of the difference in expected utilities, and e_R embeds the unobserved determinants of the difference in expected utilities, has zero (conditional) mean, and is uncorrelated with \mathbf{W} . Because people retire only if $R > 0$, the OLS estimation of β in (2.1) produces an unbiased and consistent estimate of the causal effect of retirement on life satisfaction if $cov(e, e_R) = 0$ and \mathbf{W} does not include LS . In other words, the unobserved factors affecting the decision to retire are unrelated to those affecting the level of life satisfaction (unmeasured confounding is absent and the ignorability assumption holds), and there is no simultaneity or reverse causality in the relationship between retirement and life satisfaction.

Now, it is quite likely for unmeasured factors such as personality traits and attitudes that influence the level of life satisfaction through e to affect how positively or negatively one experiences job-related situations (e.g., deadlines and conflicts, which may cause stress and anxiety, and contributions to society, which may generate a sense of accomplishment) that influence the retirement decision through e_R ; hence, the two error terms are likely to be correlated. In addition, it is quite possible for how happy or satisfied one is with life to impact the decision of whether to retire.

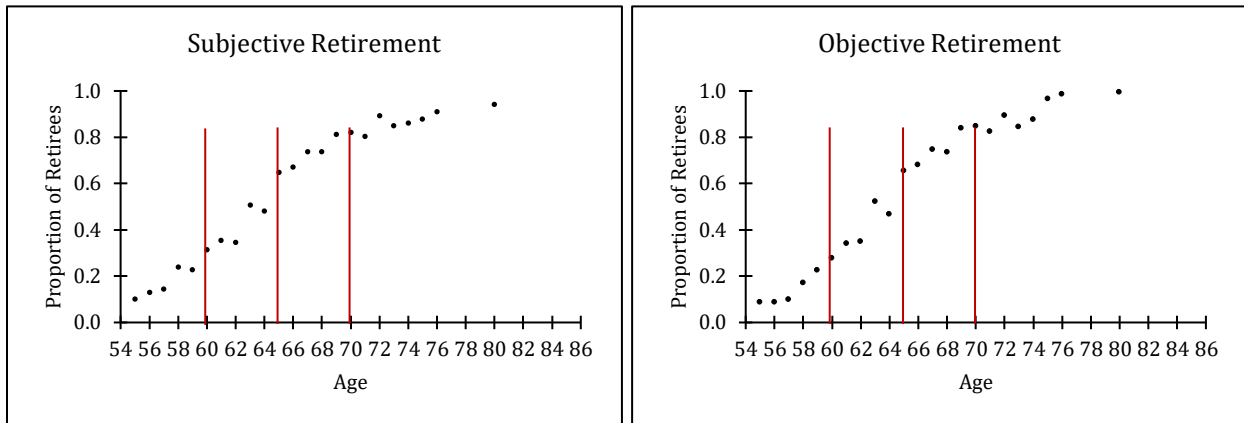
Although, the direction of influence is uncertain (both a high level of life satisfaction and a low level of life satisfaction may lead to the decision to retire); hence, simultaneity is likely to be present. As a result, $cov(e, e_R) \neq 0$, W includes LS , or both, resulting in $cov(e, R) \neq 0$; that is, I have endogeneity and cannot rely on the OLS procedure to produce an unbiased and consistent estimate of β .

To obtain an unbiased and consistent estimate of β , I need to isolate variation in retirement status that is independent of both e and e_R and thus exogenous. While the dataset includes reasons for retirement, allowing me to omit respondents who retire for health-related reasons or due to loss of employment from organizational restructuring, this only partially addresses endogeneity. It ignores that those choosing to retire may be very different people from those opting against retiring or that people may self-select into retirement because they enjoy a full and exciting life outside of work.

Consistent with related studies (e.g., [Latif, 2011](#); [Bonsang et al., 2012](#); [Mazzonna and Peracchi, 2012](#); [Belloni et al., 2016](#); [Kesavayuth et al., 2016](#)), I use age-specific retirement incentives, such as pension eligibility cut-offs, to isolate exogenous variation in retirement status. Specifically, I employ the instrumental variable (IV) approach, using the age of eligibility for accessing retirement benefits as an exogenous instrument.¹² In Canada, the eligible ages to receive the Old Age Security (OAS) and the Canada Pension Plan/Quebec Pension Plan (CPP/QPP) payments lie between 60 and 70 years. Specifically, OAS benefits are accessible at 65 years; CPP/QPP benefits, however, are accessible at 60 years, although there is a 0.6% reduction in payment per month (or by 7.2% per year) if someone retires at 60 years; retirement after the age of 65 years results, instead, in a 0.7% increase in payment per month (or by 8.4% per year). Because of the coupling of OAS and CPP/QPP benefits at age 65 years, I expect the indicator for being aged at least 65 years to be a main source of exogenous variation in retirement status, and this is consistent with the average age at which people tend to retire. In Canada, for example, the average age and median age at retirement in 2021 sit at 64.4 and 64.5 years, with the figures for men being slightly higher than the corresponding figures for women in both cases (64.9 vs. 63.8 years for average age and 64.8 vs. 64.0 years for median age; [Statistics Canada](#)).

¹² Other common techniques to address endogeneity (e.g., fixed effects, difference in differences) require panel data, and my dataset is cross-sectional. As a seeming alternative to the IV estimation, some studies (e.g., [Eibich, 2015](#); [Johnston and Lee, 2009](#); [Rose, 2020](#)) use a fuzzy regression discontinuity (RD) design and implement a two-stage least squares (2SLS) strategy to derive RD estimates, so that, in practice, RD designs are not different from IV settings; in fact, we can conceptualize the fuzzy RD design as a local IV model, that is, an IV regression with weights that decline as observations move away from pension eligibility cut-offs (see, e.g., :957–959). Nonetheless, on the basis of its adoption to date, IV has a broader appeal to address endogeneity more generally, regardless of its source (omitted variables, simultaneity, selection of treatment, and measurement errors), whereas RD targets endogeneity from selection of treatment (see [Hill et al., 2021](#)).

Figure 2.3: Proportion of Retirees by Age in Canada



As shown in [Figure 2.3](#), the proportion of retirees increases significantly between the ages of 60 and 65 (from 23% to 65% under the subjective retirement measure, and from 22% to 65% under the objective retirement measure), reaching 82% in one case and 85% in the other case at age 70 years; the greatest jump occurs around 65 years (between 63 and 65 years, to be precise), with the proportion increasing by 30 percentage points.¹³ The two figures suggest that the standard retirement age of 65 years is likely the most important threshold affecting retirement behaviour; indeed, the threshold at 65 years of age turns out to be the only statistically significant exogenous instrument for retirement, and I thus drop the other two cut-offs in the final empirical specifications. Additionally, the two figures suggest stark similarities between the two retirement measures, at least up to, and including, 74 years of age; by the age of 75 years, 96% of the population is retired under the objective measure, whereas 88% is retired under the subjective measure, but these differences turn out to be inconsequential for the qualitative effect of retirement on life satisfaction.

Although the discontinuous age cut-offs are likely to affect retirement, there is no reason to believe that they have any independent effect on life satisfaction. However, although most people retire within the eligible ages for accessing retirement benefits, there are likely to be some individuals whose retirement ensues from an employment shock or a health-related shock. To reduce the possibility of these shocks biasing my results, I create a sub-sample that excludes individuals who report having retired for health-related reasons or for job elimination due to organizational restructuring. I estimate my model with both the original sample and the sub-sample to verify the robustness of my results. My revised empirical strategy then consists of a two-equation, two-stage framework that includes the discrete choice of whether to retire (i.e., the IV) as a function of pension

¹³ As in [Figure 2.2](#), the last two proportions (at 76 and 80) pertain to age categories: 76 to 79 and 80 to 85 years of age (see footnote 6 for reasons).

age thresholds (i.e., the instruments that have no direct impact on life satisfaction), among other covariates, and life satisfaction as a function of the estimated probability of retiring and additional regressors mentioned earlier, that is,

$$R_j = \alpha_R + \boldsymbol{\beta}'_R \mathbf{Z}_j + \boldsymbol{\gamma}'_R \mathbf{X}_j + e_{Rj} \quad (2.3)$$

and

$$LS_j = \alpha + \beta \hat{R}_j + \boldsymbol{\gamma}' \mathbf{X}_j + e_j, \quad (2.4)$$

where \mathbf{Z}_j is the vector of the instruments in the retirement equation and \hat{R}_j is individual j 's predicted probability of retiring from the first-stage regression. I account for the full set of control variables as reflected in the vector \mathbf{X}_j in both stages (equations) to enhance the effectiveness of isolating the variation in R_j that generates solely through the instrument(s). The basic idea of the IV two-stage least squares (2SLS) set-up is to generate exogenous variation in an otherwise endogenous regressor in a first-stage regression and use this exogenous variation to estimate the causal effect of the regressor on the outcome variable of interest (second-stage regression).

For completeness, I report both the OLS results that assume $cov(R, e) = 0$ as the benchmark and the IV 2SLS results that account for $cov(R, e) \neq 0$ and help identify the causal effect of retirement on life satisfaction. For the causal effect to be accurate, several conditions must hold: (i) the instrument(s) must be exogenous, (ii) the instrument(s) must be highly correlated with the retirement decision (relevance assumption), (iii) the instrument(s) should have no direct impact on life satisfaction and be orthogonal to e (exogeneity assumption), and (iv) there are no individuals who would choose not to retire in the presence of retirement incentives but would retire in the counterfactual case that entails no retirement incentives (monotonicity assumption).

Although I cannot directly test for the absence of a direct impact of the instrument(s) on life satisfaction, it is reasonable to assume that there are no changes in life satisfaction that coincide with the pension eligibility cut-offs; furthermore, I cannot think of other changes that kick in at the eligibility cut-offs that might affect life satisfaction. In addition, because the literature has extensively relied on pension eligibility thresholds as instruments for retirement in related studies, including about the health and cognitive effects of retirement (e.g., [Bonsang et al., 2012](#); [Celidoni et al., 2017](#); [Coe and Zamarro, 2011](#); [Heller-Sahlgren, 2017](#); [Rose, 2020](#)), I am confident that the conditions above hold. Nevertheless, I verify the relevance and exogeneity assumptions for the dataset under consideration in the next section.

2.5 Empirical Results

The first set of estimation results, presented in [Table 2.1](#) and [Table 2.2](#), compares the OLS benchmark case with the IV 2SLS case for both the full sample and a sub-sample that excludes respondents who retired due to health-related reasons or job elimination resulting from organizational restructuring. While most individuals retire within the eligible ages for accessing retirement benefits, some may retire due to employment or health-related shocks. Excluding these cases allows for a more accurate assessment of the validity of the pension eligibility age-based thresholds in the retirement decision, free from individual-specific circumstances that may restrict choice.

Table 2.1: Objective Retirement

Dependent Variable = <i>LSS</i>	Full Sample		Sample without Health and Job Shocks	
	OLS Model	IV 2SLS Model	OLS Model	IV 2SLS Model
Objective Retirement	0.38** (0.18)	4.94** (2.19)	0.88*** (0.19)	3.39** (1.59)
Female (Ref. = male)	0.54*** (0.14)	0.35** (0.18)	0.40*** (0.16)	0.28 (0.17)
Age	0.20 (0.16)	-0.71 (0.52)	0.16 (0.18)	-0.28 (0.38)
Age ²	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)
White (Ref. = not White)	0.48 (0.33)	0.16 (0.35)	0.56 (0.36)	0.42 (0.36)
Immigrant (Ref. = not immigrant)	-0.70*** (0.24)	-0.61** (0.26)	-0.66** (0.27)	-0.60** (0.29)
Marital status (Ref. = married or common law)				
Widow or widower	-1.49*** (0.22)	-1.52*** (0.24)	-1.60*** (0.26)	-1.63*** (0.27)
Divorced or separated	-3.02*** (0.24)	-2.75*** (0.28)	-2.64*** (0.27)	-2.45*** (0.28)
Single	-2.12*** (0.34)	-1.96*** (0.36)	-2.30*** (0.39)	-2.21*** (0.40)
Education (Ref. = less than secondary)				
Secondary	0.71*** (0.21)	0.82*** (0.22)	0.49** (0.23)	0.55** (0.24)
Some post-secondary	0.431 (0.29)	0.50* (0.30)	0.03 (0.33)	0.06 (0.33)
Post-secondary	0.82*** (0.17)	0.80*** (0.18)	0.67*** (0.19)	0.64*** (0.19)
Physical health (chronic conditions)	-0.65*** (0.04)	-0.70*** (0.05)	-0.54*** (0.04)	-0.55*** (0.04)
Household size	-0.03 (0.10)	0.03 (0.11)	-0.06 (0.11)	-0.03 (0.11)
Household income	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)

Dependent Variable = <i>LSS</i>		Full Sample		Sample without Health and Job Shocks	
		OLS Model	IV 2SLS Model	OLS Model	IV 2SLS Model
Province (Ref. = ON)					
	NL	0.23 (0.27)	-0.15 (0.33)	0.05 (0.28)	-0.16 (0.31)
	PE	0.44* (0.27)	0.62** (0.30)	0.41 (0.29)	0.49 (0.30)
	NS	0.16 (0.24)	-0.14 (0.28)	-0.01 (0.26)	-0.18 (0.28)
	NB	0.37 (0.27)	0.09 (0.32)	0.43 (0.27)	0.30 (0.28)
	QC	1.11*** (0.20)	0.93*** (0.21)	0.99*** (0.22)	0.86*** (0.23)
	MB	-0.17 (0.23)	-0.12 (0.25)	-0.22 (0.26)	-0.19 (0.27)
	SK	0.50* (0.27)	0.63** (0.29)	0.29 (0.30)	0.32 (0.30)
	AB	0.23 (0.23)	0.44* (0.27)	0.20 (0.25)	0.28 (0.26)
	BC	-0.1 (0.21)	-0.10 (0.23)	-0.20 (0.23)	-0.21 (0.24)
Constant		17.62*** (5.58)	51.03*** (18.61)	19.90*** (6.135)	36.47*** (13.73)
	<i>N</i>	13,919	13,919	10,950	10,950
	<i>R</i> ²	0.14	0.06	0.11	0.09
Excluded instrument		Age ≥ 65		Age ≥ 65	
First-stage result		Age ≥ 65		Age ≥ 65	
	Age ≥ 65		0.15*** (0.02)		0.21*** (0.03)
First-stage <i>F</i> statistic (excluded variable)		34.72***			

Notes: *LSS* = life satisfaction score; IV 2SLS = instrumental variable two-stage least squares; OLS = ordinary least squares; robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2.2: Subjective Retirement

Dependent Variable = <i>LSS</i>		Full Sample		Sample without Health and Job Shocks	
		OLS Model	IV 2SLS Model	OLS Model	IV 2SLS Model
Subjective Retirement		0.24 (0.17)	4.87** (2.17)	0.90*** (0.18)	3.39** (1.60)
Female (Ref. = male)		0.54*** (0.14)	0.16 (0.23)	0.36** (0.16)	0.14 (0.21)
Age		0.23 (0.16)	-0.63 (0.48)	0.16 (0.18)	-0.28 (0.38)
Age ²		0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
White (Ref. = not White)		0.50 (0.33)	0.35 (0.34)	0.59 (0.36)	0.52 (0.36)
Immigrant (Ref. = not immigrant)		-0.71*** (0.24)	-0.71*** (0.24)	-0.68** (0.27)	-0.67** (0.27)

Dependent Variable = <i>LSS</i>	Full Sample		Sample without Health and Job Shocks	
	OLS Model	IV 2SLS Model	OLS Model	IV 2SLS Model
Marital status (Ref. = married or common law)				
Widow or widower	-1.48*** (0.22)	-1.37*** (0.24)	-1.58*** (0.25)	-1.54*** (0.26)
Divorced or separated	-3.03*** (0.24)	-2.72*** (0.28)	-2.62*** (0.27)	-2.38*** (0.30)
Single	-2.12*** (0.34)	-1.81*** (0.39)	-2.28*** (0.39)	-2.11*** (0.41)
Education (Ref. = less than secondary)				
Secondary	0.71*** (0.21)	0.78*** (0.22)	0.47** (0.23)	0.48** (0.23)
Some post-secondary	0.44 (0.29)	0.71** (0.34)	0.07 (0.33)	0.20 (0.36)
Post-secondary	0.82*** (0.17)	0.91*** (0.18)	0.68*** (0.19)	0.68*** (0.19)
Physical health (chronic conditions)	-0.65*** (0.04)	-0.73*** (0.06)	-0.54*** (0.04)	-0.55*** (0.04)
Household size	-0.03 (0.10)	0.04 (0.11)	-0.06 (0.11)	-0.04 (0.11)
Household income	0.00** (0.00)	0.00** (0.00)	0.00** (0.00)	0.00** (0.00)
Province (Ref. = ON)				
NL	0.25 (0.26)	0.01 (0.30)	0.08 (0.27)	-0.05 (0.29)
PE	0.45* (0.27)	0.80** (0.34)	0.45 (0.29)	0.62* (0.32)
NS	0.17 (0.24)	-0.1 (0.27)	-0.01 (0.26)	-0.15 (0.27)
NB	0.38 (0.26)	0.16 (0.31)	0.44 (0.27)	0.33 (0.28)
QC	1.12*** (0.20)	0.96*** (0.21)	0.99*** (0.22)	0.88*** (0.22)
MB	-0.16 (0.23)	-0.06 (0.25)	-0.20 (0.26)	-0.12 (0.27)
SK	0.50* (0.27)	0.77** (0.31)	0.31 (0.30)	0.41 (0.31)
AB	0.23 (0.23)	0.49* (0.28)	0.21 (0.25)	0.31 (0.26)
BC	-0.10 (0.21)	-0.02 (0.24)	-0.18 (0.24)	-0.14 (0.25)
Constant	16.43*** (5.54)	47.38*** (17.19)	20.07*** (6.10)	36.47*** (13.83)
	<i>N</i>	13,919	10,950	10,950
	<i>R</i> ²	0.14	0.12	0.09
Excluded instrument		Age ≥ 65		Age ≥ 65
First-stage result				
Age ≥ 65		0.15*** (0.02)		0.21*** (0.03)
First-stage <i>F</i> statistic (excluded variable)		36.49***		

Notes: *LSS* = life satisfaction score; IV 2SLS = instrumental variable two-stage least squares; OLS = ordinary least squares; robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

In the IV 2SLS model, the initial specification of the first stage includes all pension eligibility thresholds (at ages 60, 65, and 70 years) as exogenous instruments for retirement. However, the results indicate that only the increase in retirement incentives at age 65 is a statistically significant and relevant source of exogenous variation in retirement status. Consequently, in the final specification, the other two cut-offs are omitted to avoid an overidentified model. Partial results from the initial empirical model with all instruments are reported in the Appendix (Table A.2.6).

Before interpreting the results in Table 2.1 and Table 2.2, it is essential to confirm the validity of the IV setup by establishing whether the relevance and exogeneity assumptions hold. For the full sample, the first-stage F-statistics on the excluded variable (i.e., the instrument) in both tables, as also reported in Table 2.3, are statistically significant at the 1% level. These values are based on the hypothesis that the estimated coefficient of the instrument in the first-stage regression is not different from zero, and rejection thus suggests that the retirement incentive at age 65 years has significant explanatory power in the retirement decision after controlling for other factors. However, as noted by Hall et al. (1996), a statistically significant first-stage F-statistic on the excluded variable does not necessarily indicate a strong instrument. Therefore, I conduct additional testing based on the criteria established by Stock and Yogo (2005).

Table 2.3: Instrumental Variable Tests

Null Hypothesis and Test Statistic	Objective Retirement		Subjective Retirement	
	Statistic Value	<i>p</i> -value	Statistic Value	<i>p</i> -value
H ₀ : instruments are weak First-stage <i>F</i> statistic $\sim F_{1,13894}$	34.72	0.0000	36.49	0.0000
H ₀ : retirement is exogenous Robust score $\sim \chi^2_1$	12.24	0.0005	12.93	0.0003
Robust regression $\sim F_{1,13895}$	5.16	0.0232	5.46	0.0195

Using Stock and Yogo's (2005) characterization, an instrument is considered weak if the IV estimates suffer from severe size distortions and entails choosing the largest rejection rate of a nominal 5% Wald or *t*-test I am willing to tolerate (e.g., 10, 15, 20, or 25 percent). For instance, if the tolerable rejection rate is set at no more than 10% (i.e., defining the instrument as weak when the worst-case size of the nominal 2SLS *t*-test exceeds 10%), the null hypothesis of a weak instrument can be rejected, as the critical *F*-value from Stock and Yogo (2005) corresponding to one endogenous variable, one instrument, and the set rejection rate of acceptable tolerance is 16.38, which is lower

than the F -values in [Table 2.3](#).¹⁴ The correlation coefficient between the instrument and the endogenous variable in the first-stage estimation of each of the four cases (sample and sub-sample under both objective retirement and subjective retirement) further supports that the relevance condition holds, suggesting that the second-stage estimation is likely to be more precise.

Next, I test the endogeneity of the instrumented regressor within the IV model using Wooldridge's score test (which follows a χ^2_1 distribution) and a regression-based test (which follows an $F_{1,k}$ distribution, where $k = 13,895$ for my full sample). In both tests, the null hypothesis assumes that retirement is an exogenous variable. The rejection of this hypothesis supports treating retirement as endogenous.¹⁵ The results of both tests, provided in [Table 2.3](#), show that the estimated test statistics fall within rejection regions at significance levels below 5%. This confirms that retirement, whether measured objectively or subjectively, is not exogenous in the life satisfaction equation, indicating that OLS regression would yield biased estimates of the causal effect of retirement on life satisfaction.

The preceding discussion confirms the validity of implementing the IV approach for the research question under investigation, so I proceed with the analysis of the IV results,¹⁶ drawing comparisons with the OLS results as needed. It is important to emphasize that the IV estimation identifies only a local average treatment effect; in other words, the detected causal effect of retirement on life satisfaction pertains to the subgroup of individuals who react to the pension cut-off point (i.e., the compliers) and may not be generalizable ([Imbens and Angrist, 1994](#)).

The findings are consistent between the two estimation procedures and between the sample and the sub-sample. Specifically, the estimates under objective retirement ([Table 2.1](#)) closely resemble those under subjective retirement ([Table 2.2](#)), particularly in terms of the effect of retirement, which is my key variable. Regardless of how it is measured, retirement has a statistically significant positive effect on life satisfaction at the 1% significance level. However, the IV estimates show a substantially larger effect, making retirement the most influential predictor of life satisfaction among the regressors included in the analysis. On average, retirement increases life satisfaction by 5 points for the full sample and 3.4 points for the sub-sample. In comparison, the average increases according to the OLS

¹⁴ As a rule of thumb, according to [Stock et al. \(2002\)](#), an F -value > 10 is indicative of the presence of strong instruments when there is one endogenous instrumented regressor.

¹⁵ The essential idea of the two endogeneity tests is to include the estimated error (\hat{e}_R) from the first-stage regression in the structural model (i.e., [\(2.1\)](#)), estimate the structural model with the additional variable by OLS, and test whether the coefficient of \hat{e}_R is equal to zero, which would imply that $cov(e, e_R) = 0$ and that R (i.e., retirement) is not endogenous.

¹⁶ My focus is on the second-stage results, but I do report the first-stage results in the Appendix ([Table A.2.7](#)) for completeness.

estimates are 0.38 and 0.88 points, respectively, under objective retirement and statistically not different from zero and 0.9, respectively, under subjective retirement.

In [Table 2.1](#) and [Table 2.2](#), the IV results suggest that immigrants tend to be less satisfied with life. Being in a relationship, whether through legal marriage or a common-law partnership, increases life satisfaction. While being divorced, separated, single, or widowed is associated with a life satisfaction score that is 1.4–2.8 points lower. Education has a statistically significant positive effect that may be non-monotonic; for instance, those with secondary or post-secondary education have a life satisfaction score about 0.8 to 0.9 points higher than those with less than secondary education for the full sample (and about 0.5–0.7 points higher for the sub-sample). However, having some post-secondary education is either equivalent in terms of its impact on life satisfaction to having less than secondary education (for the sub-sample) or has a lower effect than secondary education. Income is consistently positive and statistically significant at the 1% level; its magnitude suggests that only substantial income increases translate into greater satisfaction with life; this result holds regardless of whether income is at the household or individual level.¹⁷ Neither household size, whether directly or through household income, nor age seems to matter, and having chronic conditions reduces life satisfaction. Across provinces, there are no noticeable differences, except for Quebec, where residents tend to be happier or more satisfied with life than those in other Canadian provinces. In the full sample, Alberta, Prince Edward Island, and Saskatchewan consistently show higher life satisfaction scores, even after accounting for additional controls in the robustness checks, as shown in [Table 2.4](#).

When I eliminate respondents reporting health and employment shocks as reasons for retiring, the qualitative findings remain consistent, and the estimates are generally similar. Retirement’s role in life satisfaction in [Table 2.1](#) and [Table 2.2](#) remains significant but is slightly lower, around 1.5 points, under both measures of retirement. Interestingly, the corresponding OLS estimates are larger, possibly suggesting less heterogeneity in the sub-sample. This is because the OLS estimate relies on the entire variation across the sample and describes the average difference in life satisfaction between retired and non-retired individuals, whereas the IV 2SLS estimate relies only on the variation attributable to the exogenous instrument and captures the effect of retiring only for

¹⁷ [Table A.2.6](#) in the Appendix shows partial results of the OLS and IV models when I replace household income with individual income.

individuals whose choice of retirement is influenced by the instrument. If there is heterogeneity in the sample, the IV 2SLS estimate is larger than the OLS estimate.

2.6 Robustness Results

To ensure the robustness of my findings, several additional analyses were conducted, focusing on potential factors that could influence the relationship between retirement and life satisfaction. This section presents the results of these robustness checks, which include alternative model specifications, additional controls, and subgroup analyses.

2.6.1 Inclusion of Additional Control Variables

First, the inclusion of additional control variables, particularly those related to social engagement and physical activity, was examined to see if they would alter the estimated effect of retirement on life satisfaction. Specifically, I added variables capturing the frequency of social interactions, a sense of belonging to the community, expressions of affection, and participation in physical activities such as walking, exercising, and gardening, and interaction terms between age and marital status and between household size and household income. The results, presented in [Table 2.4](#), confirm that the effect of retirement remains substantial, with about a 5-point increase in the life satisfaction score at the 5% significance level, even when these additional variables are included.

A key finding is the consistency in the relevance of the additional variables. Although these variables do not significantly impact the retirement decision (i.e., the first-stage regression), they do contribute to well-being. A stronger sense of belonging to the community, more frequent opportunities for affection, and more frequent social interactions or participation in various social activities (e.g., friendship, church, club, community, and charity) are associated with higher life satisfaction. Spending time on physical activities also contributes to life satisfaction, but its marginal effect is noticeably smaller than that of social engagement. This suggests that an active social life may be as important to overall well-being as (or even more important than) an active physical life. This is consistent with a growing body of research that highlights the role of social health on well-being (e.g., [Diener and Oishi, 2005](#); [Helliwell and Putnam, 2004](#); [Rohrer et al., 2018](#)). However, there is no indication that engagement in social and physical activities matters more for the life satisfaction of the older population or during retirement. There may be some age dependency in the effect, as the estimated coefficient of the interaction between age and being in a relationship is consistently negative, albeit very small, and statistically significant for all robustness specifications in [Table 2.4](#).

Table 2.4: Robustness Checks: Full Sample

Dependent Variable = <i>LSS</i>	IV 2SLS Model															
	Objective Retirement								Subjective Retirement							
Retirement	4.94**	5.04**	5.28**	5.25**	4.99**	5.07**	5.07**	4.95**	4.87**	4.95**	5.17**	5.14**	4.88**	4.97**	4.96**	4.84**
	(2.19)	(2.20)	(2.23)	(2.21)	(2.13)	(2.10)	(2.09)	(2.11)	(2.17)	(2.17)	(2.19)	(2.16)	(2.09)	(2.06)	(2.05)	(2.07)
Female	0.35***	0.33*	0.31*	0.31*	0.18	0.23	0.43***	0.40***	0.16	0.14	0.12	0.12	-0.00	0.04	0.26	0.23
	(0.17)	(0.17)	(0.18)	(0.18)	(0.17)	(0.17)	(0.15)	(0.15)	(0.23)	(0.23)	(0.23)	(0.23)	(0.22)	(0.22)	(0.19)	(0.18)
Age	-0.71	-0.65	-0.71	-0.78	-0.70	-0.77	-0.70	-0.70	-0.63	-0.58	-0.63	-0.70	-0.62	-0.69	-0.62	-0.62
	(0.52)	(0.52)	(0.52)	(0.51)	(0.49)	(0.48)	(0.47)	(0.47)	(0.48)	(0.49)	(0.49)	(0.48)	(0.46)	(0.45)	(0.43)	(0.43)
Age ²	0.00	0.00	0.00	0.01*	0.00	0.01*	0.01*	0.01*	0.00	0.00	0.00	0.00	0.00	0.01*	0.00*	0.00*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
White	0.16	0.17	0.18	0.25	-0.22	-0.22	-0.46	-0.46	0.35	0.36	0.38	0.45	-0.03	-0.03	-0.29	-0.29
	(0.35)	(0.35)	(0.35)	(0.36)	(0.35)	(0.34)	(0.36)	(0.36)	(0.34)	(0.34)	(0.34)	(0.34)	(0.33)	(0.33)	(0.34)	(0.34)
Immigrant	-0.61**	-0.60**	-0.59**	-0.50**	-0.47**	-0.40*	-0.39*	-0.39*	-0.71**	-0.70**	-0.70**	-0.60**	-0.56**	-0.50**	-0.48**	-0.48*
	(0.26)	(0.26)	(0.26)	(0.24)	(0.23)	(0.23)	(0.23)	(0.23)	(0.24)	(0.25)	(0.25)	(0.23)	(0.22)	(0.22)	(0.22)	(0.22)
Marital status																
Widow or widowe	-1.52**	-4.59**	-4.86**	-4.71**	-4.47**	-4.79**	-4.91**	-5.00**	-1.37**	-3.91**	-4.13**	-3.98**	-3.78**	-4.09**	-4.21**	-4.33*
	(0.24)	(1.56)	(1.57)	(1.55)	(1.51)	(1.50)	(1.46)	(1.46)	(0.24)	(1.56)	(1.51)	(1.50)	(1.44)	(1.41)	(1.37)	(0.24)
Divorced or separated	-2.75**	-5.55**	-5.77**	-5.48**	-4.95**	-5.28**	-5.35**	-5.42**	-2.72**	-5.04**	-5.23**	-4.93**	-4.42**	-4.75**	-4.82**	-2.75*
	(0.28)	(1.42)	(1.42)	(1.40)	(1.36)	(1.35)	(1.31)	(1.31)	(0.28)	(1.40)	(1.39)	(1.39)	(1.33)	(1.30)	(1.26)	(0.28)
Single	-1.96**	-4.75**	-4.99**	-4.80**	-3.86**	-4.29**	-4.28**	-4.33**	-1.81**	-4.12**	-4.32**	-4.13**	-3.21**	-3.63**	-3.62**	-1.96*
	(0.36)	(1.45)	(1.45)	(1.43)	(1.39)	(1.36)	(1.33)	(1.34)	(0.39)	(1.43)	(1.42)	(1.42)	(1.35)	(1.32)	(1.29)	(0.36)
Education																
Secondar	0.82***	0.83***	0.81***	0.80***	0.74***	0.70***	0.61***	0.60***	0.78***	0.79***	0.77***	0.75***	0.70***	0.65***	0.57***	0.56***
	(0.22)	(0.22)	(0.22)	(0.22)	(0.22)	(0.22)	(0.21)	(0.21)	(0.22)	(0.22)	(0.22)	(0.22)	(0.22)	(0.21)	(0.21)	(0.21)
Some post-secondar	0.50*	0.51*	0.50*	0.42	0.40	0.40	0.33	0.30	0.71**	0.73**	0.72**	0.64*	0.61*	0.61*	0.53*	0.50
	(0.30)	(0.30)	(0.31)	(0.30)	(0.30)	(0.29)	(0.29)	(0.29)	(0.34)	(0.34)	(0.34)	(0.34)	(0.33)	(0.33)	(0.32)	(0.32)
Post-secondar	0.80***	0.82***	0.80***	0.73***	0.68***	0.68***	0.59***	0.55***	0.91***	0.92***	0.91***	0.84***	0.79***	0.78***	0.69***	0.65***
	(0.18)	(0.18)	(0.18)	(0.18)	(0.17)	(0.17)	(0.17)	(0.17)	(0.18)	(0.18)	(0.19)	(0.18)	(0.18)	(0.18)	(0.17)	(0.17)
Chronic conditions	-0.70**	-0.70**	-0.70**	-0.68**	-0.65**	-0.63**	-0.57**	-0.57**	-0.73**	-0.73**	-0.73**	-0.70**	-0.67**	-0.65**	-0.59**	-0.59*
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.06)	(0.06)	(0.06)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)
Household size	0.03	0.03	0.34*	0.36*	0.18	0.20	0.14	0.14	0.04	0.04	0.33*	0.35*	0.17	0.19	0.13	0.13
	(0.11)	(0.11)	(0.19)	(0.19)	(0.18)	(0.18)	(0.18)	(0.18)	(0.11)	(0.11)	(0.18)	(0.18)	(0.18)	(0.18)	(0.17)	(0.17)
Household income	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Province																
NL	-0.15	-0.16	-0.18	-0.54*	-0.50	-0.45	-0.25	-0.23	0.01	0.00	-0.01	-0.38	-0.35	-0.29	-0.08	-0.07
	(0.33)	(0.33)	(0.33)	(0.32)	(0.31)	(0.31)	(0.29)	(0.29)	(0.30)	(0.30)	(0.30)	(0.29)	(0.28)	(0.28)	(0.27)	(0.26)

Dependent Variable = <i>LSS</i>	IV 2SLS Model															
	Objective Retirement								Subjective Retirement							
PE	0.62** (0.30)	0.61** (0.30)	0.64** (0.31)	0.47 (0.30)	0.52* (0.29)	0.51* (0.29)	0.52* (0.29)	0.51* (0.29)	0.80** (0.34)	0.80** (0.34)	0.83** (0.34)	0.65* (0.34)	0.69** (0.33)	0.68** (0.33)	0.70** (0.32)	0.68** (0.33)
NS	-0.14 (0.28)	-0.15 (0.28)	-0.15 (0.28)	-0.32 (0.27)	-0.25 (0.27)	-0.26 (0.27)	-0.22 (0.26)	-0.21 (0.26)	-0.10 (0.27)	-0.11 (0.27)	-0.12 (0.27)	-0.29 (0.26)	-0.22 (0.26)	-0.23 (0.26)	-0.18 (0.25)	-0.18 (0.25)
NB	0.09 (0.317)	0.08 (0.318)	0.08 (0.320)	0.04 (0.324)	0.06 (0.318)	0.07 (0.319)	0.17 (0.305)	0.18 (0.305)	0.16 (0.31)	0.16 (0.31)	0.16 (0.31)	0.11 (0.31)	0.13 (0.31)	0.15 (0.31)	0.25 (0.30)	0.26 (0.30)
QC	0.93*** (0.21)	0.93*** (0.21)	0.93*** (0.21)	1.07*** (0.21)	1.13*** (0.20)	1.09*** (0.20)	1.23*** (0.19)	1.25*** (0.19)	0.96*** (0.21)	0.96*** (0.21)	0.96*** (0.21)	1.10*** (0.20)	1.16*** (0.20)	1.12*** (0.19)	1.27*** (0.19)	1.29*** (0.19)
MB	-0.12 (0.25)	-0.12 (0.25)	-0.10 (0.25)	-0.13 (0.25)	-0.06 (0.24)	0.03 (0.24)	-0.10 (0.23)	-0.10 (0.23)	-0.06 (0.25)	-0.06 (0.26)	-0.05 (0.26)	-0.07 (0.26)	-0.01 (0.25)	0.08 (0.24)	-0.05 (0.24)	-0.06 (0.24)
SK	0.63** (0.29)	0.63** (0.29)	0.63** (0.29)	0.46* (0.28)	0.44* (0.26)	0.48* (0.26)	0.44* (0.25)	0.42* (0.25)	0.77** (0.31)	0.77** (0.31)	0.78** (0.32)	0.60** (0.30)	0.57** (0.29)	0.62** (0.28)	0.58** (0.27)	0.55** (0.27)
AB	0.44* (0.27)	0.45* (0.27)	0.46* (0.27)	0.58* (0.26)	0.52** (0.26)	0.59** (0.26)	0.51** (0.25)	0.51** (0.24)	0.49* (0.28)	0.49* (0.28)	0.50* (0.28)	0.63** (0.27)	0.56** (0.27)	0.64** (0.27)	0.55** (0.25)	0.56** (0.25)
BC	-0.10 (0.23)	-0.10 (0.23)	-0.10 (0.23)	-0.12 (0.23)	-0.12 (0.22)	-0.13 (0.22)	-0.14 (0.22)	-0.15 (0.22)	-0.02 (0.24)	-0.02 (0.24)	-0.01 (0.24)	-0.03 (0.24)	-0.03 (0.23)	-0.05 (0.23)	-0.06 (0.23)	-0.07 (0.23)
Age × Married		-0.04** (0.02)	-0.05** (0.02)	-0.05** (0.02)	-0.06** (0.02)	-0.06** (0.02)	-0.06** (0.02)	-0.06** (0.02)		-0.04* (0.02)	-0.04** (0.02)	-0.04** (0.02)	-0.05** (0.02)	-0.06** (0.02)	-0.06** (0.02)	-0.06** (0.02)
Size × Income			-0.00** (0.00)	-0.00** (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)				-0.00* (0.00)	-0.00* (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Sense of belonging				1.04*** (0.09)	0.89*** (0.09)	0.82*** (0.08)	0.73*** (0.09)	0.70*** (0.09)				1.09*** (0.09)	0.93*** (0.09)	0.86*** (0.09)	0.77*** (0.08)	0.74*** (0.09)
Affection					0.54*** (0.03)	0.10** (0.05)	0.09* (0.05)	0.09* (0.05)					0.54*** (0.03)	0.10** (0.05)	0.09* (0.05)	0.09* (0.05)
Social interaction						0.41*** (0.04)	0.41*** (0.04)	0.39*** (0.04)						0.41*** (0.04)	0.41*** (0.04)	0.39*** (0.04)
PASE							0.01*** (0.00)	0.01*** (0.00)							0.01*** (0.00)	0.01*** (0.00)
Social participation								0.27** (0.12)								0.28** (0.11)
Constant	51.0*** (18.61)	50.8*** (18.66)	52.4*** (18.83)	51.8*** (18.40)	44.8** (17.83)	46.7*** (17.49)	42.8*** (16.60)	42.2** (16.70)	47.4*** (17.19)	47.2*** (17.25)	48.5*** (17.35)	47.9*** (16.86)	41.1** (16.31)	42.8*** (15.97)	38.7*** (15.00)	38.2** (15.07)
N	13,919	13,919	13,919	13,919	13,655	13,629	13,620	13,607	13,919	13,919	13,919	13,919	13,655	13,629	13,620	13,607
R ²	0.06	0.05	0.05	0.08	0.13	0.14	0.16	0.16	0.04	0.04	0.03	0.06	0.12	0.13	0.15	0.15
First-stage result																
Age ≥ 65	0.15*** (0.02)	0.15*** (0.02)	0.14*** (0.02)	0.14*** (0.02)	0.14*** (0.02)	0.14*** (0.02)	0.14*** (0.02)	0.14*** (0.02)	0.15*** (0.02)	0.15*** (0.02)	0.15*** (0.02)	0.15*** (0.02)	0.15*** (0.02)	0.15*** (0.02)	0.15*** (0.02)	0.14*** (0.02)

Notes: *LSS* = life satisfaction score; IV 2SLS = instrumental variable two-stage least squares; PASE = Physical Activity Scale for the Elderly; robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

2.6.2 Alternative Instrumental Variables

To further assess the robustness of the IV approach, alternative instrumental variables beyond the age threshold of 65 years were tested. Specifically, the early retirement incentive at age 60 and the later incentive at age 70 were considered. The results, reported in [Table A.2.6](#), show that while these alternative instruments have some explanatory power, they are not as strong as the age 65 threshold. The age 65 threshold remains the most significant and reliable instrument, confirming that the positive effect of retirement on life satisfaction is primarily driven by individuals who retire at this standard retirement age.

2.6.3 Inclusion of Subgroup Analyses by Gender

Given that men and women may experience retirement differently, separate analyses for male and female respondents were conducted. The results, detailed in [Table A.2.8](#), reveal some gender-specific differences. While the positive effect of retirement on life satisfaction is significant for both men and women, the magnitude of this effect is smaller for women. Moreover, the IV 2SLS estimate for women becomes statistically insignificant when considering the sub-sample, whereas it remains significant for men, although at a reduced significance level of 10%. These findings suggest that the impact of retirement on life satisfaction may be more pronounced for men, potentially due to differences in factors such as lifetime earnings, life expectancy, financial confidence, and social roles.

2.6.4 Examination of Partial vs. Complete Retirement

The subjective measure of retirement allowed me to distinguish between partial and complete retirement. I explored whether the impact of retirement on life satisfaction differs depending on the extent of retirement. The results, provided in [Table A.2.9](#), indicate that full retirement has a stronger positive effect on life satisfaction compared to partial retirement. Although the OLS estimates suggest that partial retirement is associated with a slight increase in life satisfaction, the IV results show that only those who completely retire in response to pension incentives experience a significant boost in life satisfaction (in line with the results in [Table 2.1](#) and [Table 2.2](#)). This finding underscores the importance of complete retirement in enhancing well-being, particularly when retirement is driven by exogenous factors such as pension eligibility. Interestingly, the age thresholds at 60 and 65 years serve as sources of exogenous variation in partial retirement but in opposite directions: the early

incentive encourages partial retirement, while the later incentive discourages it, likely because people are more likely to opt for complete retirement at age 65.

To investigate whether social engagement might be a channel through which retirement enhances life satisfaction, estimates from the OLS regression of life satisfaction on all regressors, including those considered in the robustness checks, by retirement status (present vs. absent) were examined. The results reported in [Table A.2.10](#) do not support the idea that retirement increases life satisfaction by enabling retirees to engage more actively in community activities. Instead, the frequency of participation in social activities either has a larger impact on non-retirees or is comparable between the two groups. Affection, on the other hand, only affects the life satisfaction of retirees, while physical activities also matter only for retirees, but their effect on life satisfaction is negligible. These findings suggest that the opportunity retirement provides for a more socially active life does not directly translate into higher life satisfaction, and other channels may explain the positive impact of retirement on life satisfaction.

The robustness checks presented in this section confirm that my findings are consistent across various model specifications, control variables, and subgroups. Retirement appears to have a robust positive impact on life satisfaction, with social engagement emerging as a significant factor in overall well-being. However, the gender differences observed suggest that retirement policies and programs may need to be tailored to address the distinct needs and experiences of men and women. Additionally, the finding that complete retirement has a more substantial effect on life satisfaction than partial retirement has important implications for policymakers considering flexible retirement options.

2.7 Conclusion

Canada's population is aging rapidly, making retirement a significant transition in the lives of the older population and a critical policy issue due to its fiscal and welfare implications. These include higher healthcare costs, unsustainable pension commitments, a shrinking workforce, and shifts in demand driven by age-dependent preferences. Using the 2008–2009 CCHS–Healthy Aging survey, I provide evidence on the well-being implications of retirement in Canada, with life satisfaction as the primary measure. After addressing potential biases from self-selection and unobserved individual-specific heterogeneity that can bias the causal effect of retirement, I find that retirement has a positive and statistically significant effect on life satisfaction. This effect remains robust even after

the inclusion of various socio-economic and demographic controls, social life measures, expressions of affection, and levels of physical activity. It holds regardless of whether retirement is measured subjectively or objectively. The effect remains valid and strong when I exclude respondents who retired for health or job loss reasons, though it partially disappears in the IV 2SLS model when analyzing the relationship by gender. My findings suggest that men are likely to experience an increase in life satisfaction upon retirement, but women are not. All in all, the evidence from my empirical analysis underscores the importance for policymakers, when designing retirement policies in Canada, to weigh the fiscal costs of retirement at an earlier age against the benefits of retirement in terms of improvement in life satisfaction and psychological well-being and to account for possible gender-based differences in life satisfaction during retirement.

While the evidence presented in this study is critical for informing policy, several caveats should be noted. First, these results may not be directly comparable to those from other countries due to variations in life satisfaction measures, which are often based on slightly different surveys, questions, and scales. For example, unlike my measure, which evaluates agreement or disagreement with five statements rated on a 1–7 scale, life satisfaction in the Household, Income, and Labour Dynamics in Australia dataset and the German SOEP dataset is measured on a 0–10 scale and based on a single direct question about life satisfaction (e.g., [Abolhassani and Alessie, 2013](#); [Zhu and He, 2015](#)). The OECD Better Life Index similarly relies on a 0–10 scale based on one direct question (Organisation for Economic Co-operation and Development n.d.). Second, while my measure offers a sense of overall life satisfaction based on one’s cognitive judgment, it does not capture satisfaction in specific areas of life, such as relationships. Further exploration using tools that assess satisfaction in specific life domains is necessary for a deeper understanding of what drives overall life satisfaction. Third, as a subjective measure, life satisfaction is influenced by a person’s emotional state at the time of the interview, as well as other situational factors like the day of the week the survey is conducted (weekends vs. weekdays) that may affect one’s judgment (e.g., [Diener et al., 2013](#)). Fourth, my study is based on cross-sectional data collected during the 2008–2009 financial crisis. While I attempted to account for employment shocks, the broader impact of the crisis on respondents’ life satisfaction remains unaddressed. Fifth, my analysis does not fully explore the channels through which retirement may affect life satisfaction, leaving open questions about what drives the positive relationship between retirement and well-being; this is important to shed light on what could explain differences between male and female respondents, including the possibility that gender influences subjective assessments. Finally, despite the widespread use of subjective well-being measures in

research, future studies should investigate whether the relationship between retirement and well-being holds with more objective indicators such as physical and mental health.

With respect to estimation procedures, I acknowledge that, due to the cross-sectional nature of my dataset, I was unable to explore the validity and applicability of different techniques in my efforts to address the likely endogeneity of retirement status, such as the difference-in-differences and the fixed-effects models that require panel data. Instead, I adopted the IV 2SLS approach, which, while widely used, is not without criticism. For example, in a simulation-based study of 1,309 IV regressions across 30 articles published in American Economic Association journals, [Young \(2022\)](#) shows that, if errors are not independent and identically distributed, the first-stage F -statistic on the excluded variables is more likely to incorrectly reject the hypothesis that instruments are weak when they are completely irrelevant in highly leveraged regressions. As a result, the benefits of the IV 2SLS approach, such as providing information on the degree to which OLS estimates are biased, can be lost.

Bibliography for Chapter 2

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Appendix for Chapter 2

Table A.2.1: Summary Statistics of Life Satisfaction and its Components

Component	Statement	Mean	Std. Dev.	Min	Max
SLS_01	In most ways, my life is close to my ideal	5.50	0.01	1	7
SLS_02	The conditions of my life are excellent	5.47	0.02	1	7
SLS_03	I am satisfied with my life	5.75	0.01	1	7
SLS_04	So far, I have gotten the important things I want in life	5.76	0.01	1	7
SLS_05	If I could live my life over, I would change almost nothing	5.01	0.02	1	7
<i>LSS</i>	Life Satisfaction Score	27.49	0.06	5	35

Table A.2.2: Correlation Coefficient Matrix for Life Satisfaction and its Components

	SLS_01	SLS_02	SLS_03	SLS_04	SLS_05	<i>LSS</i>
SLS_01	1					
SLS_02	0.67	1				
SLS_03	0.67	0.71	1			
SLS_04	0.52	0.54	0.60	1		
SLS_05	0.46	0.46	0.47	0.48	1	
<i>LSS</i>	0.82	0.84	0.84	0.76	0.75	1

Table A.2.3: Weighted Summary Statistics

Variable	No. of Observations	Mean or Proportion	Std. Dev.	Min	Max
Objective Retirement	19,809	0.63	0.48	0	1
Subjective Retirement	19,809	0.62	0.49	0	1
Female	19,809	0.56	0.50	0	1
Age	19,809	67.60	8.60	55	85
White	19,312	0.93	0.26	0	1
Immigrant	19,778	0.20	0.40	0	1
Marital Status	19,809			1	4
Married/Common-Law		0.57	0.49		
Widow(er)		0.22	0.41		
Divorced/Separated		0.14	0.35		
Single		0.07	0.26		
Education	19,670			1	4
Less than Secondary		0.32	0.47		
Secondary		0.16	0.37		
Some Post-Secondary		0.05	0.22		
Post-Secondary		0.47	0.50		
Physical Health (Chronic Conditions)	19,809	3.07	2.36	0	16
Household Size	19,809	1.86	0.93	1	11
Household Income	14,702	54,305	49,333		
Individual Income	15,743	34,523	34,964		
Province	19,809			1	10
Ontario (ON)		0.21	0.41		
Newfoundland and Labrador (NL)		0.07	0.25		
Prince Edward Island (PE)		0.05	0.22		
Nova Scotia (NS)		0.07	0.26		
New Brunswick (NB)		0.07	0.26		
Quebec (QC)		0.18	0.38		
Manitoba (MB)		0.07	0.26		
Saskatchewan (SK)		0.07	0.26		
Alberta (AB)		0.08	0.27		
British Columbia (BC)		0.12	0.33		
Sense of Belonging to Community	19,809			1	4
Very Weak		0.09	0.29		
Somewhat Weak		0.21	0.40		
Somewhat Strong		0.42	0.49		
Very Strong		0.26	0.44		
Affection	18,935	10.26	2.68	0	12
Positive Social Interaction	18,927	13.25	3.58	0	16
Physical Activity Scale for the Elderly (PASE)	19,776	125.85	76.75	0	605
Frequency of Community Participation	19,769			0	4
Not Participate		0.02	0.15		
Participate Yearly		0.05	0.21		
Participate Monthly		0.18	0.38		
Participate Weekly		0.62	0.49		
Participate Daily		0.13	0.34		
Life Satisfaction Score	19,307	27.08	5.79	5	35

Table A.2.4: Descriptions of Variables

Variable	Description
Retirement	Indicator: completely retired =1; not completely retired = 0
Female	Indicator: female =1; male = 0
Age	Age in years
White	Indicator: white =1, not white = 0
Immigrant	Indicator: immigrant = 1; not immigrant = 0
Marital Status	Indicators: married/common law (reference indicator); widow(er); divorced/separated; single
Education	Indicators: less than secondary (reference indicator); secondary; some post-secondary; post-secondary
Physical Health (Chronic Conditions)	Number of applicable chronic conditions out of 22 possible conditions
Household Size	Number of household members
Household Income	Household income level in (CAD) dollars
Individual Income	Individual income level in (CAD) dollars
Province	Indicators: 12 provinces, 11 indicators, with Ontario as the reference province
Sense of Belonging to Community	Description of how strong sense of belonging to community is based on categories: 1 = very weak; 2 = somewhat weak; 3 = somewhat strong; 4 = very strong
Affection	Sum of frequency scores across 3 questions <ul style="list-style-type: none"> - Frequency scores between 0 (= never) and 4 (= always) - Questions are about whether respondents have: (1) someone that shows him/her love; (2) someone to hug; (3) someone to love him/her and make them feel wanted
Positive Social Interaction	Sum of frequency scores across 4 questions <ul style="list-style-type: none"> - Frequency scores between 0 (= never) and 4 (= always) - Questions are about whether respondents have someone to: (1) have a good time with; (2) get together with for relaxation; (3) do things with to get his/her mind off things; (4) do something enjoyable with
Physical Activity Scale for the Elderly (PASE)	Sum of the amounts of time spent in each of 12 activities over past week multiplied by the corresponding activity weights <ul style="list-style-type: none"> - Activities: (1) walking outside; (2/3/4) light/moderate/strenuous sport/recreational activities; (5) muscle strength/endurance exercises; (6/7) light/heavy housework; (8) home repairs; (9) lawn work or yard care; (10) outdoor gardening; (11) caring for another person; (12) work for pay or as a volunteer - Weights corresponding to above activities: (1) 20; (2) 21; (3) 23; (4) 23; (5) 30; (6) 25; (7) 25; (8) 30; (9) 36; (10) 20; (11) 35; (12) 21
Frequency of Community Participation	Sum of frequency scores across 8 activities over past 12 months <ul style="list-style-type: none"> - Frequency scores between 0 = no participation; 1 = yearly participation; 2 = monthly participation; (3) weekly participation; 4 = daily participation - Activities: (1) family/friendship activities outside the household; (2) church or religious activities; (3) sports or physical activities; (4) educational and cultural activities; (5) service club or fraternal organization activities; (6) neighbourhood, community, or professional activities; (7) volunteer or charity work; (8) any other recreational activity
Life Satisfaction Score	Sum of agreement/disagreement scores across 5 statements <ul style="list-style-type: none"> - Scores: 1 = strong disagreement; 2 = disagreement; 3 = slight disagreement; 4 = neither disagreement nor agreement; 5 = slight agreement; 6 = agreement; 7 = strong agreement - Statements: (1) in most ways, my life is close to my ideal; (2) the conditions of my life are excellent; (3) I am satisfied with my life; (4) so far, I have gotten the important things in my life; (5) if I could live over, I would change almost nothing

Table A.2.5: Weighted Summary Statistics by Retirement Status

Key Variables	Mean or Proportion			
	Objective Retirement		Subjective Retirement	
	Not Retired	Retired	Not Retired	Retired
Female	0.49	0.59	0.47	0.61
Age, y	60.59	71.76	61.46	71.42
Marital status				
Married or common law	0.66	0.52	0.65	0.52
Widow or widower	0.07	0.31	0.09	0.30
Divorced or separated	0.18	0.11	0.18	0.12
Single	0.09	0.06	0.09	0.06
Education				
Less than secondary	0.19	0.40	0.20	0.40
Secondary	0.19	0.15	0.18	0.15
Some post-secondary	0.06	0.05	0.06	0.05
Post-secondary	0.57	0.41	0.57	0.41
Physical health (chronic conditions)	2.31	3.53	2.29	3.56
Sense of belonging to community				
Very weak	0.08	0.09	0.08	0.10
Somewhat weak	0.23	0.19	0.22	0.20
Somewhat strong	0.44	0.42	0.44	0.42
Very strong	0.23	0.27	0.25	0.27
Affection	10.38	10.18	10.35	10.20
Positive social interaction	13.50	13.10	13.45	13.12
PASE	167.71	101.05	167.56	99.94
Frequency of community activity participation				
Not participate	0.02	0.03	0.02	0.03
Participate yearly	0.04	0.05	0.04	0.05
Participate monthly	0.21	0.16	0.21	0.16
Participate weekly	0.62	0.62	0.62	0.62
Participate daily	0.11	0.14	0.11	0.14
Life satisfaction score	27.04	27.10	27.16	27.03

Note: PASE = Physical Activity Scale for the Elderly.

Table A.2.6: Partial Results: All Instruments and Individual Income

Dependent Variable = <i>LSS</i>	Objective Retirement		Subjective Retirement	
	OLS Model	IV 2SLS Model	OLS Model	IV 2SLS Model
	All Instruments			
Retirement	0.38** (0.18)	4.67** (2.17)	0.24 (0.17)	4.67** (2.15)
⋮	⋮	⋮	⋮	⋮
<i>N</i>	13,919	13,919	13,919	13,919
<i>R</i> ²	0.14	0.07	0.14	0.05
Excluded instruments		Age ≥ 60, Age ≥ 65, Age ≥ 70		Age ≥ 60, Age ≥ 65, Age ≥ 70
First-stage results				
Age ≥ 60		0.03 (0.03)		0.02 (0.03)
Age ≥ 65		0.16*** (0.03)		0.16*** (0.03)
Age ≥ 70		0.01 (0.02)		0.00 (0.02)
	Individual Income			
Retirement	0.37** (0.18)	4.54** (2.12)	0.26 (0.17)	4.45** (2.09)
⋮	⋮	⋮	⋮	⋮
Individual income	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)
⋮	⋮	⋮	⋮	⋮
<i>N</i>	14,892	14,892	14,892	14,892
<i>R</i> ²	0.14	0.07	0.14	0.06
First-stage result				
Age ≥ 65		0.15*** (0.02)		0.15*** (0.02)

Notes: *LSS* = life satisfaction score; IV 2SLS = instrumental variable two-stage least squares; OLS = ordinary least squares; robust standard errors in parentheses; **p* < 0.10, ***p* < 0.05, ****p* < 0.01.

Table A.2.7: IV 2SLS First-Stage Results

Dependent Variable = Retirement		Objective Retirement	Subjective Retirement
Female		0.04*** (0.01)	0.08*** (0.01)
Age		0.16*** (0.01)	0.14*** (0.01)
Age ²		-0.00*** (0.00)	-0.00*** (0.00)
White		0.07*** (0.02)	0.03 (0.02)
Immigrant		-0.02 (0.01)	-0.00 (0.01)
Marital status			
	Widow or widower	0.01 (0.02)	-0.02* (0.01)
	Divorced or separated	-0.06*** (0.02)	-0.06*** (0.02)
	Single	-0.04* (0.02)	-0.07*** (0.02)
Education			
	Secondary	-0.02 (0.02)	-0.01 (0.02)
	Some post-secondary	-0.02 (0.02)	-0.06*** (0.02)
	Post-secondary	0.01 (0.01)	-0.02 (0.01)
Physical health (chronic conditions)		0.01*** (0.00)	0.02*** (0.00)
Household size		-0.01* (0.01)	-0.02** (0.01)
Household income		-0.00*** (0.00)	-0.00*** (0.00)
Province			
	NL	0.08*** (0.02)	0.05*** (0.02)
	PE	-0.04** (0.02)	-0.08*** (0.02)
	NS	0.07*** (0.02)	0.06*** (0.02)
	NB	0.06*** (0.02)	0.05** (0.02)
	QC	0.04*** (0.01)	0.03** (0.01)
	MB	-0.01 (0.02)	-0.02 (0.02)
	SK	-0.03 (0.02)	-0.06*** (0.02)
	AB	-0.05*** (0.02)	-0.06*** (0.02)
	BC	0.00 (0.02)	-0.02 (0.02)
Age ≥ 65		0.15*** (0.02)	0.15*** (0.02)
Constant		-5.67*** (0.44)	-5.01*** (0.46)
	<i>N</i>	13,919	13,919
	<i>R</i> ²	0.47	0.41

Notes: IV 2SLS = instrumental variable two-stage least squares; robust standard errors in parentheses; **p* < 0.10, ***p* < 0.05, ****p* < 0.01.

Table A.2.8: Retirement by Gender

Dependent Variable = <i>LSS</i>	Male		Female	
	OLS Model	IV 2SLS Model	OLS Model	IV 2SLS Model
Objective retirement	0.14 (0.23)	6.77* (3.70)	0.69*** (0.27)	3.42 (2.73)
Age	0.44** (0.22)	- 0.53 (0.66)	- 0.11 (0.24)	- 0.80 (0.79)
Age ²	- 0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.01 (0.01)
White	1.05** (0.43)	0.39 (0.54)	- 0.10 (0.50)	- 0.18 (0.50)
Immigrant	- 0.44 (0.28)	- 0.31 (0.34)	- 0.92** (0.38)	- 0.86** (0.40)
Marital status				
Widow or widower	- 1.85*** (0.41)	- 1.98*** (0.55)	- 1.22*** (0.26)	- 1.23*** (0.26)
Divorced or separated	- 3.33*** (0.38)	- 3.15*** (0.42)	- 2.71*** (0.31)	- 2.50*** (0.37)
Single	- 3.17*** (0.45)	- 3.01*** (0.49)	- 1.07** (0.49)	- 0.95* (0.52)
Education				
Secondary	1.04*** (0.29)	1.27*** (0.34)	0.40 (0.29)	0.43 (0.30)
Some post-secondary	0.55 (0.42)	0.64 (0.46)	0.30 (0.40)	0.34 (0.40)
Post-secondary	1.16*** (0.23)	1.05*** (0.26)	0.37 (0.25)	0.38 (0.25)
Physical health (chronic conditions)	- 0.60*** (0.05)	- 0.71*** (0.09)	- 0.68*** (0.05)	- 0.71*** (0.06)
Household size	- 0.07 (0.15)	0.00 (0.19)	- 0.01 (0.12)	0.03 (0.13)
Household income	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)
Province				
NL	0.15 (0.35)	- 0.17 (0.43)	0.29 (0.40)	- 0.04 (0.50)
PE	0.73** (0.37)	0.92** (0.44)	0.15 (0.39)	0.29 (0.43)
NS	0.08 (0.33)	- 0.34 (0.43)	0.29 (0.33)	0.10 (0.37)
NB	0.20 (0.39)	- 0.07 (0.48)	0.55 (0.36)	0.32 (0.43)
QC	1.12*** (0.25)	0.98*** (0.29)	1.11*** (0.30)	0.96*** (0.30)
MB	- 0.17 (0.31)	0.05 (0.37)	- 0.16 (0.34)	- 0.19 (0.36)
SK	0.42 (0.34)	0.80* (0.44)	0.66 (0.43)	0.66 (0.42)
AB	- 0.15 (0.33)	0.24 (0.42)	0.63* (0.33)	0.73** (0.35)
BC	- 0.60** (0.31)	- 0.67* (0.35)	0.48* (0.29)	0.52* (0.30)
Constant	8.67 (7.66)	45.45* (24.43)	29.61*** (8.10)	54.20* (28.04)
	<i>N</i>	6,641	7,278	7,278
	<i>R</i> ²	0.15	0.15	0.12
Excluded instrument		Age ≥ 65		Age ≥ 65
First-stage result	Age ≥ 65			
		0.12*** (0.03)		0.16*** (0.04)

Dependent Variable = <i>LSS</i>	Male		Female	
	OLS Model	IV 2SLS Model	OLS Model	IV 2SLS Model
Subjective retirement	- 0.07 (0.23)	5.27* (2.73)	0.57** (0.25)	4.27 (3.51)
Age	0.47** (0.22)	- 0.32 (0.53)	- 0.06 (0.23)	- 0.87 (0.87)
Age ²	- 0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.01 (0.01)
White	1.07** (0.43)	0.66 (0.47)	- 0.06 (0.50)	0.01 (0.52)
Immigrant	- 0.44 (0.28)	- 0.48 (0.30)	- 0.93** (0.38)	- 0.89** (0.39)
Marital status				
Widow or widower	- 1.85*** (0.41)	- 1.76*** (0.44)	- 1.20*** (0.26)	- 1.12*** (0.28)
Divorced or separated	- 3.34*** (0.38)	- 3.24*** (0.41)	- 2.71*** (0.31)	- 2.37*** (0.45)
Single	- 3.17*** (0.45)	- 3.01*** (0.47)	- 1.05** (0.49)	- 0.68 (0.63)
Education				
Secondary	1.03*** (0.29)	1.12*** (0.32)	0.41 (0.29)	0.45 (0.30)
Some post-secondary	0.54 (0.42)	0.76* (0.46)	0.33 (0.41)	0.60 (0.48)
Post-secondary	1.16*** (0.23)	1.09*** (0.26)	0.40 (0.25)	0.56* (0.31)
Physical health (chronic conditions)	- 0.60*** (0.05)	- 0.71*** (0.08)	- 0.68*** (0.05)	- 0.74*** (0.08)
Household size	- 0.08 (0.15)	0.03 (0.18)	- 0.02 (0.12)	0.02 (0.12)
Household income	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)
Province				
NL	0.16 (0.35)	- 0.01 (0.39)	0.33 (0.40)	0.07 (0.47)
PE	0.72* (0.37)	1.11** (0.46)	0.16 (0.39)	0.46 (0.51)
NS	0.09 (0.33)	- 0.17 (0.36)	0.29 (0.33)	0.04 (0.40)
NB	0.21 (0.38)	0.03 (0.45)	0.57 (0.36)	0.34 (0.43)
QC	1.13*** (0.25)	0.99*** (0.28)	1.13*** (0.30)	0.98*** (0.30)
MB	- 0.17 (0.31)	- 0.04 (0.34)	- 0.14 (0.34)	- 0.06 (0.38)
SK	0.41 (0.34)	0.76* (0.42)	0.69 (0.43)	0.87* (0.47)
AB	- 0.16 (0.33)	0.18 (0.40)	0.63* (0.33)	0.82** (0.38)
BC	- 0.60** (0.31)	- 0.60* (0.34)	0.49* (0.30)	0.62* (0.34)
Constant	7.51 (7.68)	37.02* (19.23)	27.81*** (7.93)	56.01* (30.29)
	<i>N</i>	6,641	6,641	7,278
	<i>R</i> ²	0.15	0.01	0.15
Excluded instrument		Age ≥ 65		Age ≥ 65
First-stage result				
Age ≥ 65		0.16*** (0.03)		0.13*** (0.04)

Notes: *LSS* = life satisfaction score; IV 2SLS = instrumental variable two-stage least squares; OLS = ordinary least squares; robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.2.9: Partial versus Complete Subjective Retirement

Dependent Variable = <i>LSS</i>		OLS Model	IV 2SLS Model
Partial retirement		0.60*** (0.23)	2.67 (4.26)
Complete retirement		0.41** (0.19)	5.95** (2.91)
Female		0.53*** (0.14)	0.13 (0.24)
Age		0.15 (0.33)	-1.01 (0.81)
Age ²		-0.00 (0.00)	0.01 (0.01)
White		0.47 (0.33)	0.20 (0.40)
Immigrant		-0.68*** (0.23)	-0.64** (0.28)
Marital status			
	Widow or widower	-1.46*** (0.22)	-1.30*** (0.28)
	Divorced or separated	-3.01*** (0.24)	-2.61*** (0.34)
	Single	-2.14*** (0.34)	-1.79*** (0.39)
Education			
	Secondary	0.71*** (0.21)	0.71*** (0.24)
	Some post-secondary	0.43 (0.29)	0.68** (0.34)
	Post-secondary	0.81*** (0.17)	0.82*** (0.23)
Physical health (chronic conditions)		-0.65*** (0.04)	-0.74*** (0.06)
Household size		-0.03 (0.10)	0.06 (0.12)
Household income		0.00*** (0.00)	0.00*** (0.00)
Province			
	NL	0.24 (0.26)	-0.02 (0.31)
	PE	0.45* (0.27)	0.86** (0.36)
	NS	0.17 (0.24)	-0.17 (0.30)
	NB	0.38 (0.26)	0.17 (0.31)
	QC	1.13*** (0.20)	0.96*** (0.21)
	MB	-0.17 (0.23)	-0.08 (0.25)
	SK	0.50* (0.27)	0.78** (0.32)
	AB	0.22 (0.23)	0.490 (0.28)
	BC	-0.11 (0.21)	-0.08 (0.26)
Constant		18.52 (11.82)	60.30** (27.84)
<i>N</i>		13,919	13,919
<i>R</i> ²		0.15	0.03

Dependent Variable = <i>LSS</i>	OLS Model	IV 2SLS Model
Excluded instruments		Age ≥ 60, Age ≥ 65, Age ≥ 70
First-stage results—partial retirement		
Age ≥ 60		0.05** (0.02)
Age ≥ 65		-0.06*** (0.02)
Age ≥ 70		-0.03 (0.02)
First-stage results—complete retirement		
Age ≥ 60		0.02 (0.03)
Age ≥ 65		0.16*** (0.03)
Age ≥ 70		0.00 (0.02)

Notes: *LSS* = life satisfaction score; IV 2SLS = instrumental variable two-stage least squares; OLS = ordinary least squares; robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.2.10: Life Satisfaction Score by Retirement Status (Ordinary Least Squares Results)

Dependent Variable = <i>LSS</i>	Objective Retirement		Subjective Retirement	
	Not Retired	Retired	Not Retired	Retired
Female	0.39* (0.21)	0.52*** (0.17)	0.26 (0.21)	0.60*** (0.17)
Age	0.48 (0.44)	0.21 (0.19)	0.04 (0.30)	0.27 (0.19)
Age ²	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
White	0.29 (0.47)	-0.31 (0.43)	0.36 (0.48)	-0.34 (0.43)
Immigrant	-0.18 (0.37)	-0.63*** (0.23)	-0.15 (0.38)	-0.69*** (0.22)
Marital status				
Widow or widower	-5.03 (3.32)	-5.37*** (1.69)	-5.49** (2.56)	-5.05*** (1.75)
Divorced or separated	-5.90* (3.23)	-6.17*** (1.61)	-6.04** (2.42)	-5.98*** (1.67)
Single	-4.87 (3.23)	-4.76*** (1.63)	-5.12** (2.44)	-4.49*** (1.68)
Age × Married or Common Law	-0.07 (0.05)	-0.07*** (0.02)	-0.07* (0.04)	-0.06*** (0.02)
Education				
Secondary	0.72** (0.34)	0.43* (0.24)	0.81** (0.34)	0.40* (0.24)
Some post-secondary	-0.14 (0.47)	0.59* (0.32)	0.08 (0.48)	0.62** (0.30)
Post-secondary	0.78*** (0.30)	0.43** (0.18)	0.88*** (0.29)	0.41** (0.19)
Physical health (chronic conditions)	-0.49*** (0.06)	-0.55*** (0.04)	-0.47*** (0.06)	-0.56*** (0.04)
Household size	0.16 (0.24)	-0.32* (0.20)	0.03 (0.25)	-0.11 (0.19)
Household income	0.00** (0.00)	0.00 (0.00)	0.00* (0.00)	0.00 (0.00)
Household Size × Household Income	-0.00 (0.00)	0.00** (0.00)	-0.00 (0.00)	0.00 (0.00)
Province				
NL	0.14 (0.41)	0.08 (0.31)	0.19 (0.38)	0.01 (0.32)
PE	0.49 (0.37)	0.24 (0.34)	0.50 (0.35)	0.21 (0.36)
NS	-0.11 (0.37)	0.28 (0.28)	-0.13 (0.38)	0.25 (0.27)
NB	1.15*** (0.38)	0.03 (0.34)	1.13*** (0.37)	-0.02 (0.35)
QC	1.30*** (0.32)	1.43*** (0.21)	1.38*** (0.32)	1.36*** (0.21)
MB	-0.29 (0.35)	0.19 (0.26)	-0.21 (0.34)	0.13 (0.27)
SK	0.47 (0.37)	0.21 (0.28)	0.49 (0.35)	0.17 (0.29)
AB	0.67** (0.31)	-0.06 (0.29)	0.64** (0.31)	-0.04 (0.30)
BC	-0.44 (0.30)	0.13 (0.26)	-0.16 (0.30)	-0.12 (0.27)

Dependent Variable = <i>LSS</i>	Objective Retirement		Subjective Retirement	
	Not Retired	Retired	Not Retired	Retired
Sense of belonging	0.81*** (0.14)	0.61*** (0.09)	0.84*** (0.14)	0.61*** (0.09)
Affection	0.02 (0.08)	0.17*** (0.06)	0.01 (0.08)	0.18*** (0.06)
Social interaction	0.50*** (0.06)	0.32*** (0.04)	0.49*** (0.06)	0.32*** (0.04)
PASE	0.00 (0.00)	0.01*** (0.00)	0.00 (0.00)	0.01*** (0.00)
Social participation	0.40** (0.18)	0.38*** (0.11)	0.45** (0.19)	0.32*** (0.10)
Constant	1.31 (14.05)	11.09* (6.51)	15.06 (9.74)	8.44 (6.49)
<i>N</i>	5,325	8,282	5,472	8,135
<i>R</i> ²	0.23	0.26	0.23	0.27

Notes: *LSS* = life satisfaction score; PASE = Physical Activity Scale for the Elderly; robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Chapter 3: Is Retirement Bliss or Regret? Unraveling the Impact of Retirement on Life Satisfaction using Canadian Longitudinal Study on Aging

3.1 Introduction

Expanding on the initial findings from Chapter 2, which utilized cross-sectional data from the Canadian Community Health Survey (CCHS), this chapter employs longitudinal data from the Canadian Longitudinal Study on Aging (CLSA, 2015) to deepen my understanding of the long-term effects of retirement. The CLSA enables me to track the impact of retirement over time, providing a more comprehensive understanding of how retirement affects life satisfaction in the long run. This longitudinal approach addresses some of the self-selection biases and short-term limitations present in Chapter 2's analysis, offering deeper insights into how retirement shapes life satisfaction across different phases of the transition.

Retirement represents a significant milestone, bringing with it a mix of anticipation and uncertainty as individuals leave behind the structured routines of employment and embark on a new phase of life. This transition can lead to substantial shifts in social roles, financial stability, and personal identity, prompting important questions about its impact on overall life satisfaction. For many, retirement offers a long-awaited opportunity to engage in leisure activities, spend more time with loved ones, and pursue passions that were previously postponed. However, for others, it may introduce feelings of loss and uncertainty, particularly for those who find it challenging to adapt to the absence of a meaningful career and the new dynamics of this life stage.

The impact of retirement on life satisfaction varies significantly across individuals, influenced by a complex interplay of factors such as personal attitudes, financial and health conditions, life circumstances, and the strength of social connections. Several theoretical perspectives from psychology and sociology offer insights into this transition, each emphasizing different aspects of the adaptation process. For example, role theory examines the impact of the shift from work to non-work roles on life satisfaction, which can be positive or negative depending on an individual's role engagement. Continuity theory underscores people's tendency to rely on time-consistent life patterns to deal with life changes, with no adverse effects on their retirement adjustment, unless they

are unable to maintain these patterns. The life-course perspective views retirement as part of a continuum of experiences and developments that shape well-being, emphasizing the importance of the individual context of the transition and the interplay of different life spheres. Additionally, the resource perspective stresses the importance of access to and effective use of resources—such as physical, cognitive, motivational, financial, social, and emotional—for a smooth transition into retirement without a significant reduction in quality of life.

These theoretical perspectives suggest multiple pathways through which retirement might influence life satisfaction, though the direction of this influence remains uncertain. However, within the framework of a life-cycle model of consumption and leisure, which views retirement as an optimal choice during an individual's lifespan, we find that retirement tends to increase life satisfaction. Consumption smoothing implies no change in consumption when an individual transitions into retirement, but there is an increase in leisure and well-being. Even in cases of involuntary retirement, individuals can re-optimize their circumstances, potentially offsetting utility losses during the involuntary retirement phase with utility gains anticipated during the voluntary retirement phase.

Despite the predictions of the life-cycle model, which ignores non-economic factors and potential age-related declines in physical and cognitive abilities, empirical evidence on the impact of retirement on life satisfaction is mixed. Findings span a full range of possibilities, though positive effects generally outweigh negative or statistically insignificant effects. Most studies using panel data measure well-being using a single question about overall life satisfaction (or, less frequently, happiness) and rely on self-reported retirement status. However, few studies have explored the distinctions between partial and complete retirement ([Abramowska-Kmon and Łątkowski, 2021](#); [Tambellini, 2023](#)) or between voluntary and involuntary retirement ([Bonsang and Klein, 2012](#); [Hershey and Henkens, 2014](#)), and even fewer consider the role of a spouse's retirement ([Kettlewell and Lam, 2022](#)). Furthermore, only a handful of studies differentiate between short-term and long-term effects ([Hansson et al., 2018](#); [Merz, 2018](#); [Sohier et al., 2021](#); [Wetzel et al., 2016](#); [Zhu and He, 2015](#)). Most of these studies adopt estimation strategies that fail to fully address the potential endogeneity of the retirement variable or have a narrow focus, such as [Zhu and He's](#) study, which considers only women. Moreover, fewer than half of the relevant studies tackle the endogeneity problem of the retirement variable using an instrumental variable (IV) approach that relies on pension eligibility ages as (excluded) instruments to capture the exogenous variation in retirement decisions.

In this paper, I contribute to the literature on the relationship between life satisfaction and retirement by analyzing a rich longitudinal dataset describing a representative sample of Canadian residents aged 45 to 85 years. To date, I have three waves of data covering the periods from 2011 to 2021. The longitudinal nature of this dataset allows me to control for individual-specific characteristics that may influence both life satisfaction and retirement decisions, thereby addressing the issue of self-selection. This dataset enables me to fill several gaps in the existing literature. First, I employ a holistic measure of subjective well-being that is distinct from health indicators, providing a more nuanced understanding of life satisfaction. Second, I combine a subjective measure of retirement with an objective measure based on the official definition of retirement in Canada. As detailed in [Table A.3.1](#) in Appendix A, existing studies often rely on a single statement regarding self-reported overall life satisfaction and/or self-reported retirement, with one exception that is limited to cross-sectional analysis and cannot distinguish between short- and long-term effects of retirement due to the nature of the data ([Adawi et al., 2023](#)). While some studies use a more comprehensive (multi-item) measure of life satisfaction, they often fail to address potential endogeneity issues ([Calasanti et al., 2021](#); [Dingemans and Henkens, 2014](#); [Hansson et al., 2018](#); [Hershey and Henkens, 2014](#); [Prakash et al., 2022](#)). Third, I have access to extensive data on socio-economic, demographic, and contextual factors, physical activity and health, social support, and community engagement, allowing me to explore several questions that the existing literature does not consistently address or examine separately across different studies (e.g., voluntary versus involuntary retirement, partial versus complete retirement, short- versus long-term effects, spouse's retirement). Additionally, the dataset provides detailed information on reasons for retirement, enabling me to assess how these reasons influence the impact of retirement on life satisfaction.

Methodologically, I offer a comprehensive assessment that includes several estimation strategies: fixed effects (FE), random effects (RE), FE with instrumental variables (FEIV), and difference-in-differences (DiD) approaches. These methods allow me to account for the staggered nature of the retirement decision (my treatment variable) and consider group and time heterogeneity. While a few studies have employed the FEIV strategy, none have applied the DiD method, which is particularly appealing due to recent advances in the DiD literature. Both FEIV and DiD are suitable techniques for addressing endogeneity and estimating causal effects in panel data, but DiD has the advantage of simplicity (it does not require the selection of instruments or dealing with instrument validity concerns) and fewer assumptions, such as the assumption of parallel trends, which is more plausible than the assumptions required by IV methods. However, FEIV explicitly addresses endogeneity by using fixed effects to mitigate omitted variable bias and leveraging IV strategies to handle reverse

causality. The choice between these techniques often depends on practical considerations, such as data characteristics and research questions (e.g., availability of valid and strong instruments, and satisfaction of the parallel trend assumption). By implementing both strategies, I aim to assess the consistency and robustness of my results, not only in terms of direction but also in magnitude.

An important aspect of the CLSA dataset is its combination of two data collection methodologies: computer-assisted telephone interviews and in-home interviews coupled with assessments at specified CLSA sites, with a sizeable sub-sample under each. This dual approach offers the opportunity to evaluate whether the choice of surveying method significantly affects estimation results. While face-to-face surveys may represent the golden standard in survey research as they allow for direct interaction between the interviewer and the respondent, which can help establish rapport, clarify questions, and encourage participation, they are time-consuming and costly. In contrast, computer-assisted telephone surveys are more efficient and affordable but may result in lower data accuracy since clarifying questions and visual aids are not feasible.

Understanding how retirement affects life satisfaction is crucial for several reasons. At the individual level, this knowledge can help enhance the quality of life during retirement by enabling better preparation for the transition when the time to retire arrives (e.g., pre-retirement priorities and activities), informed decision-making (e.g., financial planning), and the development of coping strategies (e.g., building social support networks). At the policy level, governments can design retirement policies and support systems that promote positive retirement experiences, creating environments that celebrate later years as a time of growth, exploration, and happiness. At the organizational level, employers can guide the development of human resource practices and retirement transition programs that help employees navigate this life stage with a sense of purpose, fulfillment, and an enriched quality of life. Given the current trends in population aging, with a growing number of retirees, the study of how retirement influences life satisfaction is increasingly relevant as it impacts a broader segment of the population.

Across all empirical specifications and regardless of the retirement measure used, my findings consistently show that retirement, whether partial or complete, positively contributes to overall well-being. Transitioning from no retirement to complete retirement leads to heightened life satisfaction, while moving from partial to complete retirement has no statistically significant effect. The voluntariness of retirement is also critical, with voluntary retirement leading to higher life satisfaction scores compared to involuntary retirement, which shows no discernible impact.

Additionally, my results indicate that life satisfaction increases with age and decreases with retirement duration, though the marginal effects are small. Notably, the positive effects of retirement on life satisfaction persist for a lengthy period before diminishing. Marital status and income significantly influence life satisfaction, with those in marital or common-law relationships and individuals with higher incomes reporting higher levels of life satisfaction. This pattern holds across gender and education levels, though the effects are more pronounced among men and those with lower education. Similarly, when evaluating the impact of retirement on life satisfaction by motivation (pull versus push factors), we observe significant increases in life satisfaction among those retiring for pull reasons and negative effects for those retiring due to push factors. Moreover, estimation based solely on data from phone interviews yields larger retirement effects than those based on face-to-face interviews, although both methods confirm a strong relationship between retirement and life satisfaction.

The remainder of this paper is structured as follows: Section 3.2 reviews the relevant theoretical and empirical literature and provides statistical details about retirement and life satisfaction in Canada. Section 3.3 introduces a formal framework for analyzing decision-making before and after retirement. Section 3.4 describes the data, outcome variables, treatment variables, and covariates used in the empirical analysis. Section 3.5 details my identification strategies, focusing on FEIV and DiD approaches, and discusses the results. Section 3.6 conducts robustness checks to further confirm and validate my findings. Finally, Section 3.7 offers concluding remarks.

3.2 Literature Review

3.2.1 A Review of Theoretical Perspectives

The existing literature offers several theoretical frameworks to understand how retirement impacts life satisfaction, including role theory, continuity theory, stage theory, the life course perspective, the resource perspective, and the resource-based dynamic perspective. In this section, I summarize the key ideas of each approach, using the works of [Wang et al. \(2011\)](#), [Abramowska-Kmon and Łątkowski \(2021\)](#), and [Tambellini \(2023\)](#).

Role theory emphasizes the significance of role transition in the retirement adjustment process, from work roles (e.g., worker role, organizational member role, career role) to non-work roles (e.g., family member role, community member role). Depending on how individuals feel about their jobs, this transition can lead to either an improvement or a decline in life satisfaction upon retirement. People

who are strongly attached to their careers and identify closely with their jobs may feel lost and without purpose after retiring, which can lower their life satisfaction. On the other hand, those who find their jobs stressful and unpleasant are less likely to feel this loss of purpose. Instead, they are more likely to view retirement as a chance to leave behind a difficult situation. This change allows them to take on new roles that bring personal fulfillment and stronger social connections, ultimately leading to a better quality of life during retirement.

Continuity theory suggests that individuals tend to form their identities from multiple sources and roles (e.g., work, family, non-work-related social networks), exhibiting consistent patterns of behaviour, activities, and social engagement over time (Atchley, 1971 and 1989). When faced with life changes such as retirement, they often use familiar strategies to stabilize their lives and minimize stress. According to this theory, retirees who continue to engage in activities and relationships that are similar to those they had before retirement are likely to maintain their life satisfaction, unless they encounter difficulties in preserving their pre-retirement lifestyle and social connections.

Stage theory proposes that people go through different phases during significant life transitions like retirement, with each phase or stage associated with specific psychological and emotional processes. These phases typically start with a honeymoon stage, where there's excitement and enthusiasm as they explore new activities and roles. This is often followed by a disenchantment stage, where the challenges of retirement, like reduced resources or unrealistic retirement expectations, become more apparent. Next is the reorientation stage, where individuals reflect on their situation and make adjustments. Finally, there's a stability stage, where they settle into a more predictable and routine lifestyle in retirement. However, these stages aren't always experienced in a strict sequence; people might move back and forth between them, and the timing duration of each stage can vary greatly from person to person.

The life course perspective views retirement as both a transition and a trajectory, encompassing the development of post-retirement life. How individuals navigate this transition depends on specific circumstances, such as their demographic characteristics, financial and health status, and ability to adapt to life events and changes. Additionally, cumulative life experiences, like career achievements and social relationships, as well as the timing and nature of the retirement itself, play crucial roles. This perspective also emphasizes the interconnectedness of different life spheres: experiences in one area, such as work life, can significantly influence experiences in another, like marital life, and vice versa. As a result, people's perceptions of their retirement experiences—whether positive or

negative—may vary depending on factors like marital status and the strength of family role identification.

The resource perspective highlights how the availability of resources during retirement significantly influences individuals' life satisfaction. Central to this perspective is the idea that people can adjust more easily to retirement if they have access to a broad range of resources, which collectively represent their total capability to fulfill their essential needs. According to [Wang \(2007\)](#), this total capability includes physical resources (e.g., muscle strength), cognitive resources (e.g., processing speed and working memory), motivational resources (e.g., self-efficacy), financial resources (e.g., pensions and savings), social resources (e.g., social networks and support), and emotional resources (e.g., mood and affectivity).

Finally, the resource-based dynamic perspective offers an integrated framework that accounts for the longitudinal nature of retirement adjustment and the possibility of non-uniform adjustment patterns ([Wang et al., 2011](#)). According to this perspective, an individual's life satisfaction after retirement changes in response to gains and losses in personal resources—whether physical, cognitive, motivational, financial, social, or emotional. These fluctuations in satisfaction occur as resources increase or decrease over time. The availability of resources is influenced by factors at multiple levels, including societal policies (macro level), workplace practices (organizational level), job satisfaction (job level), family support (household level), and personal health and coping strategies (individual level). The strength of this perspective lies in its flexibility, allowing for a deeper understanding of how different people adjust to retirement in various ways over time.

While the aforementioned theories underscore important considerations that may affect how an individual experiences the transition into retirement, they do not offer a formal framework for analyzing decision-making pre- and post-retirement. In this regard, a life-cycle model presents a suitable setup to think of decisions about consumption and the mix of work and leisure during an individual's expected lifespan as a non-dependent. Within this model, I describe the objective of a representative individual as maximizing the present value of utility (i.e., life satisfaction) streams over the independent lifespan, subject to the constraint that the present value of income streams is equal to the present value of expenditure streams. Employing a constant-elasticity-of-substitution utility function, I consider three scenarios based on the relationship between the intertemporal elasticity of substitution and the intratemporal elasticity of substitution and find that life satisfaction tends to increase upon retirement independently of whether retirement is voluntary or involuntary

in all instances but when the intratemporal elasticity of substitution falls short of the intertemporal elasticity of substitution. I provide details of the analytical derivations when the two elasticities coincide and the results of the numerical simulations when the two elasticities differ in Section 3.3.

3.2.2 A Review of Empirical Findings

Retirement research is substantial, with much of the focus on its health ramifications, yet the findings have been unable to provide a clear picture.¹ In contrast, the literature examining how retirement affects life satisfaction is less extensive, making it a fertile area for further contributions. The evidence available to date is more promising, indicating a predominantly positive impact.² However, findings from different studies vary widely in both the presence and direction of effects, often influenced by diverse well-being measures and research conducted in various parts of the world.

Panel studies reporting a positive effect on life satisfaction include those from Australia ([Heybroek et al., 2015](#); [Kettlewell and Lam, 2022](#); [Zhu and He, 2015](#)), Canada ([Latif, 2011](#)), Finland ([Prakash et al., 2022](#)), the Netherlands ([Hershey and Henkens, 2014](#)), Germany ([Merz, 2018](#); [Wetzel et al., 2016](#)), Sweden ([Hansson et al., 2018, 2020](#)), a cross-section of European countries alongside the United States ([Fonseca et al., 2017](#)), and the United States ([Calasanti et al., 2021](#), for men; [Charles, 2004](#), for the OLS and FE regressions; [Gorry et al., 2018](#)).

Conversely, panel studies identifying a negative effect are reported from a cross-section of countries ([Dingemans and Henkens, 2019](#); [Nikolova and Graham, 2014](#)) and the United States ([Calasanti et al., 2021](#) for women; [Charles, 2004](#), for 2SLS regression). Meanwhile, studies finding no statistically significant effect include those from Germany ([Abolhassani and Alessie, 2013](#); [Bonsang and Klein, 2012](#)), Poland ([Abramowska-Kmon and Łątkowski, 2021](#)), a cross-section of European countries ([Sohier et al., 2021](#); [Tambellini, 2023](#)), and the United Kingdom ([Kesavayuth et al., 2016](#)).

In the relatively few cross-sectional studies available, the majority report positive effects, such as those observed among completely retired men in Canada ([Adawi et al., 2023](#)), South Korea ([Cho and Lee, 2014](#)), and during the years surrounding retirement ([Horner, 2014](#)). However, [Cho and Lee](#)

¹ For a glimpse of retirement effect heterogeneity (in terms of both direction and magnitude) across different dimensions of health (mental, physical, self-assessed/general, healthcare utilization, and mortality), see [Filomena and Picchio \(2023\)](#), a recent meta-analysis of 308 observations from 85 academic publications over the 2000 to 2021 period.

² To clarify, it is not uncommon for studies on life satisfaction to include papers that explore the relationship between depression and retirement in their literature discussions (e.g., [Fonseca et al., 2017](#)), leading to the conclusion that the effect of retirement on life satisfaction is more heterogeneous than I posit. In this paper, I adopt a rigorous separation between life satisfaction and depression, stripping the former of any health connotation.

(2014) suggest differential effects across countries: retirees in Germany and Switzerland experience a decline in life satisfaction, while Horner (2014) finds that the initial substantial increase in well-being at the start of retirement may be short-lived, followed by a rapid decline.³

Moreover, some panel studies explore the impact of involuntary retirement or retirement with bridge employment on life satisfaction, while others examine short- and long-term effects. Evidence suggests that life satisfaction likely decreases when retirement is involuntary but remains unchanged (Bonsang and Klein, 2012) or increases (Hershey and Henkens, 2014) when retirement is voluntary. Voluntary retirees tend to report higher life satisfaction than their involuntarily retired counterparts, as highlighted in a study focusing solely on retirees (Dingemans and Henkens, 2014).

Regarding partial retirement (or retirement with bridge employment) versus complete retirement (or retirement without bridge employment), Abramowska-Kmon and Łątkowski (2021) focus on men and find that men engaged (not engaged) in bridge employment feel less (more) lonely. Tambellini (2023) focuses on women and finds that women experience an increase in life satisfaction if they retire from part-time rather than full-time work. Contrarily, a cross-sectional study (Adawi et al., 2023) suggests that partial retirement has no impact on life satisfaction, though complete retirement increases life satisfaction at least among men. The short-term effects of retirement do not last and turn negative in the long term. The collection of studies on the long-term impact of retirement indicates that while there may be positive effects in the short term, these benefits diminish over time and eventually become negative (Hansson et al., 2018; Merz, 2018; Wetzels et al., 2016; Zhu and He, 2015). Similarly, Sohler et al. (2021) find that while the short-term effect is insignificant, the long-term effect (two years post-retirement) is negative.

Lastly, Kettlewell and Lam (2022) report a positive impact of a spouse's retirement when social support is low. Hansson et al. (2020) document that personality traits influence life satisfaction—extroverts feel more satisfied while neurotics feel less satisfied with retirement. Prakash et al. (2022) uncover some heterogeneity in the effect, finding that retiring women and those with suboptimal health or without a spouse experience a larger increase in life satisfaction. The notion of heterogeneous effects is further supported by Heybroek et al. (2015) and Pinguart and Schindler (2007). While neither study classifies groups based on observable characteristics, they identify

³ Another interesting finding in Horner (2014) is that the timing of retirement (earlier versus later) does not yield notably different long-term effects on subjective well-being, implying that policymakers can increase retirement age to improve financial stability without having to worry about adversely impacting people's psychological well-being.

different life satisfaction experiences during the retirement transition ([Heybroek et al., 2015](#)) or in the long run compared to the short run ([Pinquart and Schindler, 2007](#)).

The wide range of findings regarding the role of retirement across these studies may be attributed to differences in research methodologies, sample characteristics, cultural and societal contexts, and measures of life satisfaction. Most studies use a one-item measure of life satisfaction and self-reported retirement status, and fewer than half employ appropriate estimation strategies to address the likely endogeneity problem caused by omitted variables that affect both life satisfaction and retirement and/or the possibility of reverse causality—where life satisfaction might influence the decision to retire. Furthermore, the potential for different channels of impact, as described by the theoretical perspectives, may lead to divergent implications for how retirement affects life satisfaction. A key shortcoming in the existing literature, partly due to data limitations, is the lack of nuanced exploration of the diverse theoretical mechanisms at play in the retirement experience.

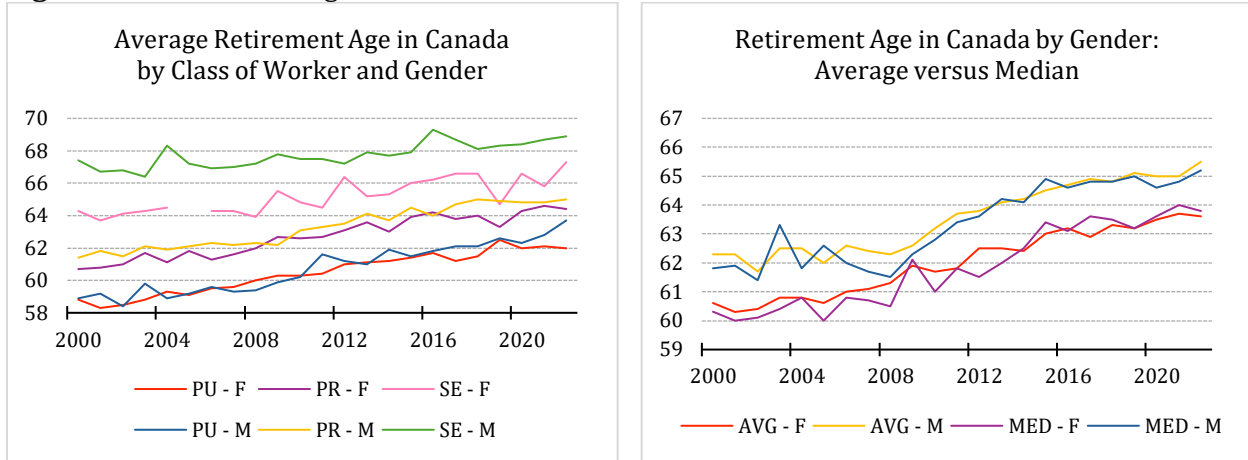
3.2.3 Retirement and Life Satisfaction in Canada

As the focus of my study is Canada, in this section I review retirement and life satisfaction statistics in Canada and provide an overview of the Canadian pension system. Based on recent figures from Statistics Canada, the national retirement age has consistently increased from 2000 to 2022 across all classes of workers—public sector (PU), private sector (PR), and self-employed (SE)—and for both men (M) and women (F). [Figure 3.1](#) shows the mean retirement age by class of worker and gender, as well as the mean and median retirement ages by gender. Some key observations include: (i) a consistent upward trend in retirement age, regardless of class of worker and gender; (ii) men tend to remain in the labour force longer than women; (iii) the self-employed category consistently exhibits the largest retirement age differential between men and women; and (iv) retirement age is highest for self-employed workers and lowest for public sector workers, regardless of gender. A comparison of means also reveals that, over the 2010 to 2020 period,⁴ the average retirement age increased by 1.8 years for both women (from 61.7 to 63.5 years) and men (from 63.2 to 65 years). During the same period, expected longevity for a woman in her early 60s increased by 0.46 years (from 24.24 to 24.7 years at 62 years of age), while expected longevity for a man in his early 60s increased by 0.7 years (from 20.31 to 21.01 at 63 years of age). At first glance, these trends suggest

⁴ The choice of timeframe (from 2010 to 2020) stems from two considerations: (1) Canada had mandatory retirement at the age of 65 years until 2009; (2) at present, longevity figures from Statistics Canada run to 2020 ([Statistics Canada. Table 13-10-0837-01](#)).

that factors beyond the prospect of a longer life may be influencing the decision to retire later, but exploring these factors, while valuable, is beyond the scope of this paper.

Figure 3.1: Retirement Age in Canada



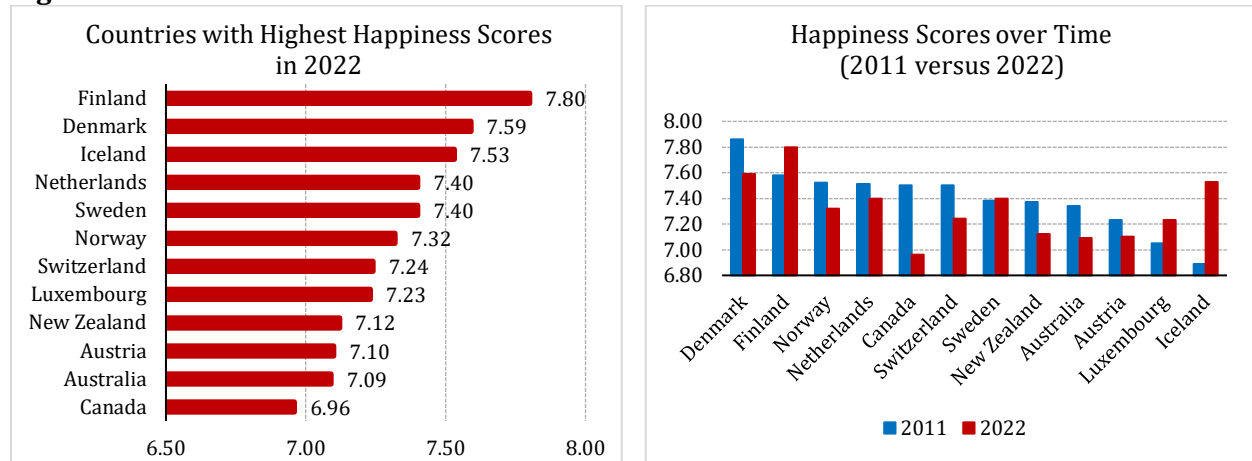
Source: [Statistics Canada, Table 14-10-0060-01](#)

To provide an overview of life satisfaction scores in Canada and globally, I use data from the Gallup World Poll, featured in the annual World Happiness Report (WHR). The poll asks individuals to assess their overall life satisfaction using the Cantril ladder, which ranges from 0 (worst possible life) to 10 (best possible life). Approximately 1,000 respondents per country participate each year, and the weighting of their answers helps create representative national averages for each year in each country. Based on data from the first WHR ([Helliwell et al., 2012](#)) and last WHR ([Helliwell et al., 2023](#)), [Figure 3.2](#) shows that Canada is among the happiest countries in 2022, with a score just slightly below 7, when the highest score, which Finland enjoys, is 7.8. However, life satisfaction in Canada has been declining over the past decade; a trend shared with other countries (e.g., Australia, Norway, Switzerland, and New Zealand). Canada has experienced the largest decline over the past decade, with a 7.2% drop in life satisfaction leading to a fall in ranking from 5th place in 2011 to 13th place in 2022. Among other countries experiencing similar declines, Switzerland experienced a 3.5% drop in average score, while Norway fell from 3rd to 7th place in the ranking. Conversely, Iceland and Luxembourg experienced substantial gains, moving up 17 and 7 places, respectively.

Finally, I describe the Canadian pension system, which sets the normal retirement age at 65 years and includes a standardized flat-rate benefit with potential top-ups, such as income-tested benefits

for those needing additional assistance, earnings-related public schemes, and voluntary private pensions.⁵

Figure 3.2: Life Satisfaction Scores



Source: World Happiness Report, 2012 and 2023

For standardized flat-rate benefits, the Old Age Security (OAS) program provides a basic pension to seniors based on residence and legal status. To qualify for the full OAS pension, individuals must have lived in Canada for at least 40 years after reaching the age of 18 years. Those who fall short of meeting the requirement for the full pension but who have resided in Canada for at least 10 years after turning 18 years old receive a partial benefit, calculated at a rate of 1/40th of the full pension for each complete year of Canadian residency. Deferring the OAS pension for up to 5 years increases the benefit by 0.6% per month, up to a maximum of 36% if collection begins at age 70.

Earnings-based benefits are available through the Canada Pension Plan (CPP), which requires at least one valid contribution to the CPP from work in Canada or credits from a former spouse or common-law partner at the end of the relationship. Although the eligibility age is 65, individuals can opt for a reduced pension starting at age 60 or an augmented pension up to age 70. An earlier CPP claim results in a 0.6% reduction per month, up to 36% at age 60, while a later CPP claim results in a 0.7% increase per month, up to 42% at age 70. The CPP covers virtually all employed and self-employed individuals in Canada, except for Quebec, which manages its own Quebec Pension Plan (QPP), a similar provincially administered public plan.

For additional assistance, the Guaranteed Income Supplement (GIS) program provides an income-tested benefit. Like the OAS benefit, the GIS benefit is not claimable before age 65, but, unlike the OAS

⁵ For more details about the Canadian pension system, see <http://www.canada.ca/en/services/benefits/publicpensions.html> and OECD (2021).

benefit, it cannot be deferred. According to the most recent data, between April 2020 and March 2021, 2.2 million retirees received GIS benefits, totaling \$13.7 billion annually.⁶

Finally, individuals can save for retirement through occupational pension plans and/or Registered Retirement Savings Plans (RRSPs). The former includes defined benefit schemes, defined contribution schemes, or hybrids of the two. However, the latter offers government-assisted retirement savings options, through banks and insurance companies, that carry tax exemption of capital gains and accrued interests until withdrawal. In 2021, over 6.6 million members were enrolled in registered pension plans ([Statistics Canada, Table 11-10-0133-01](#)), and 6.3 million people (24% of all tax filers) contributed to RRSPs, totalling \$56.1 billion in contributions, with a median contribution of \$3,890 ([Statistics Canada, Table 11-10-0044-01](#)).

3.3 A Life-Cycle Model of Retirement and Life Satisfaction

While the theories discussed in sub-section 3.2.1 highlight important considerations that may affect how an individual experiences the transition into retirement, they do not offer a formal framework for analyzing decision-making pre- and post-retirement. In this regard, a life-cycle model presents a suitable framework to analyze decisions about consumption and the balance between work and leisure over an individual's expected lifespan as a non-dependent variable. Within this model, the objective of a representative individual is to maximize the present value of utility streams over the independent lifespan, subject to the constraint that the present value of income streams is equal to the present value of expenditure streams. In this framework, utility corresponds to life satisfaction.

Specifically, using a constant-elasticity-of-substitution utility function as described by [Skinner \(2007\)](#) and [Bonsang and Klein \(2012\)](#), the representative individual's problem can be expressed as:

$$\max V(\cdot) = \frac{1}{(1 - \gamma^{-1})} \sum_{t=0}^T \frac{[C_t^{(1-\rho^{-1})} + \eta L_t^{(1-\rho^{-1})}]^{(1-\gamma^{-1})/(1-\rho^{-1})}}{(1 + \delta)^t} \quad (3.1)$$

with respect to C_t and L_t for each t subject to:

$$S_0 + \sum_{t=0}^{T^*-1} \frac{w(1 - L_t) - \xi L_t}{(1 + r)^t} + \sum_{t=T^*}^T \frac{p - \xi}{(1 + r)^t} = \sum_{t=0}^T \frac{C_t}{(1 + r)^t} \quad (3.2)$$

⁶ See the 2022 report of Canada's Office of the Audit General titled "Access to Benefits for Hard-to-Reach Populations: Independent Auditor's Report" at <https://publications.gc.ca/site/eng/9.908562/publication.html>.

where C_t and L_t denote consumption and leisure at time t , γ and ρ represent the intertemporal and intratemporal elasticities of substitution,⁷ η represents the relative taste for leisure, ξ is the per-unit cost of leisure (e.g., costs associated with leisure activities such as travelling),⁸ S_0 represents wealth at the start of the independent lifespan, w and p are per-period earnings from work in the first instance and pension in the second instance, and δ and r are the subjective rate of time preference and the rate of interest which I assume to be identical as per common practice. Without any loss of generality, I normalize the per-period level of time resource to one, so that the amount of time spent at work per period is equal to $1 - L_t$. Hence, intertemporal budget constraint is expressed as in (3.2), considering that at T^* , the individual determines that it is optimal to retire and expects to spend $T - T^*$ periods in full retirement.

To motivate optimal retirement, I assume an increase in the parameter η , conjecturing that people's relative taste for leisure increases with age. At some point, this increase is significant enough that continuing to work is no longer optimal, or part-time work is optimal but not available, making the utility of complete retirement outweigh the utility of continuing full-time work.⁹ Although one might expect η to increase gradually, I allow the parameter to jump at T^* in my numerical simulation of the model for analytical convenience, but without any loss of generality, acknowledging that gradual adjustments in the labour-leisure mix are likely unviable. The idea that the relative taste for leisure increases with age resonates with the findings of [Bonsang and Klein \(2012\)](#), who report that retirees enjoy a higher satisfaction with free time, particularly if retirement is voluntary.

Using that $\delta = r$ and expressing ρ in terms of γ , that is, $\rho = \alpha\gamma$, I summarize the solution to the individual's problem in terms of the following conditions:

$$C_t = \lambda_0^{-\gamma} \left[\frac{1}{1 + \eta^{\alpha\gamma} (w + \xi)^{1-\alpha\gamma}} \right]^{\gamma(1-\alpha)/(1-\alpha\gamma)} \quad (3.3)$$

⁷ Letting $U_t = (1 - \gamma^{-1})^{-1} Z_t^{(1-\gamma^{-1})}$, where $Z_t = [C_t^{(1-\rho^{-1})} + \eta L_t^{(1-\rho^{-1})}]^{(1-\rho^{-1})^{-1}}$, I can express the intertemporal elasticity of substitution, which measures the ease of substituting utility from one period to the next, as $\frac{\partial \ln(Z_{t+1}/Z_t)}{\partial \ln(MU_t/MU_{t+1})}$. The intratemporal elasticity of substitution, which measures the ease of substituting leisure for consumption at each point in time, is equal to $\frac{\partial \ln(C/L)}{\partial \ln(MU_L/MU_C)}$.

⁸ An alternative approach to capturing the presence of direct costs associated with activities in support of leisure is to introduce a consumption good that is complementary with leisure; however, for the purpose of highlighting the predictions of the life cycle model about the effect of retirement on life satisfaction (or utility), the added analytical complexity from a three-good utility function is unwarranted.

⁹ Alternatively, part-time work is available but at a lower pay, which would make leisure more attractive to the point that the individual would find complete retirement utility-enhancing.

and

$$L_t = \lambda_0^{-\gamma} \left(\frac{\eta}{w + \xi} \right)^{\alpha\gamma} \left[\frac{1}{1 + \eta^{\alpha\gamma} (w + \xi)^{1-\alpha\gamma}} \right]^{\gamma(1-\alpha)/(1-\alpha\gamma)}, \quad (3.4)$$

for $t = 0 \dots T^* - 1$, and

$$C_t = \begin{cases} \left(-0.5\eta + 0.5\sqrt{\eta^2 + 4\lambda_0^{1-2\gamma}} \right)^{2\gamma/(2\gamma-1)} & \text{if } \alpha = 2, \\ \lambda_0^{-\gamma} & \text{if } \alpha = 1, \\ \left(-0.5\eta^{-1} + 0.5\sqrt{\eta^{-2} + 4\eta^{-1}\lambda_0^{(\gamma-2)}} \right)^{0.5\gamma/(1-0.5\gamma)} & \text{if } \alpha = 0.5, \end{cases} \quad (3.5)$$

for $t = T^* \dots T$ when $L_t = 1$, as the marginal utility from working falls short of the marginal cost of working. Here, λ_0 represents the marginal utility of the initial wealth, which I obtain from the equation after incorporating (3.3) through (3.5). The three values of α represent three scenarios where the intertemporal elasticity of substitution is lower than, equal to, or greater than the intratemporal elasticity of substitution, with specific values chosen to facilitate analytical derivations. In fact, when $\rho \neq \gamma$, the optimal C_t level during retirement entails solving

$$Y_t + \eta Y_t^{\gamma/\rho} = \lambda_0^{\gamma(\rho-1)/(\gamma-\rho)}, \quad (3.6)$$

where $Y_t = C_t^{(1-\rho)/(\gamma-\rho)}$, and the task is very straightforward for $\alpha = 0.5$ and $\alpha = 2$.

Comparing equation (3.3) with (3.5) reveals that consumption does not change upon retirement if $\rho = \gamma$ or $\alpha = 1$, in which case:

$$\lambda_0 = \left\{ \frac{S_0 + aw + b(p - \xi)}{a[1 + \eta^\rho (w + \xi)^{1-\rho}] + b} \right\}^{-1/\rho}, \quad (3.7)$$

where:

$$a = \sum_{t=0}^{T^*-1} \left(\frac{1}{1+r} \right)^t \quad \text{and} \quad b = \sum_{t=T^*}^T \left(\frac{1}{1+r} \right)^t. \quad (3.8)$$

If consumption does not decrease but leisure increases to its maximum level once the representative individual retires at T^* , the per-period utility level must increase, and I thus expect life satisfaction

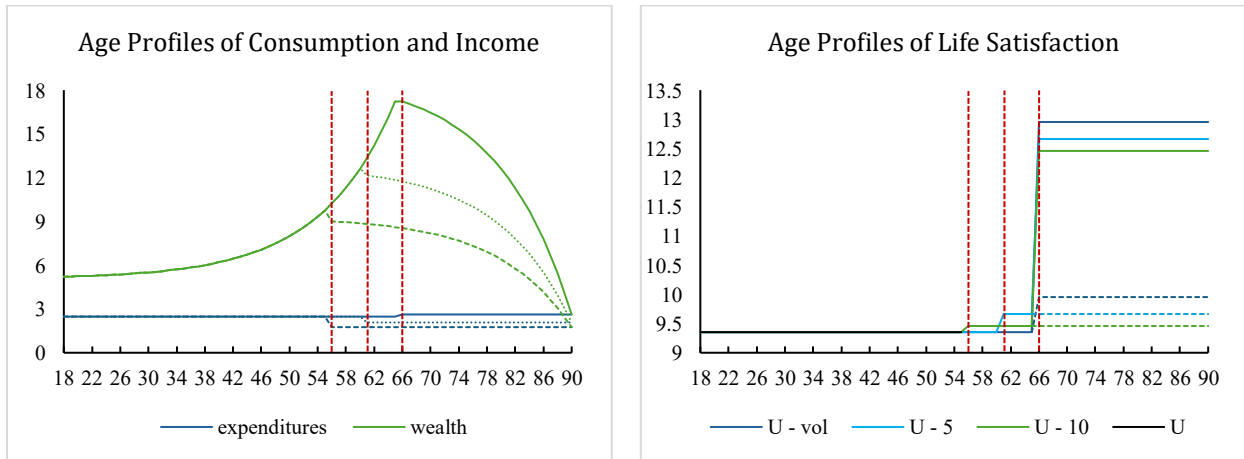
to be higher during retirement. But what happens if a negative shock forces the individual to retire before T^* ? I would expect consumption to decrease; however, it is not obvious that the net effect on utility is negative, as argued by Skinner (2007) and Bonsang and Klein (2012), given that the individual can substitute utility from one period to another and trade-off part of the higher utility anticipated during retirement to offset the utility loss from the negative shock. For example, in the $\rho = \gamma$ case,¹⁰ if involuntary retirement occurs at $T^* - \varepsilon$, the individual can adjust consumption over the residual lifespan to:

$$C_t = p - \xi + S_{T^*-\varepsilon-1}(1+r) \sum_{t=T^*-\varepsilon}^T (1+r)^{T^*-\varepsilon-t} \quad (3.9)$$

for $t = T^* - \varepsilon \dots T$.

For the remaining analysis, I rely on numerical solutions, based on the above decision-making conditions and the following assumptions: $\gamma = 1.2$, $\rho = 1.2\alpha$ (for $\alpha = 0.5, 1$, and 2), $\eta = 0.5$ in the pre-retirement phase and $\eta = 1$ in the post-retirement phase, $\delta = r = 0.1$, $\xi = 0.2$, $p = 1$, $T^* = 66$ (with the lifespan of an independent individual beginning at 18 years of age and expected to end at 90 years of age), and $w = S_0 = 3$.¹¹ I can then derive the marginal utility of the initial wealth as $\lambda_0 = 0.80$ if $\alpha = 2$ ($\gamma < \rho$), $\lambda_0 = 0.48$ if $\alpha = 1$ ($\gamma = \rho$), and $\lambda_0 = 1.26$ if $\alpha = 0.5$ ($\gamma > \rho$) and proceed to graphing the key variables over times.

Figure 3.3: Life-Cycle Model Predictions when $\alpha = 1$



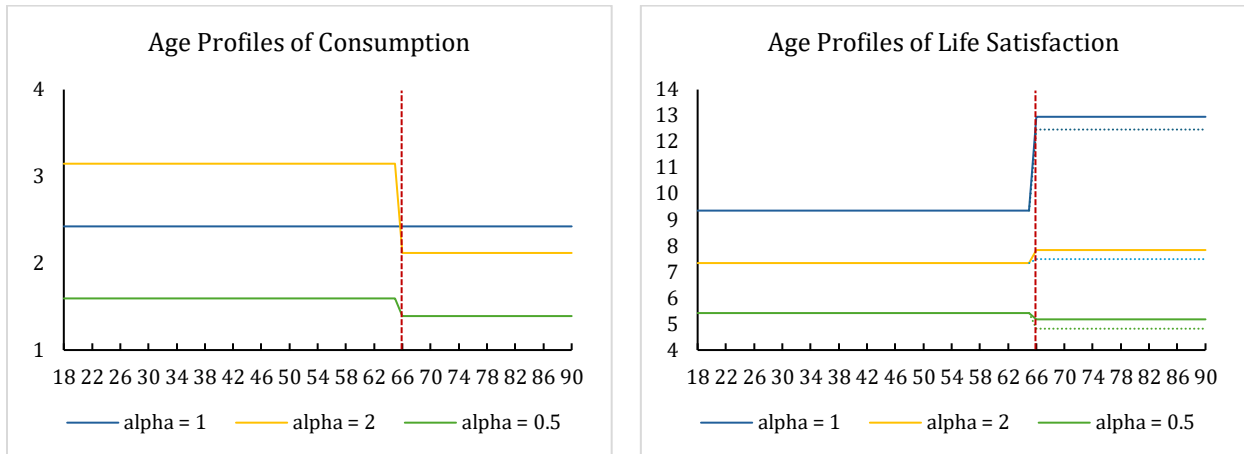
¹⁰ When $\rho = \gamma$, the fact that $\eta = 0.5$ for $T^* - 5 \leq t < T^*$ (involuntary retirement interval) and $\eta = 1$ for $T^* \leq t \leq T$ (voluntary retirement interval) does not affect the consumption choices in the two intervals, but the utility level in the first interval is inevitably lower than the utility level in the second interval.

¹¹ Although the unit of measurement for the dollar parameters is inconsequential, I can easily assume that w , p , and S_0 are in \$10,000s, so that C_t is also in \$10,000s. Additionally, I normalize the per-period total available time to 1.

Figure 3.3 pertains to the $\alpha = 1$ case and describes the time profiles of expenditures and wealth both when retirement is voluntary and when it is involuntary, occurring five or ten periods before its optimal time at T^* (i.e., at 61 and 56 years of age). The figure also compares the time profiles of life satisfaction (or utility) across the three cases. A negative shock forcing an individual to retire earlier lowers both expenditure and wealth over the remaining lifespan, but life satisfaction increases independently of whether retirement is voluntary or involuntary. Moreover, in the latter case, life satisfaction increases independently of when retirement begins (i.e., 5 or 10 years before the ideal age). However, the timing of involuntary retirement affects the magnitude of the changes: the closer the individual is to the ideal retirement age when involuntarily retired, the smaller the drop in expenditures and wealth and the larger the increase in life satisfaction during retirement. It is important to underscore that the increase in life satisfaction during retirement, whether voluntary or involuntary, occurs even at the original η . The dotted sections of the age profiles of life satisfaction for $66 \leq t \leq 90$ represent utility levels at the original η , which are still greater than the pre-retirement utility level, albeit lower than the corresponding utility levels at the higher η (solid sections).

Figure 3.4 compares consumption and life satisfaction profiles across the three α values and clearly illustrates that, when the two elasticities of substitution differ, post-retirement consumption is always lower than pre-retirement consumption. The reduction in consumption as an individual transitions into retirement at 66 years of age is larger when the intertemporal elasticity is smaller than the intratemporal elasticity ($\gamma < \rho = 2\gamma$), but, in this instance, the pre-retirement consumption level is also larger than when $\gamma = \rho$ and even larger than when $\rho = 0.5\gamma < \gamma$. Included in the figure are also the utility levels that prevail if the individual is able to respond to the increase in η at 66 years of age by working less and thus spending more time on leisure (dotted sections); in all instances, retirement is a better choice as it yields a higher utility level.

Figure 3.4: Life-Cycle Model Predictions at Different Values of α



As Figure 3.4 illustrates, retirement can lower life satisfaction when the intratemporal elasticity of substitution falls short of the intertemporal elasticity of substitution (i.e., $\alpha = 0.5$). *Ceteris paribus*, different values of ρ correspond to different bundle choices; specifically, in comparison to someone with $\gamma = \rho$, an individual with a higher (lower) ρ can more (less) readily switch between consumption and leisure and optimally selects a bundle with more (less) consumption and less (more) leisure. Upon retiring, the high- and low- ρ individuals adjust their consumption level downward, but, for the latter, who is already enjoying more leisure, the increase in leisure to its maximum level is inevitably smaller and cannot generate a utility gain sufficient to compensate for the utility loss from the decrease in consumption. Interestingly, if an individual responds to the increase in η as per equation (3.4) by remaining employed but working less, thus increasing the proportion of time devoted to leisure, utility increases in all instances but when $\rho < \gamma$ (dotted sections), where the individual cannot easily adapt to the change by substituting leisure for consumption.

3.4 Description of Data and Variables

I utilize data from the Canadian Longitudinal Study on Aging (CLSA), an extensive and comprehensive project aiming at learning about the aging process, health factors, and quality of life of the Canadian population. Initiated in 2010, the study tracks a diverse cohort of 51,338 randomly selected Canadian residents aged 45 to 85 years at the time of enrollment, with the intention of observing them for a minimum of 20 years or until their passing. Currently, I have three waves of data (baseline collection and two follow-up collections), covering the period from 2011 to 2021. The data collection is based on two methodologies or sampling designs: computer-assisted telephone interviews for the Tracking

Cohort (TRM), and in-home interviews coupled with assessments at the CLSA Data Collection Sites for the Comprehensive Cohort (COM). [Table B.3.1](#) in Appendix B summarizes measures collected by domain and sampling design.

The 21,241 TRM participants are from the ten Canadian provinces, while the 30,097 COM participants live within 25 to 50 km of one of the eleven CLSA Data Collection Sites. The sample draws from various sources: (1) the Canadian Community Health Survey – Healthy Aging (only for the TRM cohort); (2) Provincial Health Registries; (3) Telephone Sampling Random Digit Dialing; and (4) the Quebec Longitudinal Study on Nutrition and Aging (only for the COM cohort in Quebec). However, the sample excludes residents of the three territories, persons living on federal First Nations reserves and other First Nations settlements in the provinces, full-time members of the Canadian Armed Forces, individuals living in institutions (e.g., long-term care institutions), individuals with cognitive impairment as determined by the CLSA interviewing team, and individuals unable to communicate in English or French.

The sample includes two sets of weights: inflation weights, which estimate how many individuals in each province and across Canada each CLSA participant represents and are useful in descriptive analyses to provide unbiased (representative) estimates of population means and proportions of key variables; and analytic weights, which are essentially inflation weights rescaled to sum to the sample size within each province and are useful in regression analyses to estimate associations among variables when the population at hand is not a relevant consideration.¹²

3.4.1 Outcome Variables

For my outcome variable, that is, life satisfaction, the CLSA provides data using one of the most widely recognized psychometric measures of well-being: the Satisfaction with Life Scale (SWLS) developed by [Diener et al. \(1985\)](#). This scale consists of five statements related to an individual's overall life satisfaction:

1. "In most ways, my life is close to my ideal."
2. "The conditions of my life are excellent."
3. "I am satisfied with my life."

¹² More details about the weights are available in the CLSA Technical Document 2023 ([CLSA, 2023](#)).

4. "So far, I have gotten the important things I want in life."
5. "If I could live my life over, I would change almost nothing."

Respondents rate their agreement with each statement on a 7-point scale, where 1 represents strong disagreement and 7 represents strong agreement, resulting in a total score that ranges from 5 to 35. Life satisfaction is then classified into seven categories: individuals are considered extremely satisfied if their SWLS score is between 31 and 35, and extremely dissatisfied if their SWLS score is between 5 and 9. The remaining categories are satisfied (scores 25-29), slightly satisfied (scores 20-24), neutral (score 20), slightly dissatisfied (scores 15-19), and dissatisfied (scores 10-14).

In this paper, I use the above five-category measure that ranges between 5 and 35 but also create a weighted average of the five indicators (or categories) based on factor extraction by the principal-component factor method. This method is preferred for developing composite measures due to its simplicity and its ability to generate weights that reflect the importance of each individual indicator. The idea of the principal-component factor technique is to generate linear combinations of the original indicators such that the first component (combination) captures the largest amount of variability in the data, the second component, which is uncorrelated with the first, captures the next largest amount, and so on and so forth. The technique, like other conventional factor-extraction techniques, relies on the matrix of Pearson correlations, assuming that the variables are continuous and follow a multivariate normal distribution. In the presence of dichotomous or ordinal variables, a more appropriate approach is to conduct the factor-extraction analysis using a polychoric correlation matrix.¹³

To construct a life satisfaction index using the factor analysis results, I extract the number of factors to retain upon applying the principal-component factor method to the polychoric correlation matrix. The standard practice is to focus on factors that (1) have eigenvalues greater than one, (2) individually contribute more than 10% to the overall variance of the data, and (3) cumulatively contribute more than 60% to the overall variance of the data. After identifying the number of factors necessary to represent the data, I rotate them to minimize the number of items that have high loadings on the same factor, thus simplifying the interpretation of the results as, after rotation, each

¹³ The polychoric correlation between two ordinal variables is the maximum likelihood estimate of the correlation between the two unobserved continuous variables that underlie the two observed ordinal variables under the assumption that the two unobserved continuous variables follow a bivariate normal distribution. However, even with markedly skewed distributions, the Gaussian theory gives first approximations of the correlation coefficients within ± 0.05 of their true values (Pearson and Heron, 1913). Consequently, for the purpose of computing polychoric correlation coefficients, and particularly for large samples, whether the actual joint distribution differs from the normal distribution is practically inconsequential.

item is associated with only one factor and each factor represents only a small number of items. From the initial (pre-rotation) factor solution, I identify one factor that satisfies the above three requirements, explaining 70% of the total variation in the data; with only one factor to retain, rotation becomes irrelevant. I then calculate the weights associated with the five indicators by squaring the factor loadings and scaling them to sum to one. Details of this process are provided in Appendix B, [Table B.3.2](#). The resulting weights were very similar, suggesting that computing a life satisfaction index as the arithmetic average of five indicators is reasonable. However, the first three indicators (i.e., “in most ways, my life is close to my ideal”; “the conditions of my life are excellent”; “I am satisfied with my life”) were the most relevant, and the last one (i.e., “if I could live my life over, I would change almost nothing”) was the least relevant.

It is worth noting that the SWLS differs from many other well-being measures in that it assesses an individual’s overall life satisfaction, providing a global evaluation of one’s life rather than focusing on specific domains of life.¹⁴ As a measure of the ‘cognitive’ component of subjective well-being,¹⁵ the SWLS is popular due to its simplicity, brevity, and ease of use but also from its cross-cultural applicability (e.g., [Galanakis et al., 2017](#)), high internal consistency (e.g., [Pavot and Diener, 1993](#)), good test-retest reliability (e.g., [Pavot et al., 1991](#)), strong validity (e.g., [Diener et al., 1985](#); [Pavot and Diener, 1993](#)), and predictive power (e.g., [Lyubomirsky and Lepper, 1999](#)). Moreover, many of the existing well-being measures resemble general health measures, likely reflecting the WHO definition of health as “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity” ([WHO, 1946](#)). While the line between general well-being and general health may be blurry, subjective well-being focuses on how individuals think and feel about the quality of their own lives and is thus different from health. In this regard, the SWLS is clearly distinctive from health, which is not to say that health does not influence how individuals respond to the five questions comprising the SWLS.¹⁶

¹⁴ Of the 99 measures of well-being reviewed in [Linton et al. \(2016\)](#), only 13 are about global well-being, with other measures focusing on mental well-being, social well-being, physical well-being, spiritual well-being, personal circumstances, and activities and functioning.

¹⁵ According to [Diener \(1984\)](#), subjective well-being comprises two components: the ‘cognitive’ component, which is concerned with how individuals evaluate their own lives; and the ‘affective’ component, which is concerned with emotions.

¹⁶ Measures of well-being tend to encompass various dimensions, some of which may influence how one thinks and feels (determinants), others may be specific thoughts and feelings about one’s life (states), and others may be outcomes of one’s quality of life (consequences). In a recent review of 99 measures of well-being ([Linton et al., 2016](#)), there is, however, no indication that these distinctions play any role in the formulation of the measures.

3.4.2 Treatment Variables

My key explanatory variable is retirement, which is primarily measured using a subjective (or self-reported) approach, based on a question about retirement status that distinguishes between partial retirement and complete retirement. According to my weighted data, at baseline, 18,912 out of the 51,134 Canadian residents in the sample are completely retired, while 4,859 are partially retired. While self-reported retirement is commonly used in the literature on the effects of retirement on life satisfaction (Table A.3.1), it relies on individual perceptions and interpretations, which may not accurately capture retirement status.¹⁷ Given the richness of the CLSA data, I address this by including an objective measure of retirement, based on the standard definition in Canada, which classifies individuals as retired if they: (i) are over the age of 54; (ii) are not in the labour force; and (iii) receive 50% or more of their income from retirement-like sources. In my dataset, I have age, information about whether or not respondents are working, and details about sources of income (including retirement income). I thus construct an indicator for retirement for those aged at least 55 years who report not working and enjoying retirement income; I employ this indicator for my main empirical specifications as a robustness check. At baseline, 17,457 out of the 50,656 Canadian residents in my weighted sample are retired according to my objectively constructed variable of retirement. The discrepancy in sample size between the subjective retirement and the objective retirement measures results mostly from missing income data, which I require to compute the retirement indicator.

For both measures, I show transitions in and out of retirement across the three waves in Table B.3.3 in Appendix B, indicating in bold those I retain in the final sample, which excludes cases where individuals transition from retirement to non-retirement, consistent with approaches used by Heybroek et al. (2015) and Gorry et al. (2018). The Table identifies three groups: those who are present only in wave 1 (7,400 with subjective retirement and 7,339 with objective retirement), and I have no details about their retirement transition; those who are present in waves 1 and 2 but not in wave 3 (6,416 with subjective retirement and 6,687 with objective retirement); and those who are present across the three waves (36,809 with subjective retirement and 35,895 with objective retirement).

¹⁷ See Denton and Spencer (2009) for a review and assessment of different concepts (and measures) of retirement (e.g., non-participation or reduced participation in the labour force, receipt of pension income, and/or end-of-career employment); with self-assessed retirement, which concept(s) one appeals to is likely to differ across individuals. On a positive note, see Adawi et al. (2023) for a study that has access to both objective and subjective measures of retirement and finds no qualitative difference in the effect of retirement on life satisfaction between the two measures.

Table 3.1: Transition into Retirement across Waves

		Subjective Retirement	Objective Retirement
WAVES 1 and 2	NR → NR	1,571	2,864
	NR → PR	221	
	NR → CR	1,421	1,684
	PR → PR	171	
	PR → CR	756	
	CR → CR	2,235	2,117
ALL WAVES	NR → NR → NR	13,383	17,795
	NR → NR → PR	1,495	
	NR → NR → CR	2,072	3,091
	NR → PR → PR	839	
	NR → PR → CR	618	
	NR → CR → CR	1,481	2,330
	PR → PR → PR	847	
	PR → PR → CR	696	
	PR → CR → CR	943	
	CR → CR → CR	13,405	11,956
Total		42,154	41,837

In [Table 3.1](#) above, I reproduce the valid transitions when data from at least two waves are available, presenting them more intuitively to highlight changes in retirement status. Overall, the one notable difference between the objective and subjective retirement measures is the percentage of non-retired individuals (50% versus 36%), whereas the percentages of completely retired individuals are comparable (35% versus 36%). However, this difference does not warrant concern about adopting the subjective measure, which affords a more varied picture of the transition process by separating between partial retirement and complete retirement. In fact, with the objective measure, 17% of the sample retirees during the period under consideration; with the subjective measure, I have 7.5% of the sample partially retiring, 11.8% completely retiring, and 7.1% transitioning from partial to complete retirement.

Using the subjective retirement measure, I create four retirement indicators to identify whether retirement is partial (PR) or complete (CR) and whether full retirement follows from no retirement (NR) or partial retirement. In addition to retirement status, I include variables related to reasons for retirement, whether retirement was voluntary,¹⁸ conditional on retirement (i.e., interacted with retirement), and the number of years since retirement to distinguish between short- and long-term

¹⁸ A direct question about retirement being voluntary only appears in the TRM survey, and I thus consider the possibility of impact differences between voluntary retirement and involuntary retirement with the TRM sub-sample.

effects. Finally, I consider an indicator for spousal retirement, which affects the financial situation and influences daily routines, social interactions, and overall lifestyle, with implications for life satisfaction.

3.4.3 Other Explanatory Variables

My empirical specifications include additional controls to capture economic, social, demographic, and contextual dimensions. At the individual level, I account for socio-economic and demographic factors such as age, whether the respondent is female, whether the respondent is white, immigrant status, education, marital status, and personal income. At the household level, I consider contextual factors such as household size, an indicator for ownership of the dwelling, and an indicator for the type of geographic area where the dwelling is situated (urban versus rural). To account for inter-provincial variation, I include provincial indicators.

I also introduce variables measuring physical activity, health, social support, and social participation. For physical activity, I use the Physical Activity Scale for the Elderly (PASE) score, which quantifies the level of physical activity in older adults based on the frequency and duration of twelve activities in three domains: occupation (e.g., work-related activities), household (e.g., housework, gardening), and leisure (e.g., walking, sports).¹⁹ As a measure of health, I include the number of chronic conditions that have lasted or are expected to last at least six months. For social support, I have a multidimensional functional social support variable derived from the 19-item self-administered Medical Outcomes Study (MOS) Social Support Survey, covering various aspects of social support, including affection, emotional/informational support, positive social interaction, and tangible support.²⁰ I also created a social engagement index based on participation in nine community-related activities, with participation frequency ranging from 1 (no participation) to 5 (daily participation). I derive the index in exactly the same manner as I construct the life satisfaction index, with the additional step of rotating the factor loadings as I retain two factors. I use the orthogonal “varimax” rotation method (with Kaiser normalization), the most common of the rotation methods, which

¹⁹ The activities are walking outside, light/moderate/strenuous sport/recreational activities, muscle strength/endurance exercises, light/heavy housework, home repairs, lawn work or yard care, outdoor gardening, caring for another person, and work for pay or as a volunteer. See [Washburn et al. \(1993\)](#) for more information about PASE and the weights assigned to the activities.

²⁰ See [Sherbourne and Stewart \(1991\)](#) for a description of the development and evaluation of the MOS Social Support Survey.

maximizes the sum of the variances of the squared loadings across the factors. I provide the steps to arrive at the weights after rotating the factor loadings in Appendix B, [Table B.3.4](#).

I provide the complete list of variables with detailed descriptions and their weighted summary statistics for the pooled sample (across the three waves) in Appendix B ([Table B.3.5](#) and [Table B.3.6](#)).

3.5 Identification Strategy

Determining whether an association exists between two variables is relatively straightforward; however, determining whether this correlation implies a causal effect, in which one variable (the treatment) influences the other (the outcome), is more challenging. The challenge lies in the potential existence of alternative explanations for the observed association. In the context of the relationship under consideration in this paper, at least two alternative explanations are plausible: reverse causality, where the outcome itself affects the treatment, and omitted variables, where a third variable (or set of variables) affects both the treatment and the outcome but is unaccounted for in the empirical analysis. Indeed, it is reasonable to expect that individuals' satisfaction or dissatisfaction with their lives will influence their retirement decisions because unobservable factors such as personality traits, intrinsic motivations, personal values, and cognitive processes likely influence both life satisfaction and when they choose to retire.

In the presence of additional circumstances contributing to the correlation between the treatment and the outcome, I cannot simply interpret the overall correlation as a causal effect. This scenario is commonly referred to as the endogeneity problem, since the treatment is not exogenous to the model producing the outcome, but rather endogenously determined within the model and therefore correlated with the error term. As a result, in order to isolate the causal effect of retirement on life satisfaction, and given the panel nature of the data, my identification strategy consists of three components: the inclusion of additional controls, the implementation of a fixed-effects (FE) model, and the implementation of a fixed-effects instrumental variable (FEIV). Furthermore, I use a difference-in-differences (DiD) model as an alternative to the FEIV model and discuss its advantages and disadvantages.

First, I consider additional sources of potential correlation and include observed variables that other studies do not consistently or simultaneously consider, such as physical activity, social support, and participation in community-related activities. By controlling for these additional characteristics, my goal is to have a set of observables that can more adequately describe the selection into retirement,

so that the estimated association between retirement and life satisfaction, conditional on the effects of the observed factors included in the model, is more likely to give the causal effect of retirement on life satisfaction. However, as long as there remain relevant unobservable factors affecting both the retirement decision and life satisfaction, I cannot convincingly assign a causal interpretation to the estimated effect of retirement. Furthermore, even if I am able to observe and account for all non-ignorable variables, I still have to deal with the possibility that the endogeneity problem ensues from reverse causality, addressing which requires that I identify variation in the retirement decision that is independent of other factors that are correlated with life satisfaction.

Second, I use a FE model, which can address endogeneity to some extent by controlling for unobserved individual-specific time-invariant characteristics (e.g., personality traits) that may be correlated with both treatment and outcome. The model involves differencing the data by subtracting the individual mean from each observation, essentially removing the time-invariant individual fixed effects, and resulting in new variables that describe within-individual variability over time. However, while the FE model can mitigate some aspects of endogeneity, it may not fully resolve the issue, particularly when unobserved time-varying factors or reverse causality are present.

Third, to address these remaining concerns, I employ the FEIV, model which is a panel data model that combines fixed effects and instrumental variables. This approach addresses the endogeneity problem more comprehensively by emphasizing the problem's implication—specifically, the correlation between the treatment and the error term—rather than focusing solely on its root causes. The core idea of the IV technique is to find instruments that are correlated with the endogenous treatment but independent of the error term. These instruments essentially serve as proxies for unobserved variables that may be correlated with the endogenous treatment, capturing the exogenous variation in the treatment. By breaking the link between the endogenous variable and unobserved factors, the IV model improves the reliability and validity of assigning a causal interpretation to the treatment effect. However, the success of the IV method is dependent on essential assumptions: instruments must (i) be correlated with the endogenous treatment (relevance), (ii) affect the outcome only through the treatment (exclusion), (iii) be independent of the error term (independence or exogeneity), and (iv) affect the probability of receiving the treatment in a consistent increasing or decreasing manner (monotonicity).

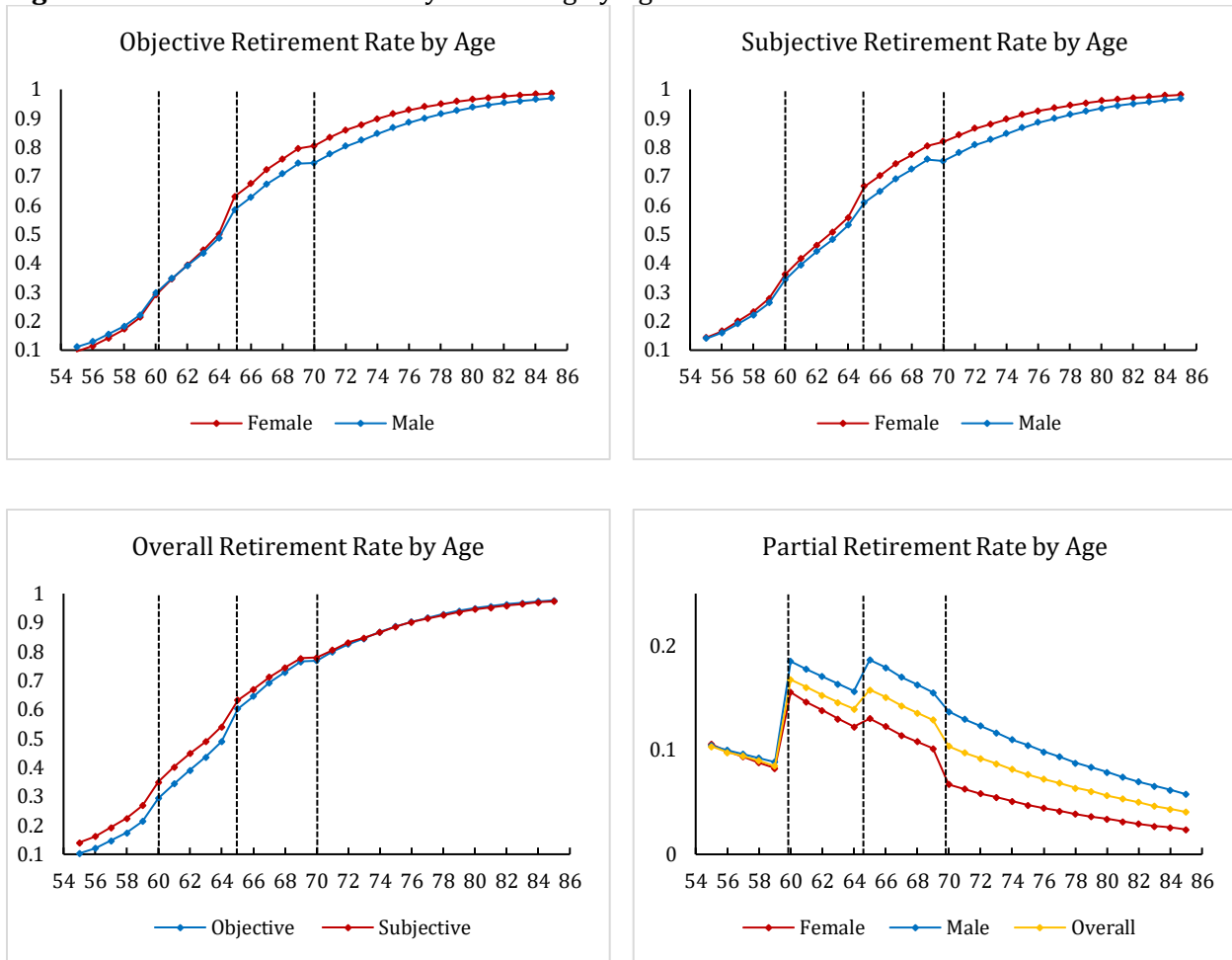
3.5.1 Determining Valid External Instruments

In determining a valid set of instruments for the retirement decision, we can rely on the extensive literature on retirement, particularly focusing on the health effects of retirement. This literature has almost exclusively used pension eligibility age as an instrument when employing the instrumental variables (IV) methodology to address the potential endogeneity of the retirement indicator. This approach is intuitive: when considering retirement, individuals assess the "retirement environment," which includes external factors that affect the attractiveness of retirement, such as pension income.

In Canada, access to full pension benefits occurs at the normal retirement age of 65 years. However, individuals can begin withdrawing at the age of 60, although the amount is lower, or they can postpone withdrawing until 70 years of age, receiving an additional premium for each extra year. As a result, there are discrete changes in the financial incentives for retirement at ages 60, 65, and 70, and we can expect the probability of retiring to shift accordingly. These three pension eligibility thresholds are strong candidates as external instruments that significantly influence the retirement decision without directly affecting life satisfaction, thereby satisfying the exclusion restriction required for valid instruments.

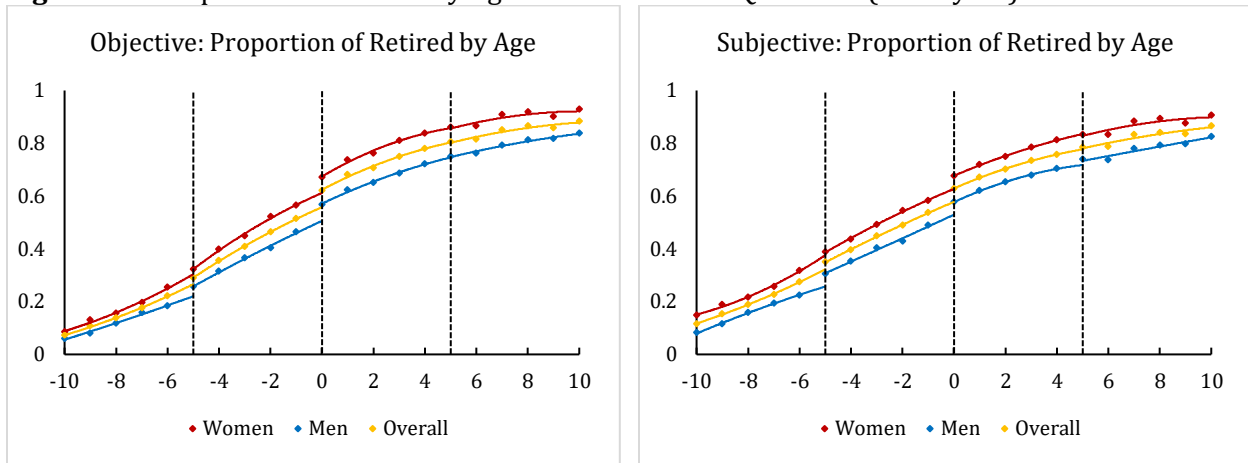
To validate the adoption of pension eligibility ages as instruments, [Figure 3.5](#) presents the estimated probability of retiring, derived from a population-average logit regression of the retirement indicator. This regression includes covariates such as age, indicators for satisfying each of the three pension eligibility ages, and various socio-demographic and economic factors. The plots indicate positive jumps in the probability of retiring at 60 and 65 years of age, regardless of how I measure retirement (i.e., objective vs. subjective). This pattern is consistent across both men and women, though women generally exhibit higher retirement rates. Interestingly, the age profile of the retirement rate is virtually the same between the objective and subjective measures, with the latter exceeding the former by 1 to 6 percentage points between 55 and 71 years of age. The relevance of pension eligibility in the retirement decision is also apparent when I consider the age profile of the partial retirement rate. This rate exhibits a positive jump at 60 and 65 years of age, when working individuals may opt for a partial transition into retirement. A negative jump is observed at 70 years of age, when partially retired individuals may opt for a complete transition into retirement.

Figure 3.5: Cumulative Probability of Retiring by Age and Gender



In addition to these plots, I also test the statistical significance of the estimated coefficients for the three pension eligibility indicators. The evidence, presented in Appendix C, [Table C.3.1](#), as part of the logistic regression results, supports the use of two of the three eligibility indicators as external instruments: being at least 60 years of age and being at least 65 years of age. Specifically, using the objective retirement measure, the odds of retiring increase by 29% and 34% at 60 and 65 years of age, respectively. When separating by gender, we observe that the probability of retiring at these thresholds is higher for women than for men at normal retirement age, but comparable at early retirement age. Similar patterns emerge when considering subjective retirement, though the increase in the odds of retiring at an early retirement age (27%) is slightly larger than at normal retirement age (24%). However, while the jumps are consistent between the two measures at early retirement age, they tend to be 8 to 10 percentage points lower at normal retirement age when using the subjective retirement measure.

Figure 3.6: Proportion of Retired by Age and Gender with Quadratic (Locally Fit) Lines



To further emphasize the significance of the pension eligibility thresholds at 60 and 65 years of age, I plot in Figure 3.6 the proportion of people who retired by the number of years before or after the normal retirement age, which is zero, with -5 indicating early retirement and +5 indicating late retirement. The fitted lines, derived from local quadratic regressions, provide additional support for the selection of early and normal retirement age indicators as (excluded) instruments in the FEIV estimation. The proportion increases the most at normal retirement age, by 11 percentage points with the objective retirement measure and by 9 percentage points with the subjective retirement measure; the second largest jump occurs at early retirement age, where the proportion increases by 7 or 8 percentage points. The increases at the late retirement age are between 2 and 3 percentage points and are in line with changes after normal retirement age. Although the proportion of female retirees consistently exceeds that of male retirees at each age, the magnitude of jumps at early, normal, and late retirement ages remain comparable between genders.

3.5.2 Implementing the Fixed Effects Instrumental Variable (FEIV) Strategy

My empirical strategy involves estimating the following model:

$$LS_{jt} = \mathbf{X}_{jt}\boldsymbol{\beta}_X + \alpha T_{jt} + \mu_j + u_{jt}, \quad (3.10)$$

where LS denotes life satisfaction, \mathbf{X} is a vector of observable variables comprising 1 (the constant) and time-invariant (e.g., gender and education) and time-varying (e.g., age and income) covariates, T is an indicator for retirement status, $\boldsymbol{\mu}$ represents unobserved individual-specific time-invariant effects (i.e., unobserved heterogeneity), u is the idiosyncratic error term, and the subscripts j and t index the individual and time (or wave). In the above equation, \mathbf{X} is exogenous with respect to u , but

I suspect that T is correlated with u , and allow for the possibility that \mathbf{X} is correlated with μ . I introduce \mathbf{Z} to denote a vector of suitable instruments for T , which includes \mathbf{X} and at least one additional time-varying element (the order condition), with $E(\mathbf{Z}'u) = 0$, and at least one element of \mathbf{Z} not included in \mathbf{X} partially correlated with T after netting out \mathbf{X} (the rank condition).

I adopt the control function (CF) approach (e.g., [Joshi and Wooldridge, 2019](#); [Papke and Wooldridge, 2008](#); [Semykina and Wooldridge, 2010](#); [Wooldridge, 2015](#) and [2019](#)) to implement two fully robust tests to detect the endogeneity of (1) T with respect to u and (2) \mathbf{Z} with respect to μ . Alternatively, we could rely on the traditional Hausman tests of endogeneity, which, however, assume that u is serially uncorrelated and homoscedastic (hence, they are not fully robust). For (1), I express the retirement specification as:

$$T_{jt} = 1[\mathbf{Z}_{jt}\boldsymbol{\beta}_Z + v_{jt} > 0], \quad (3.11)$$

where $1[\cdot]$ is a binary indicator function, with $E(\mathbf{Z}'v) = 0$. Since \mathbf{Z} and u are uncorrelated, T is endogenous if and only if $E(uv) \neq 0$. By the CF approach, I write the linear projection of the structural error (u) onto the reduced-form error (v) as $u_{jt} = \varrho v_{jt} + e_{jt}$, with $E(v e) = 0$, where $\varrho = \frac{E(uv)}{E(v^2)}$, which is zero if T is endogenous, so that (3.10) reduces to:

$$LS_{jt} = \mathbf{X}_{jt}\boldsymbol{\beta}_X + \alpha T_{jt} + \mu_j + \varrho v_{jt} + e_{jt}. \quad (3.12)$$

In the CF approach, I view v as an explanatory variable in (3.12). I can think of v as proxying for the factors in u that are correlated with T , and its inclusion in (3.12) serves to control for the endogeneity of T . Given that u and v are uncorrelated with \mathbf{Z} (and are thus uncorrelated with \mathbf{X} , which is a strict subset of \mathbf{Z}), it follows that e is uncorrelated with \mathbf{Z} (and \mathbf{X}) and must thus be uncorrelated with T , that is, $E(\mathbf{Z}'e) = E(\mathbf{X}'e) = E(Te) = 0$. I can then rely on a standard t -test on v to evaluate $H_0: \varrho = 0$.

Unfortunately, I do not observe v but, if I assume that v has a standard normal distribution, I can estimate it as:

$$\hat{v}_{jt} = T_{jt}\lambda(\mathbf{Z}_{jt}\hat{\boldsymbol{\beta}}_Z) - (1 - T_{jt})\lambda(-\mathbf{Z}_{jt}\hat{\boldsymbol{\beta}}_Z), \quad (3.13)$$

where $\lambda(\cdot)$ denotes the inverse Mills ratio, that is, the ratio between the density function and the cumulative density function of v , following a probit estimation of (3.11) for each of the three waves. I then plug \hat{v} (i.e., the generalized residuals) into (3.12), estimate the resulting (3.12) by fixed effects, and test the statistical significance of the estimate of ϱ using a standard t -test with a robust standard

error. Rejection of the hypothesis that ϱ is equal to zero implies that I should treat T as an endogenous variable and must thus rely on FEIV estimates as opposed to FE estimates. Based on the results of the above estimation, which I report in [Table C.3.2](#), I reject the hypothesis that T is exogenous at the 1 percent level of significance for both measures of retirement and establish that the FEIV model is more appropriate than the FE model. For completeness, I include the FE estimates in [Table C.3.2](#), although I do not refer to them in the discussion of findings.

Next, I assess whether the random effects instrumental variable (REIV) model is more appropriate than the FEIV model, focusing on whether the time-varying covariates in [\(3.11\)](#) are correlated with the unobserved heterogeneity. In fact, a key difference between the two models is that the REIV requires \mathbf{Z} to be uncorrelated with μ , whereas the FEIV relaxes the requirement. Assuming a Mundlak form, I can represent the unobserved individual heterogeneity as:

$$\mu_j = \varphi_0 + \bar{\mathbf{Z}}_j \boldsymbol{\varphi} + \omega_j, \quad (3.14)$$

with $E(\omega|\mathbf{Z}) = 0$. Substituting [\(3.14\)](#) into [\(3.10\)](#), I get:

$$LS_{jt} = \mathbf{X}_{jt} \boldsymbol{\beta}_X + \alpha T_{jt} + \varphi_0 + \bar{\mathbf{Z}}_j \boldsymbol{\varphi} + \omega_j + u_{jt}, \quad (3.15)$$

with $E(\omega + u|\mathbf{Z}) = 0$. I then estimate [\(3.15\)](#) using REIV and test the joint significance of the coefficients associated with $\bar{\mathbf{Z}}$, using a χ^2 distribution with k degrees of freedom ($k = \text{number of elements in } \bar{\mathbf{Z}}$). Rejection of the null hypothesis indicates that all these coefficients are simultaneously equal to zero implying a non-zero correlation between \mathbf{Z} and μ , ruling out the REIV approach. Based on the results in [Table C.3.2](#), the χ^2 test statistic values with $k = 24$ (though not included in the Table) are 1,419.30 for objective retirement and 1,488.66 for subjective retirement. In both instances, I reject the null hypothesis that $\mathbf{I}_k \boldsymbol{\varphi} = \mathbf{0}$ at the 1% significance level, confirming that REIV is not a suitable approach.

Therefore, I adopt the FEIV model as my main empirical framework, which involves a two-stage approach. In the first stage, I estimate [\(3.11\)](#) and obtain the predicted values of T . In the second stage, I replace T in [\(3.10\)](#) with the predicted T from the first stage, time-demean all variables in [\(3.10\)](#), and estimate the resulting time-demeaned version of [\(3.10\)](#). The FEIV results are presented in [Table 3.3](#), but, before proceeding to interpret them, I need to verify that my excluded instruments, which I may simply refer to as instruments from now onward, satisfy the four aforementioned conditions. I begin by noting that, based on the first-stage t statistics and F statistic in [Table 3.3](#) for the overall and by gender and by education models, I reject the null hypotheses that (i) the coefficient of each of the two

instruments is equal to zero, and (ii) the coefficients of the two instruments are simultaneously equal to zero, both at the 1% significance. I present more formal tests about of instruments in [Table 3.2](#), all of which employ robust statistics.

Table 3.2: IV Tests

Null Hypothesis and Test Statistic	Subjective Retirement (SR)		Objective Retirement (OR)	
	Statistic Value	<i>p</i> -value	Statistic Value	<i>p</i> -value
Under-Identification Test H₀: equation is under-identified Kleibergen-Paap rk LM Statistic $\sim \chi^2_2$	643.36	0.0000	815.42	0.0000
Weak Identification Test H₀: equation is weakly identified Kleibergen-Paap (K-P) rk Wald <i>F</i> Statistic - critical Stock-Yogo values for the K-P statistic with $K_1 = 1$ and $L_1 = 2$ (Stock and Yogo, 2002 and 2005): 10% maximal IV size = 19.93 15% maximal IV size = 11.59 20% maximal IV size = 8.75 25% maximal IV size = 7.25	329.51		421.54	
Redundancy Tests H₀: age60 is redundant LM Statistic $\sim \chi^2_1$	454.93	0.0000	509.61	0.0000
H₀: age65 is redundant LM Statistic $\sim \chi^2_1$	201.82	0.0000	313.81	0.0000
Over-Identification Test H₀: equation is not over-identified Hansen <i>J</i> Statistic $\sim \chi^2_1$	0.554	0.4568	1.76	0.1844

The first test, the **under-identification test**, assesses whether the model is identified, that is, whether the L_1 instrumental variables are “relevant,” meaning that they are correlated with the K_1 endogenous variables. If the instruments are irrelevant, the number of relevant instruments is less than the number of endogenous variables, and the model is thus under-identified. The test essentially evaluates the rank of a matrix: under the null hypothesis of under-identification, the matrix of reduced-form coefficients of the instruments has a rank equal to $K_1 - 1$. The test statistic is the Kleibergen-Paap (K-P) rk LM statistic, which follows a χ^2 distribution with degrees of freedom equal to $L_1 - K_1 + 1$. Rejection of the null hypothesis implies that the matrix is full column rank (i.e., columns are linearly independent), indicating that the model is identified. Based on the *p*-value associated with the K-P rk LM statistic in [Table 3.2](#), I find evidence that my model is not under-identified.

The second test, the **weak identification test**, examines whether the instruments are weakly correlated with the endogenous variables, relying on the K-P rk Wald F statistic. With $K_1 = 1$, this statistic corresponds to the first-stage F statistic for the joint significance of the L_1 instruments, which is statistically significant at the 1 percent level of significance as reported in [Table 3.3](#). However, according to [Staiger and Stock, \(1997\)](#), the issue of weak instruments can arise even when first-stage t and F statistics that are statistically significant at conventional levels in a large sample. [Stock and Yogo \(2005\)](#) identify two key characteristics of weak instruments: (i) weak instruments cause 2SLS or IV estimators to be biased, and the bias of the 2SLS estimators may exceed the bias of the OLS estimators; (ii) hypothesis tests of parameters based on IV estimators may suffer from severe size distortions. Hence, they propose critical values for the F statistic that reflect the maximal relative bias or the maximal size. In [Table 3.2](#), I report critical values for four maximal IV sizes which, at the conventional 5 percent level of significance, correspond to a size distortion of no more than 5, 10, 15, and 20 percent. These critical values are substantially smaller than the value of my F statistic, and I can then conclude that my model is not weakly identified.²¹ Combined, the results of the under-identification and weakly identification tests strongly support the assumption of “relevance,” that is, $cov(\mathbf{Z}_E, T)$, where \mathbf{Z}_E is the vector of excluded instruments, is neither zero nor small.

The third test, **the redundancy test**, considers whether specified instruments are “redundant,” meaning that their inclusion does not improve the efficiency of estimation. The test evaluates the matrix cross-product between endogenous regressors and potentially redundant instruments, after controlling for all the other instruments, assessing whether the rank of this matrix is zero based on an LM statistic that follows a χ^2 distribution with degrees of freedom equal to the product of K_1 and the number of tested instruments. Rejection of the null hypothesis indicates that the specified instruments are not redundant. The evidence in [Table 3.2](#) suggests that neither of the two instruments is redundant: age60 is not redundant after controlling for age65, and similarly, age65 is not redundant after controlling for age60.

In addition to confirming the relevance of the instruments, I must also establish their validity, indicating exogeneity, that is, $cov(\mathbf{Z}_E, u) = 0$ and \mathbf{Z}_E is correctly excluded from (3.10). Generally, directly testing the validity of instruments is challenging. However, when multiple instruments exist for a single endogenous variable (i.e., the model is over-identified), a falsification test of the

²¹ These critical values are valid for the case with *i.i.d.* errors when I rely on the Cragg-Donald Wald F statistic, as the non-robust analog of the K-P rk Wald F statistic, to test the hypothesis of weak identification. However, [Baum et al. \(2007\)](#) suggest applying these critical values to the non-*i.i.d.* case, although with caution, or referring to the “rule of thumb” of [Staiger and Stock \(1997\)](#), according to which weak identification is not a problem if $F \geq 10$.

assumption of instrument validity becomes feasible. Hence, the final test, the **over-identification test**, evaluates whether the overidentifying restrictions are valid with the Hansen J statistic, which, under the null hypothesis, follows a χ^2 distribution with r degrees of freedom, where r is the number of overidentifying restrictions. With $r = 1$, the p -value associated with the Hansen J test statistic in [Table 3.2](#) does not reject the joint null hypothesis, leading me to conclude that the evidence at my disposal does not raise any concern over the validity of the instruments.

3.5.3 Interpreting the FEIV Results

The key finding from the various FEIV regressions is that retirement contributes positively and significantly to life satisfaction. In [Table 3.3](#), objective retirement is associated with an increase in the life satisfaction score by 3.7, while subjective retirement leads to an increase of 3.8 points, representing 13% of the mean score (28.4 points). This effect is consistent across both men and women, although the magnitude of the effect differs slightly by gender.

Table 3.3: FEIV Regressions: Overall, Gender and Education

	Objective Retirement					Subjective Retirement				
	(1) Overall	(2) Female	(3) Male	(4) < PS	(5) PS	(6) Overall	(7) Female	(8) Male	(9) < PS	(10) PS
Retirement	3.68***	3.05***	4.40***	4.17***	3.54***	3.81***	3.10***	4.63***	4.40***	3.58***
	(0.56)	(0.76)	(0.84)	(1.43)	(0.56)	(0.61)	(0.85)	(0.90)	(1.59)	(0.60)
Age	0.08**	0.08**	0.07**	0.08**	0.08**	0.06**	0.07**	0.06**	0.06*	0.07**
	(0.01)	(0.01)	(0.02)	(0.03)	(0.01)	(0.01)	(0.02)	(0.02)	(0.03)	(0.01)
Duration	-0.17***	-0.13***	-0.22***	-0.17***	-0.18***	-0.15***	-0.11***	-0.20***	-0.15***	-0.15***
	(0.02)	(0.03)	(0.04)	(0.05)	(0.02)	(0.02)	(0.03)	(0.03)	(0.05)	(0.02)
Marital status										
Widow	-1.33***	-0.96***	-2.02***	-1.70***	-1.18***	-1.48***	-1.20***	-2.00***	-1.62***	-1.43***
	(0.23)	(0.30)	(0.36)	(0.51)	(0.24)	(0.24)	(0.31)	(0.35)	(0.51)	(0.25)
Divorced/separated	-1.77***	-1.45***	-2.00***	-2.03***	-1.71***	-1.76***	-1.43***	-2.00***	-1.79***	-1.76***
	(0.19)	(0.27)	(0.27)	(0.43)	(0.21)	(0.19)	(0.27)	(0.27)	(0.43)	(0.21)
Single	-1.15***	-0.38	-1.91***	-0.89	-1.30***	-1.22***	-0.55	-1.89***	-1.09*	-1.29***
	(0.24)	(0.35)	(0.31)	(0.59)	(0.23)	(0.24)	(0.36)	(0.31)	(0.61)	(0.23)
Income										
\$20,000 to \$49,999	0.60**	0.45**	0.85**	0.74**	0.53**	0.57**	0.43**	0.78**	0.61**	0.55**
	(0.11)	(0.13)	(0.21)	(0.24)	(0.12)	(0.11)	(0.14)	(0.21)	(0.25)	(0.12)
\$50,000 to \$99,999	1.40**	1.00**	1.89**	1.73**	1.26**	1.41**	1.03**	1.87**	1.60**	1.33**
	(0.16)	(0.20)	(0.27)	(0.37)	(0.16)	(0.17)	(0.21)	(0.28)	(0.40)	(0.17)
\$100,000 to \$149,999	1.92**	1.30**	2.58**	2.25**	1.78**	1.91**	1.32**	2.53**	2.05**	1.84**
	(0.20)	(0.26)	(0.34)	(0.58)	(0.20)	(0.21)	(0.28)	(0.34)	(0.61)	(0.21)
\$150,000+	2.23**	1.49**	2.96**	2.81**	2.06**	2.21**	1.44**	2.96**	2.61**	2.11**
	(0.24)	(0.31)	(0.38)	(0.80)	(0.24)	(0.25)	(0.31)	(0.39)	(0.79)	(0.24)
Household size	-0.09**	-0.18**	-0.01	-0.17	-0.07*	-0.11**	-0.20**	-0.03	-0.21*	-0.08*
	(0.04)	(0.06)	(0.06)	(0.12)	(0.04)	(0.04)	(0.06)	(0.06)	(0.12)	(0.04)
Own dwelling	0.32**	0.23	0.40*	0.11	0.40**	0.25	0.12	0.37	-0.02	0.36**
	(0.16)	(0.23)	(0.23)	(0.40)	(0.16)	(0.17)	(0.24)	(0.23)	(0.43)	(0.16)
Urban	-0.09	-0.07	-0.14	-0.08	-0.08	-0.10	-0.12	-0.11	-0.04	-0.12
	(0.12)	(0.17)	(0.17)	(0.27)	(0.13)	(0.12)	(0.17)	(0.17)	(0.27)	(0.13)

	Objective Retirement					Subjective Retirement				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Overall	Female	Male	< PS	PS	Overall	Female	Male	< PS	PS
Retirement of spouse	-0.48*** (0.10)	-0.57*** (0.15)	-0.37*** (0.13)	-0.66** (0.28)	-0.41*** (0.09)	-0.52*** (0.11)	-0.61*** (0.17)	-0.42*** (0.14)	-0.59** (0.29)	-0.48*** (0.10)
Chronic conditions	-0.09*** (0.02)	-0.06** (0.02)	-0.13*** (0.03)	-0.02 (0.05)	-0.12*** (0.02)	-0.09*** (0.02)	-0.05* (0.03)	-0.14*** (0.03)	-0.02 (0.05)	-0.12*** (0.02)
Province										
AB	-0.09 (0.53)	-0.69 (0.79)	0.57 (0.68)	-0.95 (1.75)	-0.05 (0.56)	0.05 (0.54)	-0.62 (0.83)	0.70 (0.66)	-1.34 (1.60)	0.09 (0.58)
BC	0.50 (0.49)	0.56 (0.70)	0.59 (0.61)	-2.19 (1.92)	0.88* (0.48)	0.59 (0.49)	0.42 (0.70)	0.87 (0.62)	-2.52 (1.85)	1.01** (0.49)
MB	-0.46 (0.75)	0.83 (0.94)	-1.35 (1.03)	-3.82** (1.88)	0.04 (0.80)	-0.32 (0.76)	0.95 (0.97)	-1.17 (1.05)	-3.89** (1.91)	0.21 (0.81)
NB	-0.53 (0.82)	1.61 (1.30)	-1.67* (0.91)	-1.41 (1.34)	-0.40 (0.94)	-0.91 (0.84)	1.53 (1.33)	-2.20** (0.91)	-1.65 (1.42)	-0.70 (0.96)
NL	-0.00 (0.66)	-0.06 (1.06)	0.47 (0.86)	0.00 (.)	-0.01 (0.66)	0.02 (0.66)	0.51 (1.11)	0.14 (0.84)	-7.16*** (2.15)	0.25 (0.68)
NS	0.12 (0.59)	-0.53 (0.62)	1.09 (1.07)	0.55 (2.36)	-0.07 (0.54)	0.07 (0.59)	-0.53 (0.61)	1.09 (1.07)	-0.95 (2.19)	0.05 (0.54)
PE	0.33 (1.03)	-0.07 (1.83)	1.44 (1.28)	1.24 (2.40)	0.20 (1.15)	-0.01 (1.05)	-0.16 (1.83)	0.94 (1.36)	-1.45 (2.91)	0.17 (1.16)
QC	0.14 (0.69)	0.36 (1.11)	0.02 (0.74)	0.51 (2.69)	0.10 (0.52)	-0.29 (0.75)	-0.45 (1.23)	0.34 (0.83)	-0.44 (2.49)	-0.21 (0.58)
SK	0.59 (0.80)	-0.29 (0.98)	1.44 (1.20)	1.01 (2.47)	0.63 (0.86)	0.30 (1.02)	-1.26 (1.35)	1.92 (1.20)	0.78 (2.41)	0.35 (1.09)
Observations (<i>n</i>)	106,631	52,799	53,832	16,183	90,243	107,160	53,284	53,876	16,230	90,721
Groups (<i>n_g</i>)	39,025	19,365	19,660	6,056	32,891	39,167	19,515	19,652	6,075	33,012
First-Stage Results										
Age60: age ≥ 60	0.12*** (0.01)	0.13*** (0.01)	0.11*** (0.01)	0.13*** (0.01)	0.11*** (0.00)	0.12*** (0.01)	0.12*** (0.01)	0.11*** (0.01)	0.12*** (0.01)	0.12*** (0.01)
Age65: age ≥ 65	0.11*** (0.01)	0.11*** (0.01)	0.10*** (0.01)	0.12*** (0.02)	0.10*** (0.01)	0.08*** (0.01)	0.09*** (0.01)	0.08*** (0.01)	0.10*** (0.02)	0.08*** (0.01)
Age	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00** (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.00 (0.00)	0.00*** (0.00)
Duration	0.04*** (0.00)	0.04*** (0.00)	0.04*** (0.00)	0.04*** (0.00)	0.04*** (0.00)	0.03*** (0.00)	0.03*** (0.00)	0.04*** (0.00)	0.03*** (0.00)	0.03*** (0.00)
Marital status										
Widow	0.06*** (0.01)	0.08*** (0.01)	0.04* (0.02)	0.12*** (0.03)	0.03*** (0.01)	0.07*** (0.01)	0.09*** (0.02)	0.04* (0.02)	0.09*** (0.03)	0.06*** (0.01)
Divorced/separated	0.02** (0.01)	0.03** (0.01)	0.00 (0.01)	0.02 (0.02)	0.01** (0.01)	0.02** (0.01)	0.03*** (0.01)	0.00 (0.01)	0.01 (0.02)	0.02** (0.01)
Single	0.01 (0.01)	0.03** (0.01)	-0.01 (0.02)	0.02 (0.03)	0.01 (0.01)	0.01 (0.01)	0.03 (0.02)	-0.00 (0.02)	0.02 (0.03)	0.01 (0.01)
Income										
\$20,000 to \$49,999	-0.06*** (0.01)	-0.05*** (0.01)	-0.07*** (0.01)	-0.07*** (0.01)	-0.05*** (0.01)	-0.07*** (0.01)	-0.07*** (0.01)	-0.07*** (0.01)	-0.08*** (0.01)	-0.07*** (0.01)
\$50,000 to \$99,999	-0.16*** (0.01)	-0.14*** (0.01)	-0.17*** (0.01)	-0.16*** (0.02)	-0.15*** (0.01)	-0.17*** (0.01)	-0.16*** (0.01)	-0.17*** (0.01)	-0.17*** (0.02)	-0.17*** (0.01)
\$100,000 to \$149,99	-0.23*** (0.01)	-0.19*** (0.01)	-0.26*** (0.01)	-0.25*** (0.03)	-0.22*** (0.01)	-0.23*** (0.01)	-0.21*** (0.01)	-0.25*** (0.01)	-0.24*** (0.03)	-0.23*** (0.01)
\$150,000+	-0.26*** (0.01)	-0.20*** (0.01)	-0.30*** (0.01)	-0.29*** (0.04)	-0.25*** (0.01)	-0.26*** (0.01)	-0.20*** (0.02)	-0.29*** (0.02)	-0.26*** (0.04)	-0.26*** (0.01)
Household size	-0.01*** (0.00)	-0.00 (0.00)	-0.01*** (0.00)	-0.01 (0.01)	-0.01*** (0.00)	-0.01*** (0.00)	-0.01** (0.00)	-0.01** (0.00)	-0.00 (0.01)	-0.01*** (0.00)
Own dwelling	0.03*** (0.01)	0.03*** (0.01)	0.03*** (0.01)	0.05*** (0.02)	0.02*** (0.01)	0.03*** (0.01)	0.03*** (0.01)	0.02** (0.01)	0.04* (0.02)	0.02*** (0.01)

	Objective Retirement					Subjective Retirement				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Overall	Female	Male	< PS	PS	Overall	Female	Male	< PS	PS
Urban	-0.03*** (0.01)	-0.03*** (0.01)	-0.02*** (0.01)	-0.03* (0.01)	-0.03*** (0.01)	-0.02*** (0.01)	-0.03*** (0.01)	-0.02* (0.01)	-0.03* (0.02)	-0.02*** (0.01)
Retirement of spouse	0.09*** (0.01)	0.10*** (0.01)	0.09*** (0.01)	0.10*** (0.02)	0.09*** (0.01)	0.11*** (0.01)	0.12*** (0.01)	0.10*** (0.01)	0.10*** (0.02)	0.11*** (0.01)
Chronic conditions	0.00*** (0.00)	0.00** (0.00)	0.00** (0.00)	0.00** (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.00** (0.00)	0.00*** (0.00)	0.00** (0.00)	0.00*** (0.00)
Province										
AB	0.02 (0.03)	-0.02 (0.05)	0.05 (0.04)	0.01 (0.08)	0.01 (0.03)	0.02 (0.04)	0.00 (0.06)	0.03 (0.04)	0.03 (0.09)	0.02 (0.04)
BC	0.04 (0.03)	0.00 (0.04)	0.06* (0.04)	-0.00 (0.09)	0.03 (0.03)	0.06* (0.03)	0.09* (0.05)	0.03 (0.04)	0.03 (0.10)	0.06** (0.03)
MB	-0.07 (0.04)	-0.14* (0.07)	-0.02 (0.05)	-0.17 (0.14)	-0.05 (0.04)	-0.02 (0.04)	-0.07 (0.07)	0.00 (0.05)	-0.16 (0.14)	0.01 (0.05)
NB	0.14** (0.06)	0.16** (0.08)	0.14 (0.09)	0.21 (0.19)	0.11* (0.06)	0.16** (0.06)	0.22** (0.10)	0.14 (0.09)	0.24 (0.20)	0.12* (0.06)
NL	0.04 (0.05)	0.10* (0.06)	0.00 (0.08)	0.00 (.)	0.03 (0.05)	0.07 (0.05)	0.13* (0.07)	0.03 (0.08)	0.56*** (0.20)	0.04 (0.05)
NS	0.03 (0.03)	0.01 (0.04)	0.07 (0.06)	0.17 (0.12)	-0.00 (0.03)	0.07* (0.04)	0.07 (0.06)	0.07 (0.06)	0.36** (0.17)	0.01 (0.04)
PE	-0.01 (0.07)	-0.01 (0.11)	-0.00 (0.09)	-0.07 (0.13)	0.01 (0.08)	0.05 (0.07)	0.07 (0.11)	0.02 (0.08)	0.21 (0.16)	0.05 (0.08)
QC	0.11* (0.06)	0.15* (0.08)	0.07 (0.08)	0.33*** (0.12)	0.05 (0.05)	0.18*** (0.06)	0.28*** (0.08)	0.06 (0.07)	0.40*** (0.12)	0.10 (0.06)
SK	0.05 (0.06)	0.03 (0.08)	0.06 (0.11)	-0.44 (0.28)	0.10* (0.06)	0.18* (0.10)	0.38*** (0.14)	-0.03 (0.09)	-0.42 (0.27)	0.24** (0.10)
First-Stage <i>F</i> taticic on age60 and age65	421.54	244.31	184.21	72.73	402.75	329.51	180.25	150.19	55.73	323.20
<i>p</i> -value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes: robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

For men, objective retirement is associated with an increase in life satisfaction of 4.4 points, while subjective retirement leads to a slightly higher increase of 4.6 points. For women, the increases are 3.1 points for both objective and subjective retirement, indicating that while retirement significantly improves life satisfaction for women, the effect is somewhat smaller compared to men. Additionally, [Table 3.3](#) shows that the increase in life satisfaction due to retirement is smaller among more educated retirees, regardless of how retirement is measured.

Moreover, across all FEIV regressions, I find that life satisfaction increases with age but decreases with the duration of retirement, though these changes are relatively small, especially concerning age. This suggests that as individuals age, they may develop greater resilience, adaptability, and acceptance, which contribute to increased life satisfaction. However, the benefits of retirement might diminish over time.

Beyond retirement, the covariates with the most significant impact on life satisfaction are marital status and income. Specifically, men who are married or in common-law relationships report life

satisfaction scores that are 2.0 points higher than men who are divorced/separated, or widowed. For women, the difference is approximately 1.4 to 1.5 points compared to divorced/separated women, and around 1.0 to 1.2 points when compared to widowed women. There is no significant difference in life satisfaction between women in relationships and single women, regardless of the retirement measure used.

Higher-income levels are associated with greater life satisfaction, but the effect increases at a decreasing rate. The impact is twice as large for men as for women and is larger for individuals with less than post-secondary education. For example, being in the \$150,000+ income category, compared to less than \$20,000, results in a 2.2-point increase in life satisfaction for the entire sample, 1.4 (subjective retirement) to 1.5 (objective retirement) points for women, 3.0 points for men (both objective and subjective retirement), 2.6 (subjective retirement) to 2.8 (objective retirement) points for those with less than post-secondary education, and 2.1 points (both objective and subjective retirement) for those with post-secondary education.

Additionally, [Table 3.3](#) shows no significant differences in life satisfaction across provinces, nor does living in an urban setting or owning one's home appear to matter. When household size matters, it tends to decrease life satisfaction, as does having a retired spouse. For women, having a retired spouse reduces life satisfaction scores by 0.6 points, whereas for men, it reduces life satisfaction by 0.4 points. Larger households or retired spouses may increase responsibilities, financial strain, and potential conflicts, contributing to lower life satisfaction. Furthermore, as the number of chronic conditions increases, life satisfaction decreases, particularly among men and more educated individuals. These differences may be due to variations in coping mechanisms, access to resources, societal expectations, and healthcare access. For example, having more chronic conditions decreases the life satisfaction score by 0.05 (subjective retirement) to 0.06 points (objective retirement) for women and 0.13 (objective retirement) to 0.14 points (subjective retirement) for men.

3.5.4 Implementing a Difference-in-Differences (DiD) Design

Another widely employed technique for gauging causal effects in non-experimental settings is the DiD method. In its basic form, the DiD model involves a single treatment, two time periods (1 and 2), and two groups: *(i)* one that receives the treatment in the second period (the treated group) and *(ii)* one that does not receive the treatment in either period (the control group). The key assumption is that, in the absence of treatment, the average outcomes of the treated and control groups would follow similar or parallel trajectories over time (parallel-trends assumption). Furthermore, the

treatment has no causal effect before its implementation, that is, before the treatment, the potential outcomes for the treated group are the same with and without treatment (no-anticipation assumption). Also, each unit's potential outcomes are independent of the treatment assignments of other units, satisfying the stable unit treatment value assumption (SUTVA), also known as the non-interference assumption. In this "2 × 2" design, the treatment effect on the outcome of interest is empirically estimated by comparing the change in the average outcome for the treated units with the change in the average outcome for the control units, as the parallel-trends assumption ensures that any post-treatment divergence in outcomes is attributable to the treatment itself, rather than pre-existing trend differences between the two groups.

Letting $H_{jt}(\mathbf{1})$ and $H_{jt}(\mathbf{0})$ denote the two possible values of the outcome of interest for unit j at time t under treatment and no treatment, respectively. The average treatment effect on the treated (ATT) is the difference between $H_{jt}(\mathbf{1})$ and $H_{jt}(\mathbf{0})$ averaged across all treated units. However, because we observe only one of the two potential outcomes for each unit at each point in time, this creates a missing data problem. The DiD design addresses this challenge by imputing counterfactual outcomes for treatment units based on outcomes for control units, relying on the parallel-trends, no-anticipation, and non-interference assumptions. Expressing ATT as κ and introducing the binary variable D to indicate the presence ($D = 1$) or absence ($D = 0$) of treatment, I can write κ as:

$$\begin{aligned}\kappa &\equiv \mathbb{E}[H_{j_2}(\mathbf{1}) - H_{j_2}(\mathbf{0}) | D_j = 1] \\ &= \mathbb{E}[H_{j_2}(\mathbf{1}) - H_{j_1}(\mathbf{1}) | D_j = 1] - \mathbb{E}[H_{j_2}(\mathbf{0}) - H_{j_1}(\mathbf{0}) | D_j = 1] \\ &= \mathbb{E}[H_{j_2}(\mathbf{1}) - H_{j_1}(\mathbf{1}) | D_j = 1] - \mathbb{E}[H_{j_2}(\mathbf{0}) - H_{j_1}(\mathbf{0}) | D_j = 0].\end{aligned}\tag{3.16}$$

The first expression defines ATT, but I cannot estimate it because of the missing data problem noted above. The second expression, which includes the addition and subtraction of $H_{j_1}(\mathbf{0})$ relies on the no-anticipation assumption, whereby $H_{j_1}(\mathbf{0}) = H_{j_1}(\mathbf{1})$ for all j with $D_j = 1$. However, this is also not directly estimable since I do not observe the second term for treated units. The third expression, derived from the second, uses the parallel-trends assumption, which states that $\mathbb{E}[H_{j_2}(\mathbf{0}) - H_{j_1}(\mathbf{0}) | D_j = 1] = \mathbb{E}[H_{j_2}(\mathbf{0}) - H_{j_1}(\mathbf{0}) | D_j = 0]$. This expression is estimable under SUTVA, which ensures that only one outcome is observed for each unit and that there are no interactions between units.

A natural way to estimate κ is to replace population averages with their sample analogs, that is, $\hat{\kappa} = (\bar{H}_{2,D=1} - \bar{H}_{1,D=1}) - (\bar{H}_{2,D=0} - \bar{H}_{1,D=0})$. Alternatively, I can use the two-way fixed effects (TWFE) regression specification, which facilitates the computation of standard errors. The TWFE model

regresses the outcome variable (H) on individual and time-fixed effects, which subsume the effects of the (time-invariant) treatment indicator (D), a (unit-invariant) post-treatment indicator, and a term that interacts the treatment indicator with the post-treatment indicator. The slope coefficient on this interaction term corresponds to ATT. For the question before us, I can express the TWFE model as:

$$LS_{jt} = \tau_j + \pi_t + \mathbf{X}_{jt}\boldsymbol{\beta}_X + \alpha T_{jt} + u_{jt}, \quad (3.17)$$

where $\boldsymbol{\tau}$ and $\boldsymbol{\pi}$ are vectors of time-invariant unit characteristics and unit-invariant time shocks, T is the treatment (retirement) indicator for unit j at time t , and \mathbf{X} is a vector of time-varying covariates that are independent of the treatment. However, the coefficient α in (3.17) continues to provide the ATT only if treatment effects are homogeneous across units and over time (i.e., all units experience the same treatment effect, and the effect remains constant regardless of how long the treatment has been in place). If treatment effects are heterogeneous, the (static) TWFE regression does not recover an easily interpretable casual parameter associated with the treatment, as the estimate of α represents a weighted average of all “2 × 2” DiD setups, with the sum of weights equal to one, but some weights may be negative. This can result in a situation where the estimate of α is negative even if all unit- and time-specific treatment effects are positive (e.g., if the largest treatment effects are assigned negative weights). Even if negative weights do not reverse the sign of the estimate of α , they can still affect its magnitude, making it difficult to interpret what the estimate actually captures.

More intuitively, each of the “2 × 2” DiD setups compares the outcomes of treated and control groups before and after treatment. Essentially, when units that were already treated or treated earlier serve as control units for later-treated groups, it can lead to biased estimates, as some individual treatment effects might subtract (hence, negative weights) rather than add to the estimation of average treatment effects. This phenomenon is referred to as a “bad comparisons” problem (Baker et al., 2022).

More generally, while a TWFE regression works well in the canonical case described above,²² complications arise regarding the validity of the TWFE DiD estimator when we have (i) multiple periods and variation in treatment timing across units (e.g., Athey and Imbens, 2022; De Chaisemartin and D’Haultfoeuille, 2020; Goodman-Bacon, 2021), (ii) time-varying covariates that are

²² Caetano and Callaway, 2023 show that, even in the two-period case, TWFE regressions can deliver poor estimates of ATT in the presence of: (1) violations of linearity conditions for untreated potential outcomes over time; (2) parallel trends assumptions that depend on the level of time-varying covariates; or (3) paths of untreated potential outcomes that depend on time-invariant covariates.

not independent of the treatment (e.g., [Caetano and Callaway, 2023](#)), and/or (iii) non-parallel trends. Complications under (i) are especially relevant to my paper, as I have multiple periods (three waves) and staggered treatment adoption (transition into retirement occurring at different times), which may introduce heterogeneity in treatment effects.

To address the potential challenges of the TWFE estimator in staggered designs and in the presence of heterogeneous treatment effects, several estimators are now available, resulting from recent advances in the DiD econometrics as synthesized in [Roth et al. \(2023\)](#). Of particular significance for settings with staggered treatment timing are the *Callaway and Sant'Anna estimator* ([Callaway and Sant'Anna, 2021](#)), the *imputation approach* ([Borusyak et al., 2024](#); [Gardner, 2021](#)), and the *extended TWFE estimator* ([Wooldridge, 2021](#)).

The Callaway and Sant'Anna estimator calculate individual treatment effects by group and period (group-time ATTs) when the control group consists of either never-treated units or not-yet-treated units. These group-time ATTs are then aggregated into a single ATT using a weighting strategy that reflects relative frequencies in the treated population.

The imputation approach entails two steps: the first step uses not-yet-treated observations to estimate group and period fixed effects; the second step estimates individual treatment effects by regressing the difference between observed outcomes under treatment and predicted outcomes under no treatment (from the first step) on treatment. Finally, the extended TWFE estimator fits an extended version of (3.17) that incorporates terms interacting all relevant covariates and indicators for treatment, cohort (i.e., the group of units receiving treatment in the same period), and post-treatment period, with the estimated coefficients of these interactions capturing cohort-time ATTs that I can aggregate into a single ATT through uniform weighting.²³

In this paper, I employ two STATA programs that can accommodate time-varying covariates: *did2s* ([Butts, 2021](#)), based on the imputation approach from [Gardner \(2021\)](#), and *wooldid* ([Hegland, 2023](#)), based on the TWFE approach from [Wooldridge \(2021\)](#) and the high-dimensional FE estimators from [Correia \(2017\)](#). The *did2s* program entails two steps: In the first step, it estimates:

²³ [Sun and Abraham \(2021\)](#) propose an event study approach with a fully interacted regression which recovers estimates of cohort-specific ATTs and is similar to the framework [Wooldridge \(2021\)](#) introduces. However, while [Wooldridge](#) focuses on post-treatment periods, [Sun and Abraham](#) cover all time periods, including pre-treatment, and can easily test whether the parallel trends assumption holds, although at the price of less efficiency.

$$LS_{jt} = \tau_j + \pi_t + \mathbf{X}_{jt}\boldsymbol{\beta}_X + u_{jt} \quad (3.18)$$

for $T = 0$; in the second step, it uses the results from the first step to predict counterfactual outcomes in all periods and regresses the residualized outcomes (i.e., $LS_{jt} - \widehat{LS}_{jt}$) on T to estimate the treatment effect.

The *wooldid* program also consists of two steps: In the first step, it estimates:

$$LS_{jt} = \tau_j + \pi_t + \mathbf{X}_{jt}\boldsymbol{\beta}_X + \alpha_{3t}D_{jt}^{pre}T_{j3t} + \sum_{g=2}^3 \alpha_{gt}D_{jt}^{post}T_{jgt} + u_{jt}, \quad (3.19)$$

where subscript g denotes cohort (hence, $T_{j3t} = 1$ represents the subgroup of individuals who are retired in wave 3 but not in waves 1 and 2) and

$$D_{jt}^{pre} = \begin{cases} 1 & \text{if } t = 1 \\ 0 & \text{if } t > 1 \end{cases} \quad D_{jt}^{post} = \begin{cases} 1 & \text{if } t \geq g \\ 0 & \text{if } t < g \end{cases}, \quad (3.20)$$

in the second step, it performs margin calculations to compute, for all treated observations, the difference between the predicted outcomes from the regression in the first step and the counterfactual predicted outcomes that would occur in the absence of the treatment. The purpose of the indicators in (3.20) is to capture pre- and post-treatment periods without inducing perfect multicollinearity, thus excluding one period, namely, the period just before treatment, which becomes the reference period.

Given that I have three periods (or waves), I am only able to consider the pre-treatment period for the cohort of individuals who retire in wave 3. The inclusion of α_{31} in (3.19) provides me with a simple way to test for the assumption of parallel trends. If the assumption holds, I should see no significant divergence in trends between those who retire in wave 3 and non-retired individuals in the pre-intervention period (i.e., wave 1). However, validating the assumption in pre-treatment periods does not guarantee its relevance in the current period, where its adherence is most critical. The assumption might hold in earlier periods but not in the present period, or violations could occur in earlier periods but not in the present one. Nonetheless, I consider the pre-test as a contributing factor to the overall credibility of the DiD design in my specific context. Importantly, wave 1 can be thought of as a placebo treatment period for the treated cohort 3, during which no genuine treatment effects are expected, and the coefficient α_{31} captures anticipatory effects. If the estimate of α_{31} is statistically significant, it signals the presence of anticipation bias, violating the no-anticipation assumption.

Table 3.4 presents the results for both DiD programs, confirming that the effect of retirement on life satisfaction is positive and statistically significant. The *wooldid* program also allows me to estimate the ATT per cohort and per cohort-wave combination, using the wave just before treatment as the reference period. I test whether there are differences in ATT between cohort 2 (individuals who are not retired in wave 1 but are retired in wave 2) and cohort 3 (individuals who are not retired in waves 1 and 2 but are retired in wave 3). For both subjective and objective measures of retirement, the *p*-value associated with the hypothesis that the two subgroups have the same ATT is above 0.90, suggesting no heterogeneity between the two cohorts. Furthermore, I cannot reject the null hypothesis that $\alpha_{31} = 0$ at any acceptable level of significance when using the objective measure of retirement, and at any level of significance less than 9.5% when using the subjective measure of retirement. This result suggests no anticipation bias, supporting the appropriateness of the DiD design.

Table 3.4: Staggered DiD Estimation Results

<i>did2s</i> (Gardner, 2021)						
			Coefficient	Standard Error*	<i>p</i> -value	95% CI
Subjective Retirement (SR)			0.6822	0.1013	0.0000	0.4835, 0.8808
Objective Retirement (OR)			0.5689	0.1044	0.0000	0.3641, 0.7735
<i>wooldid</i> (Wooldridge, 2021)						
Full Sample	main	SR	0.5491	0.1376	0.0001	0.2793, 0.8188
		OR	0.4521	0.1419	0.0014	0.1739, 0.7302
	pre-treatment (-2)	SR	0.2702	0.1615	0.0942	-0.04627, 0.5868
		OR	-0.0504	0.1596	0.7521	-0.3632, 0.2624
	contemporary (0)	SR	0.5003	0.1296	0.0001	0.2462, 0.7543
		OR	0.4758	0.1344	0.0004	0.2124, 0.7392
	post-treatment (1)	SR	0.7084	0.2356	0.0026	0.2466, 1.1703
		OR	0.3784	0.2349	0.1072	-0.0820, 0.8389
Cohort 2	main	SR	0.5576	0.1725	0.0012	0.2194, 0.8958
		OR	0.4539	0.1725	0.0085	0.1158, 0.7919
	contemporary (0)	SR	0.4753	0.1722	0.0058	0.1378, 0.8127
		OR	0.4975	0.1743	0.0043	0.1558, 0.8392
	post-treatment (1)	SR	0.7084	0.2356	0.0026	0.2466, 1.1703
		OR	0.3784	0.2349	0.1072	-0.0820, 0.8389
Cohort 3	main	SR	0.5322	0.1809	0.0032	0.1777, 0.8867
		OR	0.4485	0.1777	0.0116	0.1001, 0.7968
	pre-treatment (-2)	SR	0.2702	0.1615	0.0942	-0.04627, 0.5868
		OR	-0.0504	0.1596	0.7521	-0.3632, 0.2624
	contemporary (0)	SR	0.5322	0.1809	0.0032	0.1777, 0.8867
		OR	0.4485	0.1777	0.0116	0.1001, 0.7968

Note : * robust standard errors are clustered at the unit (ID) level.

Given that my dataset includes reasons for retiring, I incorporated these into the DiD analysis after categorizing them as pull or push factors. Pull factors are positive incentives that encourage

voluntary retirement (e.g., agreement with a spouse/partner, completion of required years to qualify for a pension, financially feasible, employer offered special incentives, desire to pursue hobbies/activities of personal interest, and desire to stop working). Push factors are negative circumstances that force individuals into retirement (e.g., health/disability/stress issues, organizational restructuring, caring for a family member or friend, and mandatory retirement policy). My conjecture is that the effect of retirement on life satisfaction is stronger when pull reasons motivate the decision, and the *wooldid* results, with robust standard errors clustered at the unit level, support this hypothesis. Table 3.5 presents three sets of ATTs: BOTH (including all retirees regardless of reasons), PUSH (excluding pull reasons), and PULL (excluding push reasons). The ATTs in the PULL set are larger than those in the BOTH set, while the ATTs in the PUSH set are negative and statistically significant for both measures of retirement. In all instances, there is no evidence of heterogeneity between Cohort 2 and Cohort 3.

Table 3.5: *wooldid* ATTs by Reasons for Retirement

		Subjective Retirement			Objective Retirement		
		BOTH	PUSH	PULL	BOTH	PUSH	PULL
Full Sample	main	0.5491***	-1.3923***	1.2138***	0.4521***	-1.1918***	1.0710***
	pre-treatment	0.2702*	0.2581	0.2538	-0.0504	-0.0414	-0.0439
Cohort 2	main	0.5576***	-1.2517***	1.1752***	0.4539***	-1.1065***	1.1150***
Cohort 3	Main	0.5322***	-1.7263**	1.2906***	0.4485**	-1.4019***	0.9847***
Number of Clusters		26,268	26,093	26,138	27,540	27,404	27,436
Number of Observations		64,572	57,276	60,231	67,411	60,483	63,238

Notes: robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The findings highlight rather starkly that the motivation behind retiring determines how retirement impacts life satisfaction. Individuals retiring due to pull factors, such as a mutual agreement with a spouse or meeting eligibility for pension benefits, often experience a positive transition, leading to increased satisfaction as they enter a desired phase of life. Conversely, those retiring due to push factors, such as health issues or job dissatisfaction, may initially face challenges adjusting to retirement, which can negatively impact their life satisfaction. Therefore, examining the reasons for retirement provides valuable insights into the varied experiences individuals undergo during this transition period and underscores the importance of addressing both positive and negative influences to promote optimal life satisfaction in retirement.

3.6 Robustness Results

To ensure the robustness of my findings, I tested the effect of retirement using various methods, as detailed in a series of tables in Appendix C. These methods include different data collection methodologies (phone versus in-person, as shown in [Table C.3.4](#), different measures of life satisfaction (score versus factor index), and income (personal versus household), as well as additional covariates ([Table C.3.5](#) and [Table C.3.6](#)). Interestingly, models using subjective retirement measures consistently yield slightly larger estimates of retirement's positive effect.

3.6.1 Examination of Partial vs. Complete Retirement

In [Table C.3.3](#), I delve deeper into the relationship between retirement and life satisfaction by analyzing self-reported details about retirement along three dimensions: (i) partial versus complete retirement, (ii) voluntary versus involuntary retirement,²⁴ and (iii) the transition into complete retirement from either partial retirement or no retirement. The results suggest that transitioning away from full-time work, regardless of the extent, positively impacts an individual's overall well-being and sense of fulfillment. Reducing work hours or responsibilities without fully retiring can produce life satisfaction gains similar to those experienced during complete retirement. This finding offers a different perspective from existing literature, which often views partial retirement more favourably, typically in studies focused on either men ([Abramowska-Kmon and Łatkowski, 2021](#)) or women ([Tambellini, 2023](#)).

Consistent with these findings, we observe that the effect of transitioning from partial to complete retirement on life satisfaction is smaller and statistically insignificant (1.0 points), whereas transitioning from no retirement to complete retirement shows a larger and statistically significant effect (4.9 points). This suggests differing expectations, adjustment processes, and motivations between these two groups. Those already accustomed to a semi-retired lifestyle may have expectations that align with retirement living, experiencing less additional fulfillment upon complete retirement. In contrast, those transitioning from full-time work to complete retirement may undergo a significant shift in daily rhythms and commitments, leading to a more substantial increase in life satisfaction.

[Table C.3.3](#) also highlights that the impact of retirement on life satisfaction varies depending on whether retirement is voluntary or involuntary. Voluntary retirement increases life satisfaction by a

²⁴ Information about voluntary retirement is only available in the TRA datasets.

similar amount to the overall increase reported in [Table 3.3](#) (3.9 versus 3.8 points). Involuntary retirement, however, does not significantly affect life satisfaction. While this finding aligns with the broader literature that voluntarily retired individuals tend to be more satisfied, my analysis offers a more optimistic view of involuntary retirement, suggesting that it does not reduce life satisfaction as some studies have indicated ([Bonsang and Klein, 2012](#); [Hershey and Henkens, 2014](#)). This suggests that the benefits of retirement, such as reduced work-related stress and increased leisure time, may offset the negative aspects like loss of work-related identity and financial insecurity.

3.6.2 Examination of Phone vs. In-Home Collection Method

In [Table C.3.4](#), we confirm that retirement increases life satisfaction scores across two subsamples defined by the data collection method: (i) computer-assisted telephone interviews (phone) and (ii) in-home interviews with assessments at CLSA sites (in-home). Focusing on retirement, we find that in-home interviews yield more conservative estimates than phone interviews, with the latter producing estimates that are 0.9 points higher for subjective retirement and 1.4 points higher for objective retirement, corresponding to 3 and 5 percent of the mean life satisfaction score. However, more conservative estimates do not necessarily mean more accuracy: on the one hand, during a phone interview, individuals may feel more relaxed and anonymous, which could lead to more candid responses; on the other hand, during an in-person interview, individuals may feel a stronger sense of accountability because of the face-to-face interaction, which could lead to more careful and considered responses. Encouragingly, both subsamples show a strong relationship between retirement and life satisfaction.

3.6.3 Examination of Life Satisfaction Index

When using the life satisfaction index from factor analysis as the outcome variable, the increase is 0.78 (objective) to 0.81 (subjective) points overall, corresponding to 14 percent of the mean index value (5.7 points). These results are reported in [Table C.3.5](#) for objective retirement and [Table C.3.6](#) for subjective retirement, confirming the robustness of the findings.

3.6.4 Inclusion of Additional Control Variables

The final set of results pertains to additional robustness checks I implemented to confirm the strength of the relationship between retirement and life satisfaction. I added covariates that are likely to influence life satisfaction, such as physical activities, functional social support (overall and by

aspect), and social engagement. The results are presented in [Table C.3.5](#) (objective retirement) and [Table C.3.6](#) (subjective retirement), shows that the marginal effects of these additional covariates are all positive and statistically significant. More importantly, the marginal effect of retirement on life satisfaction remains positive, statistically significant at the 1% level, and consistent in magnitude. Specifically, the effect ranges between 3.5 and 3.7 points across columns 3 through 6 in [Table C.3.5](#), and between 3.6 and 3.9 points across the corresponding columns in [Table C.3.6](#). The marginal effects estimated in the basic model, reported in [Table 3.3](#), are 3.7 and 3.8 points.

3.7 Conclusions

Retirement represents a major life transition, bringing a mix of anticipation and concern as individuals move from employment into retirement. This change triggers significant shifts across various aspects of life, including social roles, financial stability, and personal identity, all of which can impact overall life satisfaction. While retirement offers the freedom to enjoy more leisure time, pursue personal interests, and strengthen social ties, it can also evoke feelings of loss and uncertainty, especially for those who are deeply committed to their careers.

Various theoretical perspectives, such as role theory, continuity theory, and stage theory, explore the multifaceted process of adjusting to retirement. These frameworks underscore the complex interplay of individual, social, economic, and contextual factors in determining how retirement affects life satisfaction. Despite this complexity, my findings indicate that, within the life-cycle model of consumption and leisure, retirement generally leads to an increase in life satisfaction, even in cases of involuntary retirement. This is because individuals can smooth their consumption over time, balancing the losses in utility during the involuntary retirement phase with the gains expected during voluntary retirement.

Empirical evidence on the effects of retirement on life satisfaction is varied, with positive outcomes being the most common, particularly in panel studies. However, the literature also highlights nuanced differences, such as the varying impacts of voluntary versus involuntary retirement, partial versus full retirement, and the short-term versus long-term effects.

My study contributes to this literature by analyzing the effects of retirement on life satisfaction using a comprehensive longitudinal dataset of Canadian residents aged 45 to 85 years, spanning from 2011 to 2021. My approach fills several gaps in existing research. Firstly, I utilize a holistic measure of subjective well-being that is distinct from health indicators. Secondly, I combine both subjective reports of retirement and objective measures based on official definitions. Thirdly, the richness of

my dataset allows for a variety of comparisons within the same study, including the effects of voluntary versus involuntary retirement, partial versus full retirement, transition to full retirement from no retirement versus partial retirement, short- versus long-term impacts, and retirement driven by push versus pull reasons. I also employ different estimation strategies, including fixed effects, random effects, and difference-in-differences, to address endogeneity concerns. Lastly, the dual data collection methodologies in my dataset enable me to examine potential biases related to the mode of survey administration.

My key finding, as shown by my fixed effects instrumental variables (FEIV) regressions, is that retirement significantly increases life satisfaction. This positive effect is consistent across both retirement measures, with a slightly larger effect observed when using the subjective measure, and across both data collection methods, though estimates from phone interviews tend to be larger than those from face-to-face interviews. My analysis of retirement across various dimensions reveals that any transition away from full-time work tends to improve well-being, with partial retirement providing similar benefits to complete retirement. Notably, while transitioning from no retirement to complete retirement boosts life satisfaction, transitioning from partial to complete retirement does not show a statistically significant effect. Voluntary retirement is associated with higher life satisfaction scores, whereas involuntary retirement appears to have no significant impact. Moreover, retiring for reasons that pull rather than push enhances life satisfaction, while retiring for push reasons reduces life satisfaction. I also find that life satisfaction increases slightly with age but decreases marginally with the duration of retirement. Additionally, marital status and income play significant roles in influencing life satisfaction, with married individuals and those with higher incomes reporting greater satisfaction. The positive impact of retirement on life satisfaction remains robust even when controlling for additional variables, such as physical activity, functional social support, and social engagement, all of which are positively associated with life satisfaction.

Understanding the impact of retirement on life satisfaction is essential for individuals, policymakers, and organizations to effectively prepare for and support successful retirement transitions. By identifying the factors that contribute to positive retirement experiences, we can develop interventions and policies that enhance well-being in later life and foster environments that celebrate the opportunities presented by retirement. As the population continues to age, understanding how retirement impacts life satisfaction becomes increasingly important for promoting healthy and fulfilling aging experiences for everyone.

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Appendix A for Chapter 3

Table A.3.1: Studies on the Relationship between Life Satisfaction and Retirement

Author	Life Satisfaction	Retirement	Country	Data / Time Span	Group	Estimation	Effects
Abolhassani & Alessi, 2013	Satisfaction with life, all things considered (categorical, 0-10)	Involuntary retired if in receipt of pension income for at least 7 months and involuntarily inactive Voluntary retired if in receipt of pension income for at least 7 months and voluntarily inactive	Germany	Panel data German Socio-Economic Panel, 1994-2009 10,275 individuals, 45,155 observations	Age: 50-70	Pooled OLS with/without Mundlak terms	Insignificant for both voluntary and involuntary retirement
Adawi et al., 2023	Life satisfaction as sum of categorical (1-7) items (range of score: 5-35) ▪ life close to ideal ▪ excellent life conditions ▪ satisfied with life ▪ gotten important things in life ▪ change nothing in life	Subjective measure ▪ completely retired ▪ partially retired Objective measure (based on official definition), retired if ▪ over age of 54 years ▪ not in labour force ▪ 50% or more of income from retirement-like sources	Canada	Cross-sectional data 2008–2009 Canadian Community Health Survey–Healthy Aging 13,919 individuals	Age: 54-85	OLS, IV 2SLS Instruments: indicators for meeting eligibility for partial, full, and augmented pension benefits Age: 60, 65, 70	+ (males and complete retirement)
Abramowska-Kmon & Łatkowski, 2021	Happiness in recent times (categorical, 1-4) Feeling lonely (binary)	Retired = not working because retired	Poland	Panel data Social Diagnosis Survey, 2007-2015 (5 waves) 1,503 observations	Age: 55-69 Those who transitioned to retirement over period and participated in at least two waves	FE ordered logit; FE logistic	Happiness: no change Feeling lonely (among males) if ▪ not engaged in bridge employment: + ▪ engaged in bridge employment: -
Bonsang & Klein, 2012	Categorical outcomes (0-10) ▪ overall life satisfaction ▪ satisfaction in domains of life (health, income, leisure)	Voluntarily retired = not employed and no intention to go back to work Involuntarily retired = not working but intention to engage in paid employment in the future	Germany	Panel data German Socio-Economic Panel, 1995-2010 4,541 individuals, 24,838 observations	Age: 50-70 Men living in West Germany not belonging to high-income subsample	OLS, FE IV Instruments: indicators for meeting eligibility for pension benefits Age: 60, 63, 65	Voluntary retirement ▪ life satisfaction: insignificant ▪ satisfaction with income: - ▪ satisfaction with free time and health: + Involuntary retirement ▪ life satisfaction: - ▪ satisfaction with income: - (larger than under voluntary retirement)

Author	Life Satisfaction	Retirement	Country	Data / Time Span	Group	Estimation	Effects
							<ul style="list-style-type: none"> satisfaction with free time: + (smaller than under voluntary retirement)
Calasanti et al., 2021	<p>Life satisfaction score as mean of categorical (1-7) items (range of score: 1-7)</p> <ul style="list-style-type: none"> life close to ideal excellent life conditions satisfied with life gotten important things in life change nothing in life <p>Categorical outcome (1-5)</p> <ul style="list-style-type: none"> satisfaction with daily life and leisure activities satisfaction with family life satisfaction with present financial situation 	Retired = self-reported and not working for pay	United States	<p>Panel data</p> <p>Health and Retirement Study (HRS), 2008-2016</p> <p>593 individuals</p>	<p>Age: 62-72</p> <p>Retired within 10 years of being eligible to claim Social Security</p>	OLS	<p>Life satisfaction (LS): + (men); - (women)</p> <p>Financial LS: + (men); - (women)</p>
Charles, 2004	Feeling lonely (binary)	<p>Retired if</p> <ul style="list-style-type: none"> not working for pay as of survey date not actively seeking work as of survey date not worked for one year prior to survey date 	United States	<p>Panel data</p> <ul style="list-style-type: none"> Health and Retirement Study (HRS): 2nd and 3rd waves Survey of Asset and Health Dynamics among the Oldest Old (AHEAD): first 2 waves (1993, 1995) National Longitudinal Survey of Mature Men (NLS-MM): 3 waves (1981, 1983, 1990) 	<p>Age</p> <ul style="list-style-type: none"> 60-67 (HRS, wave 2); 60-69 (HRS, wave 3) 5 years younger than minimum eligible age and younger than 80 years (AHEAD) 45-59 in 1966 (NLS-MM) <p>Men</p>	<p>OLS, FE, IV 2SLS</p> <p>Instruments: indicators for meeting eligibility for pension benefits</p> <p>Age: 62, 65, 70, 72</p>	<p>OLS: +</p> <p>FE: +</p> <p>2SLS: -</p>
Cho & Lee, 2014	Overall life satisfaction (categorical, 0-5, for South Korea; 0-10 for Germany and Switzerland)	<p>Retirement as transitional process over 8 years (categorical)</p> <ul style="list-style-type: none"> complete = not working (full-time employment to full retirement) hopping type = back and forth working at reduced hours 	Germany, Switzerland, South Korea	<p>Cross-sectional data</p> <ul style="list-style-type: none"> Korean Labor and Income Panel Study German Socio-Economic Panel Switzerland Household Panel 	Age: 51+	Ordered logistic	<p>South Korea: +</p> <p>Germany, Switzerland: -</p>

Author	Life Satisfaction	Retirement	Country	Data / Time Span	Group	Estimation	Effects
		<ul style="list-style-type: none"> continuity type = working at reduced hours 					
Dingemans & Henkens, 2014	<p>Life satisfaction as average of three categorical (1-5) items (range of score: 1-5)</p> <ul style="list-style-type: none"> life close to ideal excellent life conditions gotten important things in life 	Retired = drawing on early retirement benefits or pensions	Netherlands	<p>Panel data</p> <p>Work and Retirement Panel, 2001-2011 (3 waves)</p> <p>1,248 individuals</p>	Age: 50+ Retirees	Conditional change	<ul style="list-style-type: none"> Life satisfaction (LS) of those willing to continue working but unable to find bridge jobs lower than that of full retirees not considering bridge jobs LS of those participating in bridge jobs for financial motives lower than that of retirees working based on intrinsic motives LS of involuntarily retired lower than that of voluntarily retired (with bridge employment mitigating negative shock)
Dingemans & Henkens, 2019	Life satisfaction (categorical, 0-10)	Retired = in receipt of pension income	Europe (16 countries)	<p>Panel data</p> <p>Survey of Health, Ageing and Retirement in Europe</p> <p>Waves: 2 (2006), 4 (2011), 5 (2013)</p> <p>54,156 individuals</p>	Age: 60-75 Retirees	Country FE	-
Fonseca et al., 2017	Overall life satisfaction (categorical, 0-10)	Retired = self-reported	Europe (11 countries), United States	<p>Panel data</p> <p>Health and Retirement Study, 2004-2010</p> <p>Survey of Health, Ageing and Retirement in Europe, 1992-2012</p>		SEM (LPM), FE IV (2SLS)	<p>LS: +</p> <p>Depression: -</p>
Gorry et al., 2018	<p>Categorical outcomes (1-5)</p> <ul style="list-style-type: none"> life close to ideal excellent life conditions satisfied with life gotten important things in life change nothing in life 	<p>Partially retired if working part time but mentioning being retired</p> <p>Retired if not working, not looking for work, and mentioning being retired</p>	United States	<p>Panel data</p> <p>Health and Retirement Study, 1992-2014</p>	Age: 50+	OLS, IV 2SLS	<p>OLS: + at times but weaker</p> <p>IV: + (health, mental health, life satisfaction)</p>

Author	Life Satisfaction	Retirement	Country	Data / Time Span	Group	Estimation	Effects
						Age: 62, 65/66, 70	
Hansson et al., 2018	Life Satisfaction Score (categorical, 1-5) as average of <ul style="list-style-type: none"> life close to ideal excellent life conditions satisfied with life gotten important things in life change nothing in life 	Retired = self-reported based on receiving old-age pension (with option to indicate bridge employment = retired but working)	Sweden	Panel data Health, Ageing and Retirement Transitions in Sweden, 2015-2016 (2 waves) 3,471 individuals	Age: 60-66	Latent change score	no difference between gradual and abrupt retirement + (after 1 year with a change in status) - (for those without a change in retirement status)
Hansson et al., 2020	Life satisfaction (categorical: 1-7)	Retired = self-reported based on receiving old-age pension (with option to indicate retirement but working) Respondents retained: not retired at baseline and fully retired in the last wave	Sweden	Panel data Health, Ageing and Retirement Transitions in Sweden (HEARTS)	Age: 60-66	Multivariate latent growth curve analysis	+ (for those higher in extraversion; self-esteem and social support improved during the transition into retirement) - (for those higher in neuroticism; self-esteem, autonomy, social support, and perceived physical health and cognitive ability worsened during the transition into retirement)
Hershey & Henkens, 2014	Life satisfaction score (categorical, 1-5) as average of <ul style="list-style-type: none"> life close to ideal excellent life conditions gotten important things in life 	Change in work status <ul style="list-style-type: none"> continued working retired: voluntary retired: involuntary (health) retired: involuntary (organizational) retired: involuntary (other) 	Netherlands	Panel data The Netherlands Interdisciplinary Demographic Institute, 2001 and 2006/2007 (2 waves) 1,388 individuals	Age: 50+	Hierarchical multiple regression	Life satisfaction (LS) higher for voluntarily retired than employed LS higher for employed than involuntarily retired (for health and organizational reasons)
Heybroek et al., 2015	Life satisfaction, all things considered (categorical: 0-10)	Retired = self-reported	Australia	Panel data Household, Income and Labour Dynamics in Australia survey (HILDA), 2001-2011 (11 waves) 724 individuals	Individuals with a single transition into retirement	Latent growth mixture models	Life satisfaction <ul style="list-style-type: none"> remained high across the retirement transition (40%) declined from a high level prior to retirement (28%) increased from a low level prior to retirement (14%) exhibited declining low levels (18%)
Horner, 2014	Subjective well-being (SWB) <ul style="list-style-type: none"> overall life satisfaction 	Retired = self-reported	16 Western Countries, United States	Cross-sectional data	Age: 50-70 Men	Country FE, IV 2SLS	+ (years surrounding retirement, large improvement)

Author	Life Satisfaction	Retirement	Country	Data / Time Span	Group	Estimation	Effects
	<ul style="list-style-type: none"> CASP (control, autonomy, self-realization, and pleasure) 			Survey of Health, Ageing and Retirement in Europe, 2006 Health and Retirement Study, 2004 (US) English Longitudinal Study of Ageing, 2006 (UK)		Instruments: indicators for meeting eligibility for early and normal retirement benefits Age: it varies across countries	- (few years after retirement, rapid drop)
Kesavayuth et al., 2016	Categorical outcomes (1-7) <ul style="list-style-type: none"> overall life satisfaction satisfaction in domains of life (income, leisure) 	Retired = self-reported not working and retired	United Kingdom	Panel data British Household Panel Survey, 1991-2008	Age: 50-75	FE, FE IV (2SLS), FE IV two-stage residual inclusion (2SRI) Instruments: indicators for meeting eligibility for pension benefits Age: 60 (women), 65 (men)	Overall satisfaction: insignificant Leisure satisfaction: + Income satisfaction: + (men); insignificant (women)
Kettlewell & Lam, 2022	Life satisfaction (LS) (categorical: 0-10) Mental well-being = Mental Component Summary (MCS) (range: 0 to 100)	Retired = self-reported and not in the labour force	Australia	Panel data Household, Income and Labour Dynamics in Australia Survey (HILDA), 2001-2018 (18 waves) 2,961 individuals, 20,420 observations		FE, FE IV Instruments: indicators for meeting eligibility for pension benefits Age: men (65), women (increase over time between 60 and 65.5)	Own retirement <ul style="list-style-type: none"> LS: + MCS: + for women (larger with low social support) Spouse's retirement <ul style="list-style-type: none"> LS: + with low social support MCS: + for women with low social support IV results: stronger on MCS
Latif, 2011	Happiness (categorical, 1-5)	Retired = self-reported not working due to retirement	Canada	Panel data Canadian National Population Health Survey, 1994-2006 (7 wave)	Age: 45+	Pooled OLS, ordered logit, FE, FE IV, conditional FE logit Instruments: indicators for meeting eligibility for early, normal, or late retirement benefits Age: 60, 65, 70	+

Author	Life Satisfaction	Retirement	Country	Data / Time Span	Group	Estimation	Effects
Merz, 2018	Satisfaction with life (categorical, 0-10)	Retired = in receipt of pension benefits	Germany	Panel data Socio-Economic Panel, 33 waves		FE	+ (just before retirement and soon after retirement) - (after retirement in the long run)
Nikolova & Graham, 2014	Categorical outcome ▪ BPL (best possible life) Binary outcomes ▪ smiling a lot the previous day ▪ happiness the previous day ▪ stress the previous day ▪ anger the previous day	Retired = self-reported not working and retired	Europe (8 countries), Turkey, United States	Panel/pooled cross-sectional data Gallup World Poll, 2009-2012		Order logit, logit, propensity score matching (PSM)	- (smiling, happiness) + (stress, anger)
Pinquart & Schindler, 2007	Satisfaction nowadays with life as a whole (categorical, 0-10)	Retired = shifted from receiving wages (if employed) or benefits (if unemployed) to drawing pensions	Germany	Panel data German Socioeconomic Panel data, 1984-2003 1,456 individuals	Retirees	Latent growth mixture	Three groups ▪ life satisfaction (LS) declined at retirement but continued on a stable or increasing trajectory thereafter (group 1) ▪ LS increased at retirement but overall declined (group 2) ▪ LS showed a small and temporary increase at retirement (group 3)
Prakash et al., 2022	Total life satisfaction score as sum categorical (1-5) items (range of score: 4-20) ▪ interestingness ▪ happiness ▪ easiness ▪ togetherness	Pre-retirement, retirement transition, and post-retirement	Finland	Panel data Finnish Retirement and Aging Study Cohort Study, 5 waves 3,543 individuals	Retired between 2014 and 2019 and working in 2012	Linear regression models with generalized estimation equations	+ (during retirement transition and post-retirement) bigger effect for women, people with suboptimal health, and people without a spouse
Sohier et al., 2021	Satisfaction with life (categorical, 0-10) CAS (control, autonomy, self-realization) as a measure of agency-freedom	Retired = self-reported	Europe (9 countries)	Panel data Survey of Health, Ageing and Retirement in Europe Waves: 2006 (2 nd), 2011 (4 th), 2013 (5 th) 38,344 individuals, 62,082 observations	Age: 50-75	FE, IV Instruments: indicators for meeting eligibility for early and normal retirement benefits Age: it varies across countries	Life satisfaction: insignificant (at the beginning); - (two years after retirement); + (for those retiring from low-quality jobs) no difference between: ▪ partial and full ▪ before and after normal retirement age ▪ joint (with partner) and individual Agency-freedom: +

Author	Life Satisfaction	Retirement	Country	Data / Time Span	Group	Estimation	Effects
Tambellini, 2023	Satisfaction nowadays with life as a whole (categorical, 0-10)	Retired = self-reported	Europe (11 countries)	Panel data Survey of Health, Ageing and Retirement in Europe, 2004-2017 (7 waves) 2,877 individuals	Age: 50+ Women (employed or unemployed in the first wave; retired in last wave)	Sequence analysis, cluster analysis, FE	+ (from discontinuity or part-time work to retirement) no effect (from full-time work to retirement)
Wetzel et al., 2016	Satisfaction with life, all things considered (categorical, 0-10)	Direct transition: full-exit retirees who were previously in full-time employment Indirect transition: previously unemployed full-exit retirees who were employed at least until the age of 57	Germany	Panel data German Socio-Economic Panel 3,361 individuals, 27,697 observations		Dual change score	+ (short run for both groups but more pronounced for indirect transition) - (long run for retirees with less education)
Zhu & He, 2015	Satisfaction with life (categorical, 0-10)	Retired = not in the labour force	Australia	Panel data Household, Income and Labour Dynamics in Australia Survey, 2001-2012 (12 waves)	Age: 51-75 Women	FE, FE IV, 2SLS Instruments: indicators for meeting eligibility for pension benefits Age: it changes over time	+ (soon after retirement) - (with retirement duration)

Appendix B for Chapter 3

Table B.3.1: Summary of CLSA Measures by Domain*

Measures by Domain	TRM Cohort (sample size = 21,241)	COM Cohort (sample size = 30,097)
LIFESTYLE/BEHAVIOR		
Alcohol use	✓	✓
Tobacco use	✓	✓
Nutrition	No	✓
Nutritional risk	✓	✓
Dietary supplement use	✓	✓
Physical activity	✓	✓
HEALTH STATUS		
Activities of daily living	✓	✓
Instrumental activities of daily living	✓	✓
Pain	✓	✓
Sleep	No	✓
Women's health	✓	✓
Medications	✓	✓
Online social networking	No	✓
Self-reported function	✓	No
Health status/successful aging	✓	✓
Chronic conditions	✓	✓
Chronic disease symptoms	No	✓
Injury	✓	✓
Oral health	✓	✓
Self-reported height and weight	✓	No
Self-reported vision and hearing	✓	✓
Falls and consumer products	✓	✓
PHYSICAL MEASURES		
Weight and height	No	✓
Hip and waist circumference	No	✓
Pulse rate and blood pressure	No	✓
Electrocardiogram	No	✓
Spirometry	No	✓
Bone density and bio-impedance (DXA)	No	✓
Hearing	No	✓
Timed 4-metre walk	No	✓
Timed get up and go (TUG)	No	✓
Standing balance	No	✓
Chair rise: balance and coordination	No	✓
Visual acuity	No	✓
Tonometry	No	✓
Retinal scan	No	✓
Grip strength	No	✓
BIOLOGICAL SPECIMENS		
Blood	No	✓
Urine	No	✓

Measures by Domain	TRM Cohort (sample size = 21,241)	COM Cohort (sample size = 30,097)
PSYCHOLOGICAL MEASURES		
Depression	✓	✓
Satisfaction with Life	✓	✓
Short cognitive battery	✓	No
Full cognitive battery	No	✓
Psychological distress	No	✓
Post-traumatic stress disorder	✓	✓
Personality traits	No	✓
SOCIAL & DEMOGRAPHIC MEASURES		
Social networks and social support availability	✓	✓
Social participation	✓	✓
Informal/formal caregiving and care receiving	✓	✓
Transitions in work and retirement	✓	✓
Social inequality	✓	✓
Wealth/income	✓	✓
Home ownership	✓	✓
Built environments	✓	✓
Migration, mobility, transportation	✓	✓
Life space assessment	No	✓
Education	✓	✓
Ethnicity, language, religion	✓	✓
Family and living arrangements	✓	✓
Paid and unpaid work	✓	✓
Caregiving	✓	✓
Veteran identifiers	✓	✓
HEALTH CARE USE		
Health and social service provider visits	✓	✓
Preventive health services	✓	✓
Data linkage with provincial health databases	✓	✓

* Detailed explanations of measures are available at www.clsa-elcv.ca.

Table B.3.2: Weights of Life Satisfaction Components

	Factor Loadings	Squared Factor Loadings	Squared Factor Loadings (scaled to unity sum)	Weights
	Factor 1	Factor 1	Factor 1	
1	0.8755	0.7665	0.2209	0.2209
2	0.8511	0.7244	0.2088	0.2088
3	0.8963	0.8034	0.2316	0.2316
4	0.8030	0.6448	0.1859	0.1859
5	0.7283	0.5304	0.1529	0.1529
Explained VAR		3.4695		

Explained VAR = sum of squared factor loadings. Weights = squared factor loadings scaled to unity sum.

Table B.3.3: Summary of Data across Waves

ONLY WAVE 1				ONLY WAVES 1 and 2					
	Sub Ret	Obj Ret		Sub Ret	NR - W2	PR - W2	CR - W2		
NR - W1	3,673	4,530		NR - W1	1,571	221	1,421		
PR - W1	644			PR - W1	41	171	756		
CR - W1	3,083	2,809		CR - W1			2,235		
				Obj Ret	NR - W2		CR - W2		
				NR - W1	2,864		1,684		
				CR - W1	22		2,117		
ALL WAVES (1, 2, and 3)									
Sub Ret	NR - W3			PR - W3			CR - W3		
	NR - W2	PR - W2	CR - W2	NR - W2	PR - W2	CR - W2	NR - W2	PR - W2	CR - W2
NR - W1	13,383	314	13	1,495	839	18	2,072	618	1,481
PR - W1	165	144	5	169	847	17	121	696	943
CR - W1			20			44			13,405
Obj Ret	NR - W3						CR - W3		
	NR - W2		CR - W2				NR - W2		CR - W2
NR - W1	17,795		330				3,091		2,330
CR - W1	99		135				159		11,956

Table B.3.4: Weights of Social Engagement Components

	(Orthogonally) Rotated Factor Loadings		Squared Factor Loadings (scaled to unity sum)		Relevant Squared Factor Loadings (re-scaled to unity sum)		Weights
	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2	
1	0.8571	0.2531	0.2790	0.0311	0.2979		0.1672
2	0.0165	0.6464	0.0001	0.2030		0.2300	0.1009
3	0.0844	0.6966	0.0027	0.2357		0.2671	0.1172
4	0.5150	0.3460	0.1007	0.0581	0.1076		0.0604
5	0.2979	0.6153	0.0337	0.1839		0.2084	0.0914
6	0.5955	0.1437	0.1347	0.0100	0.1438		0.0807
7	0.6942	0.1905	0.1830	0.0176	0.1954		0.1097
8	0.7935	-0.0336	0.2391	0.0005	0.2553		0.1433
9	0.2664	0.7316	0.0270	0.2600		0.2946	0.1293
Explained VAR	2.6331	2.0587					
Explained/Total	0.5612	0.4388					

Explained VAR = sum of squared factor loadings. Steps (after rotation of factor loadings): (1) compute squared loadings and scale them to unity sum; (2) assign items to factors based on the magnitude of their scaled squared loadings; (3) re-scale the relevant squared loadings within each factor to unity sum; (4) multiply the re-scaled squared factor loading of each item by the proportion of the variance explained by the factor representing the item.

Table B.3.5: Descriptions of Variables

Variable	Description
Life satisfaction	<p>Two measures:</p> <ul style="list-style-type: none"> Sum of agreement/disagreement scores across 5 statements Weighted average of scores across 5 statements, with weights based on principal component factor analysis <p>Scores: 1 = <i>strong disagreement</i>; 2 = <i>disagreement</i>; 3 = <i>slight disagreement</i>; 4 = <i>neither disagreement nor agreement</i>; 5 = <i>slight agreement</i>; 6 = <i>agreement</i>; 7 = <i>strong agreement</i></p> <p>Statements: (1) in most ways, my life is close to my ideal; (2) the conditions of my life are excellent; (3) I am satisfied with my life; (4) so far, I have gotten the important things in my life; (5) if I could live over, I would change almost nothing</p>
Retirement	<p>Two measures:</p> <ul style="list-style-type: none"> Subjective measure: two indicators for completely retired and partially retired Objective measure (derived): one indicator for completely retired
Reasons for retirement	Binary indicators for reasons for retiring: (1) agreement with spouse/partner; (2) health/disability/stress; (3) organizational restructuring; (4) completion of required years to qualify for pension; (5) financially feasible; (6) employer offered special incentives; (7) caring for a family member or friend; (8) mandatory retirement policy; (9) desire to pursue hobbies/activities of personal interest; (10) desire to stop working
Retirement age	Age in years at retirement
Years since retirement	Number of years since retirement
Retirement voluntary (only in TRA)	Binary indicator for voluntary retirement
Age	Age in years
Female	Indicator: female = 1; 0 otherwise
White	Indicator: white = 1; 0 otherwise
Immigrant	Indicator: immigrant = 1; 0 otherwise
Education	Indicators: less than secondary (reference); secondary; some post-secondary; post-secondary
Marital status	Indicators: married or common law (reference); widow or widower; divorced or separated; single
Personal or household income	Indicators: less than \$20,000 (reference); \$20,000 to \$49,999; \$50,000 to \$99,999; \$100,000 to \$149,999; \$150,000+
Retirement status of spouse/partner	Binary indicator for retirement of spouse/partner
Household size	Number of people within household (excluding participant)
Own dwelling	Indicator: own dwelling = 1; 0 otherwise
Urban	Indicator: urban = 1; 0 otherwise
Province	Binary indicators: 10 provinces; 9 indicators, with Ontario as the reference province
Physical Activity Scale for the Elderly (PASE)	<p>Sum of the amounts of time spent in each of 12 activities over past week multiplied by the corresponding activity weights</p> <ul style="list-style-type: none"> Activities: (1) walking outside; (2/3/4) light, moderate, or strenuous sport or recreational activities; (5) muscle strength or endurance exercises; (6/7) light or heavy housework; (8) home repairs; (9) lawn work or yard care; (10) outdoor gardening; (11) caring for another person; (12) work for pay or as a volunteer Weights corresponding to above activities: (1) 20; (2) 21; (3) 23; (4) 23; (5) 30; (6) 25; (7) 25; (8) 30; (9) 36; (10) 20; (11) 35; (12) 21

Variable	Description
Chronic conditions	Sum of long-term health conditions, diagnosed by a health professional, that have lasted or are expected to last at least 6 months; conditions are: asthma, arthritis, osteoporosis, back problems/excluding fibro/arthritis, high blood pressure, ever diagnosed with high blood pressure, migraine headaches, chronic bronchitis, emphysema, COPD, diabetes, angina, had a heart attack, heart disease, cancer, stomach or intestinal ulcers, suffers from the effects of a stroke, urinary incontinence, bowel disorder, cataracts, glaucoma, thyroid condition, mood disorder, or other physical or mental condition
Functional social support MOS (Medical Outcomes Study) Scale	Average of responses over the 19 items in the MOS survey covering four aspects of social support: (1) affection (involving expressions of love and affection); (2) emotional or informational support (the expression of positive affect, empathetic understanding, and the encouragement of expressions of feelings, or the offering of advice, information, guidance or feedback); (3) positive social interaction (the availability of other persons to positively interact with); (4) tangible social support (the provision of material aid or behavioral assistance)
Affection (Subscale of MOS scale)	Sum of frequency scores across 3 questions <ul style="list-style-type: none"> • Frequency scores between 0 (<i>never</i>) and 4 (<i>always</i>) – rescaled to range between 0 and 100 • Questions are about whether respondents have someone who shows them love, someone to hug, or someone to love them and make them feel wanted
Emotional or informational support (Subscale of MOS scale)	Sum of frequency scores across 8 questions <ul style="list-style-type: none"> • Frequency scores between 0 (<i>never</i>) and 4 (<i>always</i>) – rescaled to range between 0 and 100 • Questions: about whether respondents have someone to listen and to advise them in a crisis, someone to give information, confide in, and talk to, or someone who understands their problems
Positive social interaction (Subscale of MOS scale)	Sum of frequency scores across 4 questions <ul style="list-style-type: none"> • Frequency scores between 0 (<i>never</i>) and 4 (<i>always</i>) – rescaled to range between 0 and 100 • Questions: about whether respondents have someone to have a good time with, get together with for relaxation, do things with to get their minds off things, or do something enjoyable with
Tangible social support (Subscale of MOS scale)	Sum of frequency scores across 4 questions <ul style="list-style-type: none"> • Frequency scores between 0 (<i>never</i>) and 4 (<i>always</i>) – rescaled to range between 0 and 100 • Questions are about whether respondents have someone to help them if they are confined to bed, someone to take them to the doctor, someone to prepare meals, or someone to do daily chores
Social engagement index	Weighted average frequency across 9 activities over past 12 months, with weights based on principal component factor analysis <ul style="list-style-type: none"> • Frequency scores between 1 = no participation; 2 = yearly participation; 3 = monthly participation; 4 = weekly participation; 5 = daily participation • Activities: (1) community-related activities; (2) religious activities; (3) clubs or fraternal organization activities; (4) educational or cultural activities; (5) association activities; (6) other recreational activities; (7) family/friendship activities outside of household; (8) sports or physical activities with others; (9) volunteer or charity work

Table B.3.6: Summary Statistics for Pooled Data

Variable	Obs	Mean/ Proportion	Std. Dev.	Min	Max
<u>Life Satisfaction</u>					
Satisfaction with Life Scale Score	130,883	28.15	6.49	5	35
Satisfaction with Life Scale Classification	130,883			1	7
Extremely dissatisfied		1.45%	0.00		
Dissatisfied		3.55%	0.00		
Slightly dissatisfied		6.69%	0.00		
Neutral		1.81%	0.00		
Slightly satisfied		13.21%	0.00		
Satisfied		28.95%	0.00		
Extremely satisfied		44.34%	0.00		
Satisfaction with Life Index (factor analysis)	130,883	5.66	1.30	1	7
<u>Retirement Information</u>					
Subjective Retirement Status	132,856			0	2
Not Retired		46.04%	0.00		
Partially Retired		9.31%	0.00		
Completely Retired		44.66%	0.00		
Objective Retirement Status	131,219			0	1
Not Retired		58.29%	0.00		
Completely Retired		41.71%	0.00		
Retirement Age	82,149	57.88	7.01	40	90
Years since Retirement	82,134	10.82	8.36	0	56
Retirement Status of Spouse/Partner	89,477	43.83%	0.50	0	1
Retirement Voluntary (only in TRA)	32,017	76.54%	0.42	0	1
<u>Reasons for Retirement</u>					
An agreement with spouse/partner contributed to	84,258	21.96%	0.41	0	1
Health/disability/stress contributed to retirement	84,258	27.48%	0.45	0	1
Organizational restructuring contributed to retirement	84,258	14.06%	0.35	0	1
Completed the required years of service to qualify for	84,258	29.06%	0.45	0	1
Retirement was financially possible	84,258	44.52%	0.50	0	1
Employer offered special incentives to retirement	84,258	9.21%	0.29	0	1
Providing care to a family member or friend	84,258	9.31%	0.29	0	1
Employer had a mandatory retirement policy	84,258	2.46%	0.15	0	1
Wished to pursue hobbies/activities of personal interest	84,258	27.64%	0.45	0	1
Wanted to stop working	84,258	41.40%	0.49	0	1
Participant never worked/Not applicable	47,113	0.78%	0.09	0	1
<u>Individual Socio-Economic and Demographic Factors</u>					
Age	132,856	62.4	10.26	44	94
Female	132,856	52.14%	0.5	0	1
White	132,856	96.06%	0.19	0	1
Immigrant	132,818	14.20%	0.35	0	1
Education	132,559			1	4
Less Than Secondary		16.74%	0.00		
Secondary		12.47%	0.00		
Some Post-Secondary		9.07%	0.00		
Post-Secondary		61.72%	0.00		
Marital Status	132,643			1	4
Married or Common-Law		74.30%	0.00		
Widow		7.89%	0.00		
Divorced or Separated		10.32%	0.00		
Single		7.49%	0.00		

Variable	Obs	Mean/ Proportion	Std. Dev.	Min	Max
Total Personal Income	125,481			1	5
< \$20,000		17.85%	0.00		
\$20,000 - \$49,999		38.18%	0.00		
\$50,000 - \$99,999		31.31%	0.00		
\$100,000 - \$149,999		8.19%	0.00		
\$150,000+		4.46%	0.00		
<u>Household Contextual Characteristics</u>					
Household Size (excluding participant)	131,653	1.34	1.10	0	9
Own Dwelling	131,132	84.79%	0.36	0	1
Urban	132,668	83.62%	0.37	0	1
<u>Province Information</u>					
Province	132,849			1	10
AB		10.06%	0.00		
BC		18.12%	0.00		
MB		8.88%	0.00		
NB		2.34%	0.00		
NFLD & LAB		6.36%	0.00		
NS		9.04%	0.00		
ON		21.86%	0.00		
PEI		1.97%	0.00		
QC		19.08%	0.00		
SASK		2.29%	0.00		
<u>Physical Activity and Health</u>					
Physical Activity Scale for the Elderly (PASE)	127,963	144.21	77.52	0	732
Chronic Conditions	131,659	3.78	2.88	0	25
<u>Social Support: MOS Scale</u>					
Functional Social Support (scale)	126,438	83.04	17.33	0	100
Affection (subscale)	130,441	87.35	19.51	0	100
Emotional and Informational Support (subscale)	128,641	81.78	19.11	0	100
Positive Social Interaction (subscale)	130,623	83.41	19.47	0	100
Tangible Social Support (subscale)	129,218	82.56	20.67	0	100
<u>Social Participation</u>					
Social Engagement Index (factor analysis)	130,088	2.61	0.59	1	5

Appendix C for Chapter 3

Table C.3.1: Population-Average Logit Regression for the Retirement Decision (age > 54)

	Objective Retirement			Subjective Retirement		
	Overall	Female	Male	Overall	Female	Male
Age60	1.2949*** (0.0467)	1.2593*** (0.0606)	1.2819*** (0.0684)	1.2742*** (0.0416)	1.2556*** (0.0577)	1.2738*** (0.0608)
Age65	1.3415*** (0.0478)	1.4237*** (0.0717)	1.2603*** (0.0624)	1.2449*** (0.0406)	1.3401*** (0.0651)	1.1682*** (0.0520)
Age70	0.8582*** (0.0351)	0.8823** (0.0522)	0.8511*** (0.0485)	0.8656*** (0.0331)	0.9354 (0.0551)	0.8293*** (0.0422)
Age	1.1828*** (0.0067)	1.2020*** (0.0096)	1.1702*** (0.0092)	1.1655*** (0.0056)	1.1724*** (0.0089)	1.1612*** (0.0072)
Female	1.1136*** (0.0386)			1.1585*** (0.0395)		
White	1.3379*** (0.1255)	1.2734* (0.1767)	1.3940*** (0.1791)	1.3226*** (0.1243)	1.1352 (0.1621)	1.5386*** (0.1930)
Immigrant	0.7666*** (0.0355)	0.7296*** (0.0488)	0.7996*** (0.0513)	0.7811*** (0.0367)	0.7406*** (0.0523)	0.8256*** (0.0517)
Marital status						
Widow	2.3116*** (0.1662)	2.2797*** (0.2068)	2.1832*** (0.2880)	2.0305*** (0.1393)	1.9889*** (0.1742)	1.9389*** (0.2390)
Divorced/separated	1.1749*** (0.0582)	1.0994 (0.0712)	1.2591*** (0.0987)	1.1034** (0.0529)	1.0080 (0.0635)	1.2171*** (0.0925)
Single	1.4340*** (0.0833)	1.3317*** (0.1149)	1.5122*** (0.1178)	1.4270*** (0.0788)	1.2701*** (0.1002)	1.5517*** (0.1196)
Education						
Secondary	1.1962** (0.0914)	1.2885** (0.1426)	1.1350 (0.1217)	1.1633** (0.0880)	1.3519*** (0.1493)	1.0237 (0.1072)
Some post-secondary	1.1344 (0.0927)	1.2722** (0.1529)	1.0420 (0.1170)	1.1531* (0.0938)	1.4396*** (0.1751)	0.9464 (0.1036)
Post-secondary	1.2053*** (0.0824)	1.2697** (0.1297)	1.1722* (0.1082)	1.1589** (0.0788)	1.3259*** (0.1356)	1.0458 (0.0950)
Income						
\$20,000 to \$49,999	0.6170*** (0.0246)	0.6094*** (0.0303)	0.6200*** (0.0440)	0.5898*** (0.0234)	0.5676*** (0.0274)	0.6116*** (0.0450)
\$50,000 to \$99,999	0.3471*** (0.0157)	0.3300*** (0.0200)	0.3557*** (0.0263)	0.3486*** (0.0155)	0.3364*** (0.0196)	0.3564*** (0.0271)
\$100,000 to \$149,999	0.1609*** (0.0096)	0.1854*** (0.0157)	0.1528*** (0.0135)	0.1901*** (0.0112)	0.2267*** (0.0193)	0.1787*** (0.0160)
\$150,000+	0.1068*** (0.0083)	0.1529*** (0.0199)	0.0954*** (0.0100)	0.1422*** (0.0108)	0.2204*** (0.0302)	0.1229*** (0.0126)
Household size	0.9464*** (0.0161)	0.9299*** (0.0232)	0.9506** (0.0221)	0.9483*** (0.0158)	0.9251*** (0.0222)	0.9620* (0.0224)
Own dwelling	1.2858*** (0.0562)	1.2983*** (0.0779)	1.2957*** (0.0828)	1.2060*** (0.0521)	1.2020*** (0.0729)	1.2204*** (0.0749)
Urban	1.0549 (0.0397)	1.0203 (0.0552)	1.1018* (0.0580)	1.0627 (0.0398)	1.0530 (0.0561)	1.0819 (0.0571)
Retirement of spouse	2.2316*** (0.0716)	2.4041*** (0.1143)	2.1481*** (0.0935)	2.2542*** (0.0700)	2.4056*** (0.1110)	2.1489*** (0.0905)
Chronic conditions	1.0645*** (0.0055)	1.0602*** (0.0073)	1.0721*** (0.0085)	1.0562*** (0.0055)	1.0501*** (0.0075)	1.0655*** (0.0081)
Province						
AB	0.7461*** (0.0513)	0.7157*** (0.0748)	0.7800*** (0.0706)	0.8095*** (0.0552)	0.8046** (0.0787)	0.8224** (0.0775)
BC	0.8082*** (0.0415)	0.7992*** (0.0560)	0.8193*** (0.0616)	0.8859** (0.0450)	0.9327 (0.0666)	0.8428** (0.0611)

	Objective Retirement			Subjective Retirement		
	Overall	Female	Male	Overall	Female	Male
MB	0.9478 (0.0612)	0.9572 (0.0836)	0.9405 (0.0896)	0.9211 (0.0567)	0.9388 (0.0803)	0.9096 (0.0811)
NB	1.0211 (0.1088)	0.8834 (0.1241)	1.1919 (0.1844)	1.0587 (0.1043)	1.0138 (0.1391)	1.1545 (0.1609)
NL	1.2225** (0.0995)	1.6073*** (0.1708)	0.9507 (0.1165)	1.2311*** (0.0972)	1.5853*** (0.1628)	0.9760 (0.1168)
NS	1.1206* (0.0670)	1.1372 (0.0976)	1.1153 (0.0934)	1.0750 (0.0624)	1.0789 (0.0895)	1.0876 (0.0884)
PE	0.6346*** (0.0707)	0.7309** (0.1135)	0.5579*** (0.0889)	0.6436*** (0.0683)	0.7955 (0.1168)	0.5248*** (0.0804)
QC	1.1518*** (0.0587)	1.3075*** (0.0915)	1.0244 (0.0753)	1.1900*** (0.0584)	1.3870*** (0.0948)	1.0290 (0.0724)
SK	0.7092*** (0.0799)	0.8207 (0.1117)	0.6126*** (0.1106)	0.7181*** (0.0792)	0.8878 (0.1223)	0.5695*** (0.0998)
Observations (<i>n</i>)	96,706	48,191	48,515	97,802	49,012	48,790
Groups (<i>n_g</i>)	43,428	21,736	21,692	43,830	22,063	21,767

Notes: estimated coefficients = odd ratios; robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C.3.2: Endogeneity Tests with LS Score as the Outcome: FE vs FEIV and FEIV vs REIV

	Objective Retirement			Subjective Retirement		
	(1) CF	(2) FE	(3) CRE2SLS	(4) CF	(5) FE	(6) CRE2SLS
Retirement	1.3470***	0.1618*	0.3759***	1.8454***	0.2038**	0.4880***
Age	(0.2568) 0.0586*** (0.0103)	(0.0970) 0.0875*** (0.0078)	(0.0499) 0.0780*** (0.0050)	(0.3042) 0.0442*** (0.0109)	(0.0988) 0.0857*** (0.0077)	(0.0484) 0.0739*** (0.0050)
Marital status						
Widow	-1.3417*** (0.2301)	-1.1198*** (0.2273)	-1.0386*** (0.1444)	-1.5616*** (0.2369)	-1.2394*** (0.2318)	-1.1128*** (0.1455)
Divorced/separated	-1.7494*** (0.1908)	-1.7038*** (0.1906)	-1.5327*** (0.1411)	-1.7395*** (0.1899)	-1.6815*** (0.1897)	-1.5481*** (0.1402)
Single	-1.2329*** (0.2508)	-1.1674*** (0.2498)	-1.1005*** (0.1561)	-1.2866*** (0.2515)	-1.1805*** (0.2499)	-1.0888*** (0.1557)
Income						
\$20,000 to \$49,999	0.4664*** (0.1073)	0.3889*** (0.1065)	0.3390*** (0.0719)	0.5216*** (0.1090)	0.3328*** (0.1044)	0.3128*** (0.0710)
\$50,000 to \$99,999	1.0014*** (0.1323)	0.8328*** (0.1281)	0.6706*** (0.0848)	1.1284*** (0.1409)	0.7948*** (0.1258)	0.6621*** (0.0836)
\$100,000 to \$149,999	1.3489*** (0.1663)	1.0663*** (0.1561)	0.9020*** (0.1047)	1.5180*** (0.1785)	1.0231*** (0.1532)	0.8875*** (0.1035)
\$150,000+	1.6294*** (0.1932)	1.2779*** (0.1785)	1.1087*** (0.1253)	1.8134*** (0.2029)	1.2557*** (0.1749)	1.1234*** (0.1239)
Household size	-0.1160*** (0.0421)	-0.1194*** (0.0422)	-0.0926*** (0.0271)	-0.1265*** (0.0416)	-0.1372*** (0.0416)	-0.1110*** (0.0269)
Own dwelling	0.3909** (0.1632)	0.4457*** (0.1636)	0.3459*** (0.0993)	0.3015* (0.1669)	0.3646** (0.1676)	0.2936*** (0.0987)
Urban	-0.2330* (0.1255)	-0.2234* (0.1254)	-0.1736** (0.0779)	-0.2117* (0.1257)	-0.2049 (0.1256)	-0.1736** (0.0773)
Retirement of spouse	-0.3291*** (0.0916)	-0.0905 (0.0777)	-0.1570*** (0.0526)	-0.4408*** (0.1007)	-0.0847 (0.0784)	-0.1723*** (0.0521)
Chronic conditions	-0.0920*** (0.0179)	-0.0817*** (0.0178)	-0.1016*** (0.0118)	-0.0975*** (0.0188)	-0.0783*** (0.0182)	-0.1025*** (0.0117)
Province						
AB	0.0021 (0.5022)	-0.0096 (0.5076)	-0.1259 (0.4440)	0.1667 (0.5102)	0.1286 (0.5139)	0.0014 (0.4457)
BC	0.6419 (0.4802)	0.6226 (0.4863)	0.3046 (0.3917)	0.8400* (0.4837)	0.8107* (0.4864)	0.5106 (0.3891)
MB	-0.7463 (0.6983)	-0.7369 (0.6961)	-0.5205 (0.5883)	-0.3854 (0.7111)	-0.4313 (0.7081)	-0.3564 (0.5974)
NB	-0.0241 (0.8013)	-0.0157 (0.7973)	0.7785 (0.7750)	-0.2821 (0.8108)	-0.2966 (0.8124)	0.1483 (0.6830)
NL	0.0989 (0.5738)	0.1102 (0.5791)	0.6697 (0.6541)	0.2588 (0.5948)	0.2755 (0.5995)	0.4627 (0.6279)
NS	0.1788 (0.5918)	0.2094 (0.5950)	0.2106 (0.4662)	0.3300 (0.5738)	0.3486 (0.5766)	0.2236 (0.4548)
PE	0.0747 (1.0037)	0.0625 (1.0029)	0.3830 (0.7709)	0.2258 (1.0003)	0.1592 (1.0048)	0.3576 (0.7664)
QC	0.6680 (0.5252)	0.6710 (0.5239)	0.6042 (0.5035)	0.3899 (0.5455)	0.4073 (0.5476)	0.2813 (0.5113)
SK	0.8675 (0.7455)	0.7840 (0.7638)	1.2844* (0.6735)	1.1620 (0.7344)	0.9569 (0.7834)	1.4219** (0.6737)
$\hat{\nu}$	-0.7341*** (0.1512)			-1.0043*** (0.1733)		
Means						
Age			-0.0308*** (0.0076)			-0.0281*** (0.0076)

	Objective Retirement			Subjective Retirement		
	(1) CF	(2) FE	(3) CRE2SLS	(4) CF	(5) FE	(6) CRE2SLS
Widow			-0.2859 (0.1801)			-0.1887 (0.1812)
Divorced/separated			-1.3202*** (0.1764)			-1.2625*** (0.1754)
Single			-1.8022*** (0.1999)			-1.8301*** (0.1995)
\$20,000 to \$49,999			1.0662*** (0.1202)			1.1086*** (0.1189)
\$50,000 to \$99,999			1.6369*** (0.1268)			1.6796*** (0.1254)
\$100,000 to \$149,999			2.1043*** (0.1638)			2.1825*** (0.1626)
\$150,000+			2.8637*** (0.1851)			2.8746*** (0.1839)
Household size			0.0461 (0.0446)			0.0723 (0.0445)
Own dwelling			1.2877*** (0.1320)			1.3536*** (0.1316)
Urban			-0.2087** (0.1062)			-0.2142** (0.1058)
Retirement of spouse			0.5335*** (0.0939)			0.5659*** (0.0938)
Chronic conditions			-0.3845*** (0.0157)			-0.3875*** (0.0156)
AB			0.0978 (0.4530)			-0.0110 (0.4546)
BC			-0.3683 (0.3992)			-0.5520 (0.3968)
MB			0.2964 (0.5971)			0.1443 (0.6062)
NB			-0.0666 (0.7923)			0.5340 (0.6992)
NL			-0.4776 (0.6647)			-0.2259 (0.6382)
NS			-0.4522 (0.4760)			-0.4574 (0.4651)
PE			0.2044 (0.7924)			0.2921 (0.7878)
QC			0.9540* (0.5093)			1.3050** (0.5170)
SK			-1.0058 (0.6925)			-1.1219 (0.6913)
age60			0.1529 (0.1193)			0.0892 (0.1189)
age65			0.5269*** (0.1338)			0.5494*** (0.1328)
Constant	23.9688*** (0.6563)	22.5889*** (0.5689)	24.1353*** (0.3667)	24.6059*** (0.6641)	22.7440*** (0.5689)	24.1387*** (0.3667)
Observations (n)	117,054	117,054	117,054	117,626	117,626	117,626
Groups (n _g)	48,524	48,524	48,524	48,640	48,640	48,640

Notes: robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C.3.3: FEIV Regressions: PR vs CR and Transition into CR from NR vs from PR

		Subjective Retirement		
		(1) Partial vs Complete	(2) NR → CR vs PR → CR	(3) Voluntary vs Involuntary
Retirement				
	Partial (PR)	3.1176*** (1.2001)		
	Complete (CR)	3.2911*** (0.5601)		
	NR to CR transition		4.8602*** (1.5854)	
	PR to CR transition		1.0068 (3.8635)	
	Voluntary CR (TRA only)			3.8747** (1.6297)
	Involuntary CR (TRA only)			6.6253 (6.7095)
Age		0.0273 (0.0181)	0.0503** (0.0207)	0.0502*** (0.0185)
Duration		-0.0603*** (0.0189)	-0.1003 (0.0693)	-0.1347*** (0.0381)
Marital status				
	Widow	-1.4961*** (0.2382)	-1.5061*** (0.2439)	-1.6881*** (0.3919)
	Divorced/separated	-1.7316*** (0.1938)	-1.7492*** (0.1939)	-1.5787*** (0.3494)
	Single	-1.2495*** (0.2439)	-1.2106*** (0.2469)	-1.2054*** (0.4178)
Income				
	\$20,000 to \$49,999	0.5082*** (0.1098)	0.5424*** (0.1178)	0.6748*** (0.1933)
	\$50,000 to \$99,999	1.3608*** (0.1590)	1.4373*** (0.1751)	1.5224*** (0.2928)
	\$100,000 to \$149,999	1.9097*** (0.2122)	1.9834*** (0.2460)	2.0935*** (0.3633)
	\$150,000+	2.2380*** (0.2462)	2.2760*** (0.2679)	2.1841*** (0.4371)
Household size		-0.1138** (0.0457)	-0.1156*** (0.0431)	-0.1610** (0.0784)
Own dwelling		0.2974* (0.1694)	0.2725 (0.1729)	0.3537 (0.3086)
Urban		-0.1103 (0.1216)	-0.0985 (0.1225)	-0.1829 (0.1703)
Retirement of spouse		-0.4943*** (0.1049)	-0.5334*** (0.1113)	-0.6112*** (0.1857)
Chronic conditions		-0.0854*** (0.0189)	-0.0908*** (0.0197)	-0.1432*** (0.0393)
Province				
	AB	0.1172 (0.5392)	0.0571 (0.5526)	1.0264 (0.7676)
	BC	0.7454 (0.4901)	0.6316 (0.4974)	1.4584* (0.7661)
	MB	-0.3214 (0.7499)	-0.3141 (0.7673)	0.6237 (1.3587)
	NB	-0.8481 (0.8238)	-1.1919 (0.9643)	-0.3543 (1.0301)
	NL	0.0197 (0.6460)	-0.0770 (0.6757)	1.3089 (1.2308)

		Subjective Retirement		
		(1) Partial vs Complete	(2) NR → CR vs PR → CR	(3) Voluntary vs Involuntary
	NS	-0.0217 (0.5761)	-0.0226 (0s.6142)	0.2450 (1.0210)
	PE	-0.0337 (1.0717)	-0.1897 (1.0568)	-0.2730 (1.3422)
	QC	-0.0151 (0.7596)	-0.3282 (0.7767)	-0.7180 (1.3900)
	SK	0.3088 (0.9478)	0.0420 (1.1366)	2.0503** (1.0229)
Observations (<i>n</i>)		107,160	107,160	39,078
Groups (<i>n_g</i>)		39,167	39,167	14,715
First-stage results				
Partial (PR)				
	Age ≥ 60	0.0513*** (0.0053)		
	Age ≥ 65	-0.0433*** (0.0058)		
Complete (CR)				
	Age ≥ 60	0.1016*** (0.0057)		
	Age ≥ 65	0.1186*** (0.0061)		
NR to CR				
	Age ≥ 60		0.0950*** (0.0051)	
	Age ≥ 65		0.0487*** (0.0051)	
PR to CR				
	Age ≥ 60		0.0232*** (0.0031)	
	Age ≥ 65		0.0352*** (0.0040)	
Voluntary CR				
	Age ≥ 60			0.0989*** (0.0082)
	Age ≥ 65			0.0753*** (0.0090)
Involuntary CR				
	Age ≥ 60			0.0304*** (0.0050)
	Age ≥ 65			-0.0027 (0.0041)

Notes: robust standard errors in parentheses; **p* < 0.10, ***p* < 0.05, ****p* < 0.01.

Table C.3.4: FEIV Regressions: Collection Method

	Objective Retirement		Subjective Retirement	
	(1) Phone	(2) In-Home	(3) Phone	(4) In-Home
Retirement	4.5571***	3.1776***	4.3735***	3.4744***
	(0.8954)	(0.7275)	(0.9598)	(0.8061)
Age	0.0673***	0.0845***	0.0515***	0.0697***
	(0.0155)	(0.0149)	(0.0180)	(0.0163)
Duration	-0.1630***	-0.1771***	-0.1295***	-0.1601***
	(0.0320)	(0.0338)	(0.0291)	(0.0322)
Marital status				
Widow	-1.5225***	-1.1934***	-1.6709***	-1.3557***
	(0.3561)	(0.2980)	(0.3741)	(0.3020)
Divorced/separated	-1.6765***	-1.8161***	-1.6156***	-1.8356***
	(0.3268)	(0.2364)	(0.3291)	(0.2370)
Single	-1.0199***	-1.2222***	-1.2357***	-1.2135***
	(0.3638)	(0.3177)	(0.3827)	(0.3158)
Income				
\$20,000 to \$49,999	0.7733***	0.5012***	0.6558***	0.5169***
	(0.1747)	(0.1475)	(0.1754)	(0.1507)
\$50,000 to \$99,999	1.6391***	1.2577***	1.4993***	1.3533***
	(0.2579)	(0.1975)	(0.2723)	(0.2106)
\$100,000 to \$149,999	2.2790***	1.7036***	2.0752***	1.8106***
	(0.3337)	(0.2584)	(0.3481)	(0.2755)
\$150,000+	2.4001***	2.0902***	2.1356***	2.2264***
	(0.3904)	(0.3018)	(0.3958)	(0.3172)
Household size	-0.1279*	-0.0750	-0.1536**	-0.0927*
	(0.0767)	(0.0515)	(0.0755)	(0.0516)
Own dwelling	0.4467*	0.2331	0.3423	0.1893
	(0.2687)	(0.2035)	(0.2939)	(0.2020)
Urban	-0.1897	0.0017	-0.1871	-0.0237
	(0.1642)	(0.1752)	(0.1683)	(0.1749)
Retirement of spouse	-0.6176***	-0.3714***	-0.6381***	-0.4429***
	(0.1543)	(0.1286)	(0.1734)	(0.1393)
Chronic conditions	-0.1552***	-0.0497**	-0.1384***	-0.0587**
	(0.0296)	(0.0238)	(0.0322)	(0.0239)
Province				
AB	0.8537	-0.6820	0.9989	-0.5193
	(0.7748)	(0.6983)	(0.7577)	(0.7272)
BC	1.3598*	-0.0035	1.3965*	0.1112
	(0.7875)	(0.5911)	(0.7380)	(0.6180)
MB	-0.1854	-0.8049	0.6750	-0.9654
	(1.3425)	(0.9039)	(1.3596)	(0.9110)
NB	0.3893	-1.5451	-0.2547	-1.5172
	(0.8796)	(1.4168)	(0.9715)	(1.4491)
NL	0.8172	-0.4879	1.2551	-0.6970
	(1.2248)	(0.7708)	(1.2181)	(0.7680)
NS	0.5591	0.0882	0.3126	0.0985
	(1.0486)	(0.7100)	(0.9972)	(0.7096)
PE	0.3911	2.3816	-0.1816	2.3235
	(1.2613)	(1.9850)	(1.2845)	(2.0159)
QC	-0.2405	0.7427	-0.5604	0.3147
	(1.2448)	(0.7235)	(1.2691)	(0.8483)
SK	2.0681**	-0.5850	2.0786**	-1.2804
	(1.0304)	(1.1940)	(1.0195)	(1.5913)
Observations (<i>n</i>)	39,162	67,469	39,078	68,082
Groups (<i>n_g</i>)	14,749	24,276	14,715	24,452

	Objective Retirement		Subjective Retirement	
	(1) Phone	(2) In-Home	(3) Phone	(4) In-Home
First-stage results				
Age ≥ 60	0.1208*** (0.0079)	0.1162*** (0.0066)	0.1294*** (0.0087)	0.1108*** (0.0070)
Age ≥ 65	0.0964*** (0.0094)	0.1103*** (0.0074)	0.0718*** (0.0095)	0.0911*** (0.0074)

Notes: robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C.3.5: FEIV Regressions: Robustness Checks with Objective Retirement

		Objective Retirement					
		(1)	(2)	(3)	(4)	(5)	(6)
		LS Factor	HH Income	PASE	MOS Scale	Subscales	SEI
Retirement		0.78***	3.44***	3.56***	3.72***	3.63***	3.49***
		(0.11)	(0.56)	(0.57)	(0.60)	(0.60)	(0.61)
Age		0.01***	0.08***	0.08***	0.07***	0.08***	0.09***
		(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Duration		-0.04***	-0.16***	-0.16***	-0.17***	-0.17***	-0.16***
		(0.00)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)
Marital status							
	Widow	-0.29***	-0.86***	-1.25***	-1.01***	-0.90***	-0.90***
		(0.05)	(0.24)	(0.23)	(0.23)	(0.23)	(0.23)
	Divorced/separated	-0.36***	-1.47***	-1.76***	-1.51***	-1.42***	-1.43***
		(0.04)	(0.20)	(0.19)	(0.20)	(0.20)	(0.20)
	Single	-0.23***	-0.92***	-1.20***	-1.08***	-1.02***	-1.01***
		(0.05)	(0.25)	(0.23)	(0.23)	(0.23)	(0.23)
Income							
	\$20,000 to \$49,999	0.12***	0.44**	0.56***	0.54***	0.52***	0.53***
		(0.02)	(0.21)	(0.11)	(0.11)	(0.11)	(0.11)
	\$50,000 to \$99,999	0.29***	0.98***	1.32***	1.30***	1.27***	1.31***
		(0.03)	(0.24)	(0.16)	(0.16)	(0.16)	(0.16)
	\$100,000 to \$149,999	0.40***	1.53***	1.82***	1.78***	1.74***	1.77***
		(0.04)	(0.27)	(0.20)	(0.21)	(0.21)	(0.21)
	\$150,000+	0.47***	1.99***	2.12***	2.09***	2.05***	2.08***
		(0.05)	(0.29)	(0.24)	(0.25)	(0.24)	(0.25)
Own dwelling		-0.02**	-0.14***	-0.11**	-0.11***	-0.11***	-0.12***
		(0.01)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
		0.06*	0.31*	0.38**	0.33**	0.33**	0.36**
		(0.03)	(0.17)	(0.16)	(0.16)	(0.16)	(0.16)
Urban		-0.02	-0.07	-0.07	0.02	0.00	-0.00
		(0.02)	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
Retirement of spouse		-0.10***	-0.33***	-0.46***	-0.51***	-0.49***	-0.48***
		(0.02)	(0.09)	(0.10)	(0.10)	(0.10)	(0.10)
Chronic conditions		-0.02***	-0.09***	-0.09***	-0.09***	-0.09***	-0.09***
		(0.00)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Province							
	AB	-0.00	0.02	0.10	0.08	0.06	0.16
		(0.11)	(0.54)	(0.56)	(0.57)	(0.56)	(0.56)
	BC	0.10	0.62	0.57	0.62	0.64	0.65
		(0.10)	(0.49)	(0.50)	(0.52)	(0.52)	(0.52)
	MB	-0.08	-0.24	-0.48	-0.29	-0.32	-0.32
		(0.16)	(0.75)	(0.76)	(0.75)	(0.75)	(0.76)
	NB	-0.13	-0.44	-0.50	-0.77	-0.75	-0.52
		(0.16)	(0.84)	(0.88)	(0.93)	(0.91)	(0.91)
	NL	0.01	-0.03	-0.07	0.00	0.00	0.05
		(0.13)	(0.63)	(0.71)	(0.71)	(0.70)	(0.69)
	NS	0.03	0.24	0.22	0.21	0.26	0.35
		(0.12)	(0.59)	(0.62)	(0.65)	(0.65)	(0.65)
	PE	0.04	0.55	0.16	0.24	0.26	0.93
		(0.21)	(1.04)	(1.04)	(1.05)	(1.04)	(0.91)
	QC	0.02	0.19	0.07	-0.10	-0.08	0.02
		(0.14)	(0.71)	(0.73)	(0.75)	(0.74)	(0.72)
	SK	0.16	0.67	0.77	1.06	1.01	1.04
		(0.16)	(0.81)	(0.82)	(0.82)	(0.82)	(0.82)

		Objective Retirement					
		(1)	(2)	(3)	(4)	(5)	(6)
		LS Factor	HH Income	PASE	MOS Scale	Subscales	SEI
Additional covariates							
	Pase			0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)
	Functional social support (MOS scale)				0.05*** (0.00)		
	Affection (MOS subscale)					0.02*** (0.00)	0.02*** (0.00)
	Emotional support (MOS subscale)					0.01** (0.00)	0.01** (0.00)
	Positive social interaction (MOS subscale)					0.02*** (0.00)	0.02*** (0.00)
	Tangible social support (MOS subscale)					0.00 (0.00)	0.00 (0.00)
	Social engagement index (SEI)						0.40*** (0.09)
	Observations (<i>n</i>)	106,631	104,428	104,717	100,412	100,598	99,693
	Groups (<i>n_g</i>)	39,025	38,510	38,561	37,328	37,388	37,190
First-stage results							
	Age ≥ 60	0.12*** (0.01)	0.12*** (0.01)	0.12*** (0.01)	0.11*** (0.01)	0.11*** (0.01)	0.11*** (0.01)
	Age ≥ 65	0.11*** (0.01)	0.11*** (0.01)	0.10*** (0.01)	0.10*** (0.01)	0.10*** (0.01)	0.10*** (0.01)

Notes: robust standard errors in parentheses; **p* < 0.10, ***p* < 0.05, ****p* < 0.01.

Table C.3.6: FEIV Regressions: Robustness Checks with Subjective Retirement

		Subjective Retirement					
		(1)	(2)	(3)	(4)	(5)	(6)
		LS Factor	HH Income	PASE	MOS Scale	Subscales	SEI
Retirement		0.81***	3.51***	3.74***	3.85***	3.73***	3.61***
		(0.12)	(0.61)	(0.63)	(0.65)	(0.65)	(0.66)
Age		0.01***	0.06***	0.07***	0.06***	0.06***	0.08***
		(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Duration		-0.03***	-0.14***	-0.15***	-0.15***	-0.14***	-0.14***
		(0.00)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Marital status							
	Widow	-0.33***	-0.96***	-1.40***	-1.14***	-1.04***	-1.04***
		(0.05)	(0.24)	(0.24)	(0.24)	(0.24)	(0.24)
	Divorced/separated	-0.36***	-1.43***	-1.74***	-1.50***	-1.41***	-1.42***
		(0.04)	(0.20)	(0.19)	(0.20)	(0.20)	(0.20)
	Single	-0.25***	-0.99***	-1.30***	-1.13***	-1.08***	-1.06***
		(0.05)	(0.25)	(0.23)	(0.23)	(0.23)	(0.23)
Income							
	\$20,000 to \$49,999	0.12***	0.46**	0.53***	0.51***	0.49***	0.50***
		(0.02)	(0.21)	(0.12)	(0.12)	(0.12)	(0.12)
	\$50,000 to \$99,999	0.29***	0.97***	1.34***	1.31***	1.27***	1.31***
		(0.03)	(0.24)	(0.17)	(0.17)	(0.17)	(0.17)
	\$100,000 to \$149,999	0.40***	1.56***	1.83***	1.78***	1.74***	1.78***
		(0.04)	(0.27)	(0.22)	(0.22)	(0.22)	(0.22)
	\$150,000+	0.46***	2.04***	2.13***	2.10***	2.05***	2.08***
		(0.05)	(0.30)	(0.25)	(0.26)	(0.25)	(0.26)
Household size		-0.02***	-0.16***	-0.12***	-0.13***	-0.13***	-0.13***
		(0.01)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Own dwelling		0.05	0.26	0.31*	0.24	0.25	0.28*
		(0.03)	(0.17)	(0.16)	(0.17)	(0.17)	(0.17)
Urban		-0.02	-0.08	-0.08	0.01	-0.01	-0.01
		(0.02)	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
Retirement of spouse		-0.11***	-0.36***	-0.51***	-0.56***	-0.53***	-0.51***
		(0.02)	(0.10)	(0.11)	(0.11)	(0.11)	(0.11)
Chronic conditions		-0.02***	-0.09***	-0.09***	-0.09***	-0.09***	-0.09***
		(0.00)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Province							
	AB	0.02	-0.02	0.22	0.17	0.15	0.24
		(0.11)	(0.55)	(0.55)	(0.56)	(0.56)	(0.56)
	BC	0.12	0.64	0.63	0.67	0.70	0.71
		(0.10)	(0.49)	(0.50)	(0.51)	(0.51)	(0.51)
	MB	-0.04	-0.10	-0.36	-0.21	-0.22	-0.20
		(0.16)	(0.76)	(0.77)	(0.76)	(0.75)	(0.76)
	NB	-0.21	-0.31	-0.90	-1.19	-1.15	-0.95
		(0.17)	(0.92)	(0.90)	(0.95)	(0.93)	(0.93)
	NL	0.01	-0.05	-0.04	0.11	0.12	0.23
		(0.13)	(0.63)	(0.71)	(0.71)	(0.70)	(0.69)
	NS	0.02	0.34	0.16	0.14	0.20	0.28
		(0.12)	(0.57)	(0.61)	(0.63)	(0.63)	(0.63)
	PE	-0.02	0.35	-0.23	-0.31	-0.26	0.33
		(0.21)	(1.06)	(1.08)	(1.12)	(1.10)	(1.02)
	QC	-0.07	-0.09	-0.37	-0.46	-0.42	-0.30
		(0.15)	(0.76)	(0.79)	(0.83)	(0.81)	(0.80)
	SK	0.10	0.35	0.56	0.79	0.76	0.81
		(0.20)	(1.01)	(0.93)	(0.95)	(0.95)	(0.96)

		Subjective Retirement					
		(1) LS Factor	(2) HH Income	(3) PASE	(4) MOS Scale	(5) Subscales	(6) SEI
Additional covariates							
	Pase			0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)
	Functional social support (MOS scale)				0.05*** (0.00)		
	Affection (MOS subscale)					0.02*** (0.00)	0.02*** (0.00)
	Emotional support (MOS subscale)					0.01** (0.00)	0.01** (0.00)
	Positive social interaction (MOS subscale)					0.02*** (0.00)	0.02*** (0.00)
	Tangible social support (MOS subscale)					0.00 (0.00)	0.00 (0.00)
	Social engagement index (SEI)						0.39*** (0.10)
	Observations (<i>n</i>)	107,160	105,090	105,262	100,916	101,103	100,186
	Groups (<i>n_g</i>)	39,167	38,696	38,719	37,478	37,539	37,338
First-stage results							
	Age ≥ 60	0.12*** (0.01)	0.12*** (0.01)	0.12*** (0.01)	0.11*** (0.01)	0.11*** (0.01)	0.11*** (0.01)
	Age ≥ 65	0.08*** (0.01)	0.08*** (0.01)	0.08*** (0.01)	0.08*** (0.01)	0.08*** (0.01)	0.08*** (0.01)

Notes: robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

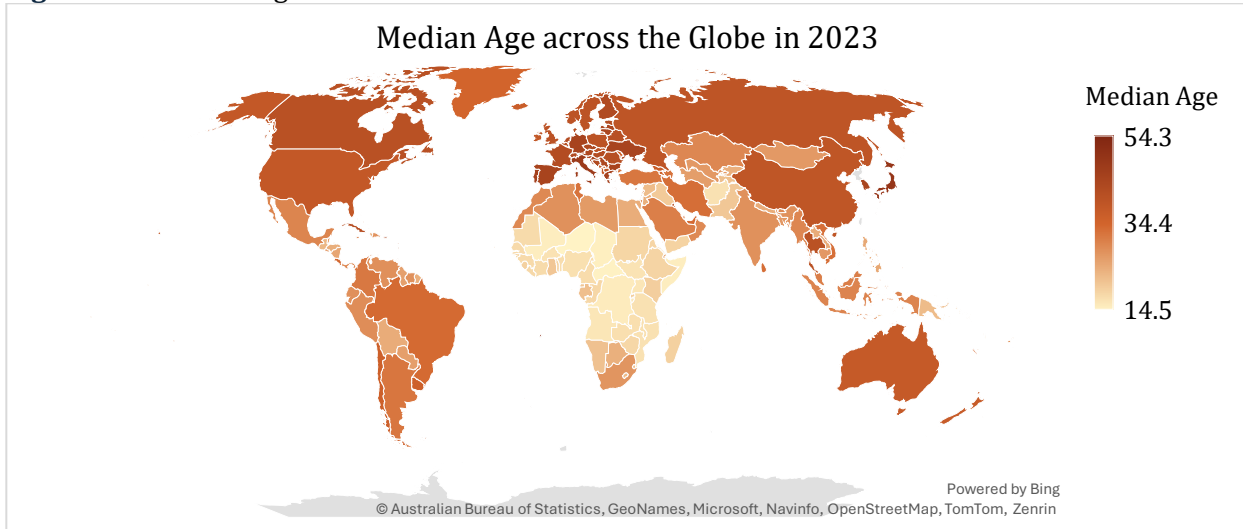
Chapter 4: Retiring to Thrive? Investigating the Effects of Retirement on General, Physical, and Mental Health

4.1 Introduction

Building on the longitudinal analysis of retirement's impact on life satisfaction presented in Chapter 3, this chapter shifts focus to examine how retirement influences physical and mental health outcomes. While previous chapters explored the psychological and subjective aspects of well-being, understanding retirement's effects on physical and mental health offers a more holistic view of retirees' overall well-being. Using data from the Canadian Longitudinal Study on Aging (CLSA), this chapter investigates whether retirement contributes to improvements in health outcomes or exacerbates health challenges over time. By incorporating objective health measures and employing rigorous econometric techniques, this analysis aims to provide deeper insights into how retirement shapes both physical and mental well-being in the long term.

The question of how retirement impacts well-being is particularly important, especially in the current context where many countries are experiencing an aging population due to increasing life expectancy and falling birth rates. According to recent figures from the United Nations (UN), the median age, which reflects the midpoint in the age distribution of a population, ranged from 14.5 to 54.3 years in 2023, with a global average of 30.5 years (Figure 4.1). Higher-income countries across North America, Europe, and East Asia tend to have higher median ages, such as 40.6 in Canada, 44.9 in Germany, and 49.1 in Japan. Projections extending to 2100 (UN, 2024) suggest that this trend will continue, with estimates indicating the median age will rise to 48.4 years in Canada and 42.3 years globally. Figure 4.2 shows UN population projections by broad age groups for Canada (in millions) and the world (in billions) from 2022 to 2100, based on the medium fertility variant, which assumes fertility rates in each country will converge toward the replacement rate of 2.1 children per woman. In both cases, projections suggest consistent growth in the 65+ age category, outpacing growth in all other age groups. Globally, the projections also point to gradual declines in the 0 to 14 and 15 to 24 age groups over the same period.

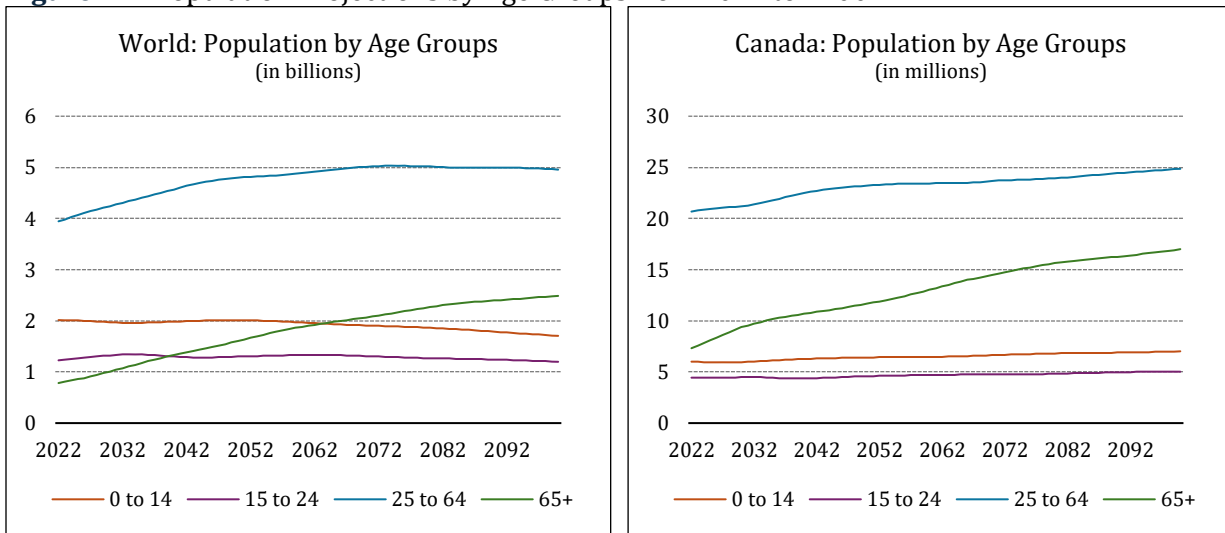
Figure 4.1: Median Age in 2023



Source: [United Nations, 2024](#)

The shift in global demographics is creating serious challenges for healthcare systems, social security networks, and the workforce. Understanding how retirement influences well-being is crucial for finding ways to address these concerns. The knowledge gained from this can help policymakers develop age-friendly initiatives that encourage healthy aging. It can also help healthcare providers prepare for the unique needs of older populations. Since retirement affects more than just individual well-being, as it also impacts workforce structures, pension schemes, and intergenerational relationships, it carries broader social and economic consequences. A clearer understanding of its effects can guide more effective social and economic strategies.

Figure 4.2: Population Projections by Age Groups from 2022 to 2100



Source: [United Nations, 2024](#)

Retirement marks a significant life transition that can influence individuals physically, mentally, emotionally, and socially. However, the effects of retirement on well-being are not always clear, as their direction and magnitude can differ from person to person, depending on factors such as lifestyle choices, social support, and overall health status. There are several potential positive outcomes associated with retirement, including reduced stress, improved sleep, better physical fitness and healthier eating habits, increased leisure time for enjoyable and fulfilling activities, greater opportunities for social engagement, and a stronger sense of control over daily life. On the other hand, retirement can also have negative effects by reducing work-related physical activity and social interactions, limiting healthcare access for those who depended on employer-provided insurance, introducing financial stress and anxiety, diminishing a sense of identity and purpose tied to one's career, and disrupting established daily routines.

The impact of retirement on well-being remains a question that requires empirical investigation. Although various studies have explored this topic, their findings present no clear consensus. This lack of clarity likely reflects the complexity of the factors involved, as well as individual differences, with personal circumstances, personality traits, and coping mechanisms varying widely and making it difficult to generalize findings across diverse populations. Additionally, inconsistencies in measurement tools and research methodologies across studies complicate the comparison and integration of results. External factors, such as economic shifts and policy changes affecting retirement benefits and pensions, further contribute to these variations. Cultural norms, social expectations, and support systems related to retirement also differ across societies, adding another layer of complexity to understanding the effects of retirement on well-being.

Recent literature reviews examining the connection between health and retirement, which is the central focus of this chapter, suggest that various factors may contribute to the heterogeneity in the estimated effects. For instance, [Nishimura et al. \(2018\)](#) point out that results can be influenced by the choice of estimation method and the countries involved in the study, though they appear less affected by how retirement is defined. Similarly, [van der Heide et al. \(2013\)](#) find that outcomes differ depending on the health measures used, with positive effects linked to mental health and negative effects associated with perceived general health and physical health measures. A meta-analysis conducted by [Filomena and Picchio \(2023\)](#), which covers 85 publications from 2000 to 2021, identifies both health measures and retirement schemes as key sources of heterogeneity. Further evidence that individual and contextual factors contribute to these differences comes from another recent review, which focuses on mental health, cognitive functioning, and mortality. This review

highlights the relevance of factors such as job stress, retirement type, retirement age, and financial security (van Ours, 2022).

This chapter revisits the topic of retirement to examine its implications for health and the broader dimensions of well-being (or simply well-being),¹ drawing on the extensive informational value of a comprehensive dataset representative of the Canadian population. Specifically, I utilize three waves of data from the Canadian Longitudinal Study on Aging (CLSA), a research initiative that tracks a sample of 51,388 Canadian residents aged 45 to 85 at recruitment, which began in 2010, for a period of at least 20 years or until death. The CLSA (2015) dataset offers a wide range of information on participants' demographics, health assessments, lifestyle factors, psychosocial elements, cognitive function, and more. However, to the best of my knowledge, it has not yet been fully explored in relation to the questions addressed in this chapter.² The objective here is to analyze the richness of the CLSA data to contribute more broadly to the literature on retirement and, more specifically, to deepen my understanding of the relationship between health and retirement in Canada. This is particularly relevant given that only 3% of the 162 estimates available on various health dimensions to date focus on the Canadian context.

In this chapter, I contribute to the literature by approaching the topic from several angles. To begin, I adopt a broad framework for measuring health, using both subjective assessments available in the dataset and constructing objective measures based on specific health details integrated into two indices. While few studies have used health indices (e.g., Coe & Zamarro, 2011; Insler, 2014), none have focused specifically on the Canadian context. Only two studies (Mountian & Diaz, 2020; Zhu, 2016) have explored these indices along both mental and physical health dimensions. The richness of my dataset allows me to incorporate additional health information when building the indices and to compare these measures alongside self-reported health assessments within a single analysis. Moreover, rather than relying solely on a subjective definition of retirement, I develop an objective measure based on three specific criteria individuals must meet to be formally considered retired in Canada. By incorporating more objective measures for both retirement and health, I am better positioned to address possible endogeneity issues that might arise due to measurement errors.

¹ While well-being is a broader term than health as it encompasses both health (physical, mental, and emotional) and satisfaction with life in general, I use the two terms (health and well-being) interchangeably throughout the chapter; in other words, referring to well-being is equivalent to referring to the health dimensions of well-being.

² A recent study (Gosselin & Boller, 2022) uses one wave of the CLSA data and focuses only on mental health. While it employs propensity score matching (PSM) to address selection bias, it does not fully resolve potential endogeneity arising from health driving retirement decisions.

Secondly, the extensive scope of my dataset allows me to investigate how retirement's effects differ across a range of sociodemographic and retirement-related factors. To the best of my knowledge, no existing study has analyzed heterogeneity across multiple dimensions at once, such as education, gender, pre-retirement occupation, retirement duration (short-term versus long-term), and retirement type (voluntary versus involuntary; partial versus full). Although previous research has explored some of these factors, gender tends to receive the most attention, and no study has addressed all these dimensions in a single framework. Within Canada, only two of the four existing studies, [Latif \(2011\)](#) on mental health and [Latif \(2012\)](#) on self-assessed health, account for gender heterogeneity, with both finding no significant disparities between males and females. Research conducted outside Canada either disregards heterogeneity altogether (e.g., [Barschkett et al., 2022](#); [Bauer & Eichenberger, 2021](#)) or limits the analysis to one factor (e.g., [Mazzonna & Peracchi, 2012](#); [Mein et al., 2003](#)), two factors (e.g., [Messe & Wolff, 2019a](#); [Mizuochi, 2024](#)), or three factors (e.g., [Abeliansky & Strulik, 2023](#); [Grøtting & Lillebø, 2020](#)). Few studies differentiate between voluntary and mandatory retirement, and most find no significant differences ([Bonsang & Klein, 2012](#); [Dave et al., 2008](#); [Mandal & Roe, 2007](#); [Rhee et al., 2016](#)), while two find a negative effect on mental health with mandatory retirement and either an insignificant effect ([Mosca & Barrett, 2016](#)) or a positive effect ([Hagani et al., 2024](#)) with voluntary retirement. For partial versus complete retirement, studies by [Bianchini & Borella \(2016\)](#) and [Dave et al. \(2008\)](#) find no significant differences in outcomes. The level of detail available in my dataset on all these dimensions, allows me to offer a more comprehensive analysis of multiple impact differences.³

Thirdly, I have detailed information on reasons for retiring, which allows me to mitigate a key source of potential endogeneity in the relationship between health and retirement, specifically reverse causality or simultaneity, by excluding respondents who report retiring for health-related reasons. As a result, unlike existing studies, I do not need to rely on identification strategies that, while helpful in addressing potential endogeneity to isolate the causal effect of retirement on health, come with their own assumptions or limitations. The instrumental variable framework, which is likely the most common strategy and typically uses pension eligibility age thresholds as valid instruments, requires that the instrument influences retirement without directly affecting health, except through its impact on retirement. This assumption can be difficult to justify, as eligibility thresholds might also correlate with unobserved factors that independently influence health. Furthermore, this approach estimates a Local Average Treatment Effect (LATE), meaning it captures the impact only for individuals whose

³ For clarity, impact differences refer to instances in which the direction of the effect varies between partial and complete retirement or between voluntary and involuntary retirement.

retirement decisions are influenced by the instrument, which may limit the generalizability of the findings.

Finally, another important aspect of the CLSA dataset is its combination of two collection methodologies: computer-assisted telephone interviews and in-home interviews with assessments conducted at designated CLSA sites. Each method has a sizeable sub-sample, offering an opportunity to assess whether the choice of surveying approach influences estimation results. Face-to-face surveys are often regarded as the gold standard in survey research because the direct interaction between interviewer and respondent can help establish rapport, clarify questions, and encourage participation. However, they tend to be time-consuming and costly. In contrast, computer-assisted telephone surveys provide a more efficient and cost-effective alternative, although they may compromise data accuracy since respondents cannot access visual aids, and interviewers are unable to clarify questions or responses directly.

The results indicate that retirement generally improves self-assessed general and mental health, although it is associated with a decline in physical activity. Complete retirement has a stronger influence on health outcomes than partial retirement; however, the initial decision to retire appears to have the most significant effect, as moving from partial to complete retirement does not yield additional health benefits. Voluntary retirement shows a notable impact on health outcomes, while involuntary retirement does not produce significant changes in general or mental health. The effects of retirement also evolve over time, with improvements in general health emerging in the short term and mental health benefits becoming more evident in the long term. Age appears to influence health outcomes in complex ways, initially enhancing self-assessed health, although these improvements tend to diminish over time. Being widowed is associated with the most adverse health effects, whereas social support consistently contributes to improved well-being across various dimensions. While household and regional factors seem to have minimal impact, social engagement enhances general and functional health but does not appear to significantly influence mental health or physical activity.

I structure the remainder of this chapter as follows. In Section 4.2, I summarize the relevant literature. Section 4.3 outlines the data, including the outcome variables, the main treatment variable, and all other covariates considered in the primary empirical analysis and robustness checks. In Section 4.4, I detail the identification strategies employed. Section 4.5 presents and discusses the main results. In Section 4.6, I conduct robustness checks to assess the reliability of the findings. Finally, Section 4.7 offers concluding remarks.

4.2 Literature Review

Theoretically, we can study the effect of retirement on health within the framework of the human capital model for health demand ([Grossman, 1972](#)), which integrates the household production model of consumer behavior with the theory of human capital investment. In this model, individuals perceive health both as a consumption good, providing utility, and as an investment good, enhancing productivity and earning capacity. They optimize their health by balancing the marginal cost through healthy behaviors (e.g., exercising) and health inputs (e.g., medical care) against the marginal benefit, which arises from increased utility and productivity (and consequently income). Upon retirement, the marginal benefit of investing in health declines as the incentive to boost productivity and earning capacity diminishes, potentially leading to worse health outcomes. However, with the absence of work-related demands, retirees gain more free time, lowering the opportunity cost of time and thereby reducing the marginal cost of investing in health, which could lead to improved health outcomes. If the reduction in the opportunity cost of time is substantial enough for the decrease in marginal cost to outweigh the decline in marginal benefit, retirement could improve health. Otherwise, it could deteriorate. Within Grossman's health demand model, the theoretical impact of retirement on health remains ambiguous, underscoring the need for empirical investigation to clarify this relationship.

There are, however, other mechanisms through which retirement can impact health. On the positive side, retirement can reduce work-related stress, provide more time for relaxation and physical activity, and encourage better health behaviors such as healthier eating and regular medical check-ups. On the negative side, retirement can present challenges such as a loss of purpose and social isolation, which can deteriorate mental health. Some retirees may become less physically active, and financial strain from reduced income can create stress and limit access to healthcare and healthy lifestyle options. Additionally, the lack of mental stimulation from work can increase the risk of cognitive decline. The overall health impact of retirement depends on individual circumstances, including pre-retirement health, personal preferences, and the availability of social and financial resources.⁴

The empirical research on how retirement impacts well-being, covering both health and life satisfaction, is extensive but disproportionately concentrated on health outcomes. This focus likely

⁴ See, for example, [Cohen \(2004\)](#) about the relationship between health and social engagement, [Park & Iacocca \(2014\)](#) about the relationship between health behaviors and stress, and [Warburton et al. \(2006\)](#) about the health benefits of physical activity.

stems from the perceived influence of retirement on individuals' physical and mental health, its implications for healthcare needs and expenses, the availability of relevant data, and its significance for policy. Despite the wide research, the evidence remains inconclusive, with studies presenting varied findings on how retirement affects health. This highlights the value of exploring novel and richer datasets, particularly within under-examined contexts such as Canada.

To the best of my knowledge, there are currently 94 studies examining the relationship between health and retirement, with health encompassing self-assessed or general health (SAH), physical health (PH), and mental health (MH).⁵ A few studies incorporate more objective measures of general health by constructing health indices that combine objective health dimensions or a mix of objective and subjective health indicators ([Abeliansky and Strulik, 2023](#); [Che and Li, 2018](#); [Coe and Zamarro, 2011](#); [Insler, 2014](#); [Mazzonna and Peracchi, 2017](#); [Mountian and Diaz, 2020](#); [Zhu, 2016](#)). A related contribution comes from a recent meta-regression analysis ([Filomena and Picchio, 2023](#)), which extends the range of health measures to include mortality and healthcare utilization. This analysis reviews 85 publications over a 21-year span, from 2000 to 2021, with 24 studies supporting the hypothesis that retirement improves health, 10 reporting evidence of worsening health, and 51 found no statistically significant effect. After adjusting for publication bias, the meta-regression concludes that the average effect of retirement on health is small and barely significant, potentially reflecting the presence of offsetting influences.

⁵ MH research has utilized measures such as the Center for Epidemiologic Studies Depression Scale, Euro-D, Short-Form 36, Geriatric Depression Scale, and Kessler Psychological Distress Scale, alongside assessments of anxiety, mood disorders, cognitive function, stress, social functioning, antidepressant use, memory recall, verbal fluency, sleep disturbances, and overall well-being. PH research has examined body mass index, chronic conditions like hypertension and heart disease, musculoskeletal disorders, mobility limitations, pain, grip strength, activities of daily living, adherence to physical activity guidelines, and engagement in moderate or vigorous exercise.

Table 4.1: A Snapshot of the Literature

No. of Health Outcome Variables		Cross-Sectional				Longitudinal			
		1	2	3	4	1	2	3	4
Asia	China	1				4	1	1	
	Japan					3	2	1	
	Singapore					1			
Australia		1				3	1	3	1
Europe	8 - 19 Countries					11	3	2	
	Denmark					1			
	Finland					2	1		
	France		1	1		1	1		
	Germany					1	1	1	
	Ireland					1			
	Netherlands					3			
	Norway					1	1		
	Sweden						1		
	Switzerland						1	1	
	UK					2	2	6	
North America	Canada		1			3			
	USA					10	4	4	
South America	Brazil								1
Other	Europe/Australia + USA	1				2			
Total		3	2	1	0	49	19	19	2

Of the 94 articles in the existing literature, the majority are based on studies from European countries, with most relying on longitudinal data and focusing on one or two health dimensions. [Table 4.1](#) presents a snapshot of this literature, distinguishing between cross-sectional and longitudinal studies and indicating the number of health variables considered by geographic region. This table underscores the opportunity to contribute to the literature by analyzing the relationship between health and retirement within the Canadian context. Additionally, it allows for a more comprehensive approach by accounting for all health dimensions and incorporating measures of general health that reflect both subjective and objective health characteristics.

Table 4.2: A Summary of Results of the Effect of Retirement by Health Variable and Geographic Area

	Health Index			SAH			MH			PH		
	+	-	n/a	+	-	n/a	+	-	n/a	+	-	n/a
Asia	1			3		2	5	2	2	1	3	2
Australia	1			3		1	7	1	1	4		1
Europe	2		1	13	3	4	19	5	9	10	5	10
North America	1			4	1	3	9	3	6	2	3	3
South America	1					1			1	1		
(by Impact) Total	6	0	1	23	4	11	40	11	19	18	11	16
(by Health Variable) Total	7			38			70			45		

Table 4.2 presents a breakdown of the nature of retirement's impact by health variables and geographic area. Since several studies examine multiple health measures, the number of results (160) exceeds the number of articles (94).⁶ Nearly half of the results (44%) focus on mental health, 28 % on physical health, and 24 % on self-assessed health, while only 4 % pertain to health indices. The majority of the findings originate from Europe (51%), and of the 22 % from North America, just 3% are based on Canadian data, including three results on mental health, one on physical health, and one on self-assessed health. Although the results are mixed, positive effects appear more frequently for general health, particularly when measured objectively through an index, with 86% showing positive effects, though this is based on only seven estimates. When measured subjectively through self-assessment, 61% of the results indicate positive effects. For mental and physical health, the outcomes are more diverse, with 43% and 60% respectively indicating negative or insignificant effects, with insignificant findings being more prevalent. While findings vary across studies, even when analyzing the same datasets, the overall picture is somewhat reassuring. For example, Apouey et al. (2019) report positive effects on mental, physical, and self-assessed health using data from the 2001–2014 Household, Income and Labour Dynamics in Australia (HILDA) Survey. In contrast, Atalay et al. (2019), using 2012–2016 HILDA data, focus solely on mental health and find no effects for females and negative effects for males. Despite these variations, the general evidence suggests that retirement does not typically lead to health deterioration.⁷

Table 4.3 illustrates the distribution of positive and negative effects by geographic area and health measure, as well as across all health measures. Darker colour intensities represent larger proportions.⁸ For example, among estimates derived from Australian data, 75% of the effects on self-assessed health (SAH), 78% of the effects on mental health (MH), and 80% of the effects on physical health (PH) are positive. Across all health measures, 78% of the effects are positive. Additionally, of all positive effects across the four regions and health measures, 18% originate from studies using Australian data. Overall, the literature presents a more optimistic view of SAH, with the largest percentage of the estimates that show deterioration sitting at 15%. With the exception of Australia, PH tends to exhibit more negative effects and fewer positive effects compared to SAH and MH. Among the four regions, Australia demonstrates the most favourable health outcomes post-retirement. In

⁶ Two studies (Rohwedder & Willis, 2010; Schmitz & Westphal, 2021) combine data from Europe and the USA. However, while Schmitz & Westphal (2021) provide separate estimates for Europe (though not for the USA), Rohwedder & Willis (2010) do not differentiate between the two regions. As a result, I include the former for Europe but exclude the latter. Furthermore, from Hagani et al. (2024), I only consider the results for China, as the second set of results does not separate between Australia and the USA.

⁷ Negative effects account for 11%, 16%, and 24% of the SAH, MH, and PH results, respectively. For more details, see Table A.4.1.

⁸ The table is based on 150 results as it excludes findings from South America and about health indices (ten in total).

contrast, other regions display mixed results, with moderate positive effects ranging between 44% and 54%, accompanied by a higher incidence of negative findings. Although Europe accounts for more than half of the positive effects, it also has the largest share of negative effects, likely reflecting the fact that most studies originate from this region.

Table 4.3: Distribution of Positive and Negative Effects

		SAH	MH	PH	All-1 ^a	All-2 ^b
Positive Impact	Asia	0.60	0.56	0.17	0.45	0.11
	Australia	0.75	0.78	0.80	0.78	0.18
	Europe	0.65	0.58	0.40	0.54	0.53
	North America	0.50	0.50	0.25	0.44	0.19
Negative Impact	Asia	0.00	0.22	0.50	0.25	0.19
	Australia	0.00	0.11	0.00	0.06	0.04
	Europe	0.15	0.15	0.20	0.17	0.50
	North America	0.13	0.17	0.38	0.21	0.27
^a Within-region across all health measures. ^b Within-impact across all health measures.						

Among the European studies, several examine multiple countries, relying on the same dataset, the Survey of Health, Ageing and Retirement in Europe (SHARE). These studies cover overlapping periods beginning in 2004 and primarily address endogeneity by applying the instrumental variable (IV) identification strategy, often combined with fixed effects. The few studies that analyze two or three health measures consistently report positive effects across measures (Hessel, 2016; Leimer and Ewijk, 2022; Müller and Shaikh, 2018) or find no evidence of deterioration (Coe and Zamarro, 2011). The remaining studies focus on a single measure, mainly MH, with findings ranging from positive (Belloni et al., 2016; Bianchini and Borella, 2016; Celidoni et al., 2017; Kolodziej and García-Gómez, 2019) to negative (Mazzonna and Peracchi, 2012; Carmel and Tur-Sinai, 2022; Schmitz and Westphal, 2021) or insignificant (Fonseca et al., 2014; Heller-Sahlgren, 2017; Mazzonna and Peracchi, 2017). Of the two studies that focus exclusively on PH, Kesavayuth et al. (2018) identify a positive impact, whereas Godard (2016) finds a negative effect.

The remaining European studies primarily focus on individual countries, demonstrating varied approaches to addressing endogeneity, with some studies overlooking this issue altogether. Others apply diverse strategies such as Regression Discontinuity Design (RDD), Propensity Score Matching (PSM), and Difference-in-Differences (DiD), alongside traditional methods like Instrumental Variable (IV) and Fixed Effects-IV (FE-IV) models. The periods covered by these studies vary significantly, ranging from 1980 to 2019. Evidence from countries like Denmark (Nielsen, 2019), Finland (Kuusi

et al., 2020; Lahdenperä et al., 2022; Oksanen et al., 2011), and the Netherlands (De Grip et al., 2012; Picchio & van Ours, 2020; Rijs et al., 2012) generally points toward positive health outcomes following retirement. Findings from other countries are more mixed but do not suggest overall health deterioration. In France, the results tend to be favourable (Messe & Wolff, 2019b; Westerlund et al., 2009) or statistically insignificant (Blake & Garrouste, 2019; Messe & Wolff, 2019a), with only one of eight estimates showing a negative impact (Blake & Garrouste, 2019). Similarly, studies from Norway report either positive effects (Grøtting & Lillebø, 2020; Syse et al., 2017) or negligible impacts (Syse et al., 2017). In Sweden, research offers no evidence of a significant health impact (Eyjólfsson et al., 2019). For other non-UK European countries, the findings are mixed, with both positive and negative outcomes observed in Germany and Switzerland, while results from Ireland are consistently negative. In Germany, Eibich (2015) evaluates all three health dimensions, reporting positive effects across the board. Similarly, Bonsang & Klein (2012) focus on SAH, finding favourable results. Conversely, Barschkett et al. (2022) report declines in both MH and PH. In Switzerland, Mojon-Azzi et al. (2007) find positive outcomes across all three health dimensions, while Bauer & Eichenberger (2021) observe negative effects on SAH and PH. In the case of Ireland, the only available study (Mosca & Barrett, 2016) focuses on MH, highlighting signs of health deterioration following retirement.

Studies using UK data, primarily drawn from the English Longitudinal Study of Ageing (ELSA) and the Whitehall II Cohort Study, are more extensive and often examine multiple health measures. The majority of these studies suggest either no impact or a positive effect of retirement on health. With the exception of Fé and Hollingsworth (2016), who find no association between retirement and any of the three health measures, studies that assess at least two health outcomes report varied effects. Gorry and Slavov (2021) and Johnston and Lee (2009) find improvements in both SAH and MH, though PH declines in the 2021 study and remains unchanged in the 2009 study. Jokela et al. (2010) and Mein et al. (2003) observe improvements in MH but no changes in PH. Similarly Carrino et al. (2020) and Rose (2020) both find no significant impact on PH; however, their conclusions differ for SAH and MH. Carrino et al. (2020) report no change in SAH but an improvement in MH, while Rose (2020) finds an increase in SAH but no change in MH. The other study that considers all three health dimensions (Behncke, 2012), finds no change in MH, alongside declines in both SAH and PH. Among studies focused exclusively on MH, Roberts et al. (2011) report no significant effect, whereas Fleischmann et al. (2020) document an improvement.

The Australian literature, primarily used data from the HILDA survey and frequently employed IV strategies to address potential endogeneity, presenting a relatively consistent picture. Among the four studies that assess all three health dimensions, three report improvements across all (Apouey

et al., 2019; Binh Tran & Zikos, 2019; Zhu, 2016), while one study observes improvements in MH and PH but no change in SAH (Atalay & Barrett, 2014). Studies that focus solely on MH show varied outcomes, reporting positive effects (Butterworth et al., 2006; Dayaram & McGuire, 2019; Kettlewell & Lam, 2022), negative effects (Atalay et al., 2019), or no significant changes (Gill et al., 2006). Dayaram and McGuire (2019) also explore PH but find no significant evidence of health changes.

For Asia, research has predominantly concentrated on China, Japan, and Singapore. In China, several studies, often using data from the China Health and Retirement Longitudinal Study (CHARLS), suggest positive impacts on SAH (Che & Li, 2018) and MH (Hagani et al., 2024; Lei & Liu, 2018), while other analyses find no significant effects across the three health dimensions (Wang et al., 2024). However, findings for PH are mixed, with some studies indicating negative effects (Feng et al., 2020; Yuan et al., 2023) and others reporting positive outcomes (Yu et al., 2023). In Japan, the relationship between retirement and health appears more ambiguous. SAH either improves (Oshio & Kan, 2017) or remains unchanged (Chen et al., 2024), PH declines (Chen et al., 2024) or remains stable (Mizuochi, 2024), and MH findings vary, with some studies reporting improvements (Chen et al., 2024; Mizuochi, 2024; Oshio & Kan, 2017), while others suggest declines (Bertoni & Brunello, 2017; Shiba et al., 2017) or no significant change (Kajitani et al., 2017). In the case of Singapore, Kim and Koh (2020) found an improvement in SAH following retirement.

In South America, research remains scarce, with only one study from Brazil (Mountian & Diaz, 2020). This study finds no significant changes in SAH and MH, but it does report an improvement in PH. In North America, the majority of studies focus on U.S. data, primarily drawing from the Health and Retirement Study (HRS), with overlapping timeframes and frequent use of IV and FE-IV strategies to address endogeneity concerns. Several studies present consistent findings across health dimensions: Han (2021), Horner and Cullen (2016), and Rhee et al. (2016) all report no significant effects on MH and PH, or on SAH and MH. Conversely, Dave et al. (2008) identify negative effects across all three measures, while Calvo et al. (2013) and Gorry et al. (2018) observe positive effects on SAH and MH, or across all health dimensions. Other research considering all three measures (Coe & Lindeboom, 2008; Neuman, 2008) suggests improvements in SAH, with no significant changes in MH and PH. The remaining studies tend to focus on a single health dimension. Studies examining MH generally report improvements (Clouston & Denier, 2017; Coe et al., 2012; Drentea, 2002; Fonseca et al., 2024; Mandal & Roe, 2007), while Kim and Moen (2002) find no effect and Bonsang et al. (2012) reports a decline. For PH, Kämpfen and Maurer (2016) report positive effects, whereas Chung et al. (2009) observe a deterioration.

For the Canadian context, which is the central focus of this study, the existing body of evidence remains limited. [Latif \(2012\)](#) finds no significant effect on SAH, while [Li and Nowrouzi-Kia \(2024\)](#) report a decline in PH and an improvement in MH. Similarly, [Latif \(2011\)](#) identifies a positive effect on MH, although [Gosselin and Boller \(2022\)](#) document a negative impact. It is important to note that [Gosselin and Boller \(2022\)](#) rely on the same dataset as the present study but utilize only a single wave of data and focus exclusively on MH. Additionally, their methodology does not adequately address potential endogeneity arising from reverse causality and unobserved confounding factors, as their reliance on PSM accounts only for selection based on observed characteristics, leaving unmeasured variables unaccounted for, that may influence both the treatment and the outcome.

[Table 4.4](#) presents the distribution of findings by identification strategy and geographic region. The data suggest that panel data methods (e.g., FE and FD) within an IV model account for the largest proportion of positive effects across all geographic regions. Other strategies associated with relatively higher shares of positive outcomes include panel data methods with IV for Australia, RDD for both Asia and Europe, and other methods that do not directly address endogeneity concerns for Europe. Interestingly, panel data methods incorporating IV also yield the largest share of negative effects, though this pattern is limited to Australia and North America. For Asia, the most negative effects emerge from studies using RDD and IV strategies, while in North America, the most negative outcomes are reported using IV-based panel, PSM, and other methods. When considering insignificant effects, greater variation emerges across identification strategies. In Asia, IV-based panel data methods and RDD account for the majority of non-significant findings. In Australia and North America, IV and other methods dominate the distribution of insignificant results, with PSM producing a comparable share of null findings in Australia. For Europe, the distribution of non-significant effects appears more evenly spread across various methodological approaches. The table also provides the timeline the available studies cover per geographic area.

Table 4.4: Distribution of Results by Identification Strategy and Geographical Area

			Asia	Australia	Europe	North America
			(1987 – 2020)	(1995 – 2018)	(1985 – 2020)	(1987 – 2021)
Panel Data Methods	No IV	+	0.00	0.20	0.02	0.00
		-	0.17	0.00	0.00	0.00
		n/a	0.00	0.00	0.00	0.00
	IV	+	0.50	0.53	0.32	0.50
		-	0.17	1.00	0.13	0.71
		n/a	0.50	0.00	0.19	0.08
IV	+	0.20	0.13	0.11	0.31	
	-	0.33	0.00	0.20	0.00	
	n/a	0.00	0.33	0.15	0.50	
RDD	+	0.20	0.00	0.26	0.06	
	-	0.33	0.00	0.00	0.00	
	n/a	0.50	0.00	0.22	0.00	
DiD	+	0.00	0.00	0.06	0.00	
	-	0.00	0.00	0.33	0.00	
	n/a	0.00	0.00	0.15	0.00	
PSM	+	0.00	0.07	0.00	0.00	
	-	0.00	0.00	0.20	0.14	
	n/a	0.00	0.33	0.11	0.00	
Other	+	0.10	0.07	0.23	0.13	
	-	0.00	0.00	0.13	0.14	
	n/a	0.00	0.33	0.19	0.42	

Regarding effect heterogeneity, existing research primarily investigates a limited set of factors, with gender, occupation, and education being the most common. However, the evidence remains relatively sparse, and findings related to gender-based heterogeneity are particularly inconsistent across different health measures. Some studies suggest that women are less likely to experience health deterioration upon retirement compared to men (Atalay et al., 2019; Feng et al., 2020; Godard, 2016) or are more likely to experience health improvements (Atalay & Barrett, 2014; Dayaram & McGuire, 2019; Eibich, 2015; Kettlewell & Lam, 2022; Leimer & Ewijk, 2022). In contrast, other studies find that retired men either face no decline in health (Lei & Liu, 2018; Yuan et al., 2023) or experience health improvements (Belloni et al., 2016; Butterworth et al., 2006; Eibich, 2015; Grøtting & Lillebø, 2020; Messe & Wolff, 2019b; Mizuochi, 2024; Mountian & Diaz, 2020; Oshio & Kan, 2017; Picchio & van Ours, 2020) when retired women face either deteriorations or no change in health outcomes. Furthermore, several studies find no significant gender-based differences in retirement-related health outcomes (Abeliansky & Strulik, 2023; Apouey et al., 2019; Binh Tran & Zikos, 2019; Fonseca et al., 2024; Heller-Sahlgren, 2017; Kämpfen & Maurer, 2016; Kesavayuth et al., 2018; Kim & Moen, 2002; Kolodziej & García-Gómez, 2019; Kuusi et al., 2020; Latif, 2011, 2012; Leimer & Ewijk, 2022; Mandal & Roe, 2007; Mazzonna & Peracchi, 2012, 2017; Messe & Wolff, 2019a, 2019b; Mizuochi,

2024; Mountian & Diaz, 2020; Neuman, 2008; Nielsen, 2019; Rose, 2020; Schmitz & Westphal, 2021; Shiba et al., 2017; Wang et al., 2024; Westerlund et al., 2009; Yu et al., 2023).

Consistent differences by occupation are also difficult to identify, as retirees from blue-collar jobs display mixed health outcomes. Some studies suggest health improvements for blue-collar retirees (Carrino et al., 2020; Coe et al., 2012; Dave et al., 2008; Eibich, 2015; Fonseca et al., 2024; Grøtting & Lillebø, 2020; Kuusi et al., 2020; Mazzonna & Peracchi, 2017), whereas others report deteriorations (Chung et al., 2009; Coe & Lindeboom, 2008; Godard, 2016; Kesavayuth et al., 2018; Kuusi et al., 2020; Lei & Liu, 2018; Leimer & Ewijk, 2022; Messe & Wolff, 2019b; Mizuochi, 2024). Some studies find no notable differences in health outcomes compared to white-collar retirees (Abeliansky & Strulik, 2023; Belloni et al., 2016; Dave et al., 2008; Eibich, 2015; Godard, 2016; Heller-Sahlgren, 2017; Kolodziej & García-Gómez, 2019; Kuusi et al., 2020; Lei & Liu, 2018; Leimer & Ewijk, 2022; Messe & Wolff, 2019b; Mizuochi, 2024; Westerlund et al., 2009).

Studies that differentiate between low and high education levels generally find no significant disparities in how retirement affects health outcomes (Abeliansky & Strulik, 2023; Blake & Garrouste, 2019; Heller-Sahlgren, 2017; Hessel, 2016; Kämpfen & Maurer, 2016; Wang et al., 2024). The few studies that do identify differences yield conflicting results, with some suggesting that retirees with lower education levels experience better health outcomes (Eibich, 2015; Grøtting & Lillebø, 2020), while others indicate worse outcomes (Blake & Garrouste, 2019; Feng et al., 2020).

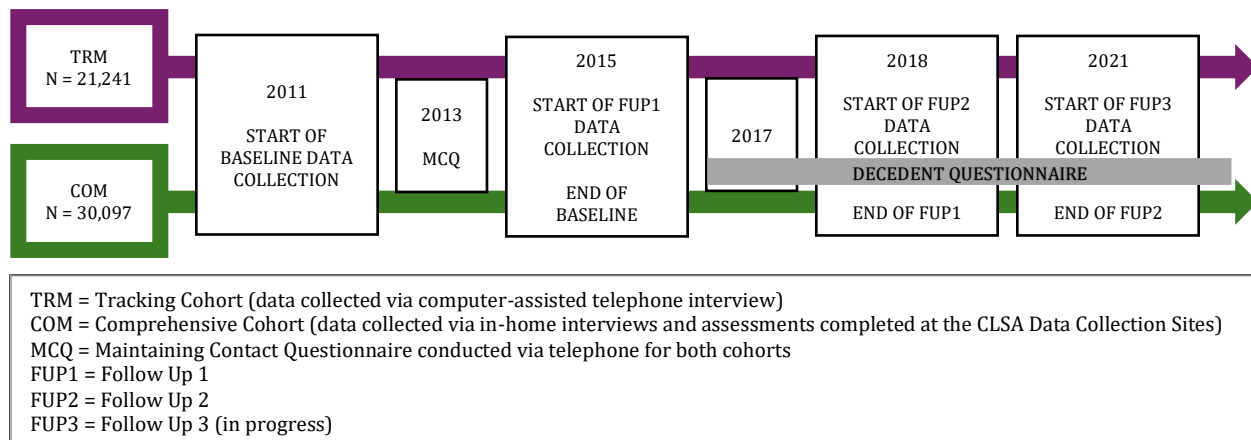
The literature also examines heterogeneity effects related to the length and type of retirement. Evidence on retirement duration remains limited. While some studies suggest that positive health effects of retirement persist in the long run (Bianchini & Borella, 2016; Binh Tran & Zikos, 2019), others argue that these effects diminish over time (Coe & Lindeboom, 2008). Regarding the nature of retirement, studies that differentiate between voluntary and mandatory retirement mostly report no significant differences (Bonsang & Klein; Dave et al., 2008; Mandal & Roe, 2007; Rhee et al., 2016). However, two find a negative effect on mental health with mandatory retirement and either an insignificant effect (Mosca & Barrett, 2016) or a positive effect (Hagani et al., 2024) with voluntary retirement. For partial versus complete retirement, studies by Bianchini & Borella (2016) and Dave et al. (2008) find no significant differences in health outcomes.

4.3 Description of Data and Variables

The dataset utilized in this study is derived from the Canadian Longitudinal Study on Aging (CLSA, 2015), a comprehensive and large-scale research initiative designed to investigate the aging process,

health determinants, and quality of life among the Canadian population. Initiated in 2010, the study follows a diverse cohort of 51,338 Canadian residents, aged between 45 and 85 years at the time of recruitment, over a period of at least 20 years or until death. Currently, three waves of data are available for analysis, encompassing the baseline collection and two subsequent follow-up waves. A visual overview of the sample components and the timeline of data collection is presented in [Figure 4.3](#).

Figure 4.3: CLSA Data Collection: Sample Components and Collection Timeline



The CLSA sample comprises participants from across the ten Canadian provinces, with Tracking (TRM) participants representing a geographically diverse population, while Comprehensive (COM) participants are drawn from areas within 25 to 50 kilometers of one of the eleven CLSA Data Collection Sites. The sample is constructed from several sources: (1) the Canadian Community Health Survey – Healthy Aging (exclusive to the TRM cohort); (2) Provincial Health Registries; (3) Telephone Sampling Random Digit Dialing; and (4) the Quebec Longitudinal Study on Nutrition and Aging (specific to the COM cohort in Quebec). Certain groups are excluded from the study, including residents of the three territories, individuals living on federal First Nations reserves and other First Nations settlements within the provinces, full-time members of the Canadian Armed Forces, individuals residing in institutions such as long-term care facilities, those with cognitive impairments as determined by the CLSA interviewing team, and individuals unable to communicate in either English or French.

To ensure that the sample accurately represents the Canadian population in terms of geography, education, sex, and age, two sets of weights are applied. The first set comprises inflation weights, which adjust for unequal probabilities of selection and nonresponse. Each respondent's inflation weight reflects the number of individuals in the Canadian population they represent, allowing for unbiased estimates of population totals when applied to the weighted sample. The second set

consists of analytic weights, which are proportional to the inflation weights but rescaled to sum to the sample size within each province for the TRM cohort and within each Data Collection Site (DCS) for the COM cohort.⁹ For both weighting schemes, pooled sample weights (TRM + COM) are also constructed. This involves rescaling the TRM inflation weights so that they sum to the sample size within each DCS and provincial non-DCS area, producing pooled analytic weights for the TRM cohort. These are then combined with the analytic weights from the COM cohort,¹⁰ to generate a complete set of analytic weights for the pooled sample. The pooled inflation weights are subsequently recalibrated to ensure that the distribution of the weighted sample aligns with the population distribution by location, education, sex, and age, using benchmarks from the 2011 National Household Survey.¹¹

In this study, I apply the pooled inflation weights for the descriptive analysis, which aims to characterize the Canadian population by estimating means and proportions of variables of interest based on the sample. For estimating the effects of retirement on health, I instead utilize the pooled analytic weights. This approach focuses on understanding relationships among individual-level variables, where representing the broader population is not the primary concern. Additionally, employing rescaled weights helps prevent respondents from larger provinces from disproportionately influencing the results.

4.3.1 Outcome Variables

My outcome variable is health, but I consider different dimensions (general, mental, and physical) and both subjective and objective measures. For general health, I utilize two self-reported health measures (categorical, 1 to 5) and two indices (continuous, 0 to 1) that I derive by combining objective and subjective health characteristics. For mental health, I have a perceived measure and a depression score (both categorical, 1 to 5).¹² For physical health, I have a measure of the ability to perform basic and instrumental activities of daily living (OARS) and the physical activity scale for the elderly (PASE). A summary and description of these health variables are provided in [Table 4.5](#).

⁹ More details about the weights are available in the CLSA Technical Document 2023 ([CLSA, 2023](#)).

¹⁰ The pooled analytic weights of COM cohort participants are the same as their COM analytic weights.

¹¹ In 2011, when recruitment of CLSA participants began, only the short-form census was in place, with limited information; the National Household Survey, which replaced the long-form census and available to about 30% of Canadian census households, was voluntary and had response rate of 68.6% ([CLSA, 2023](#)).

¹² In the CLSA dataset, category 1 indicates excellent health and category 5 indicates poor health. I reverse the scale so that higher values reflect better health, although I keep the original scale when constructing the health indices.

Table 4.5: Health Variables

Variables and Descriptions	
General	<i>Self-rated General Health (SAH)</i> : ordinal score, from 1 (poor) to 5 (excellent)*
	<i>Self-rated Healthy Aging (SAHA)</i> : ordinal score, from 1 (poor) to 5 (excellent)*
	<i>Index-1 (HI-1)</i> : continuous, from 0 (poor) to 1 (excellent), computed as the average of normalized predictions of 10 binary and ordinal objective and subjective health characteristics
	<i>Index-2 (HI-2)</i> : continuous, from 0 (poor) to 1 (excellent), computed as the average of normalized predictions of 13 binary and ordinal objective and subjective health characteristics
	<i>Index-3 (HI-3)</i> : continuous, from 0 (poor) to 1 (excellent), computed as the normalized weighted prediction of self-rated general health, estimated using an ordered probit regression with 12 binary and ordinal objective health characteristics as covariates (robustness check)
Mental	<i>Perceived Mental Health (PMH)</i> : ordinal score, from 1 (poor) to 5 (excellent)*
	<i>Center for Epidemiological Studies Short Depression Scale (CES-SD)</i> : ordinal score, from 1 (minimal symptoms) to 4 (severe symptoms)
	<i>Kessler Psychological Distress Scale (K-10)</i> : ordinal score, from 1 (low distress) to 4 (severe distress) (robustness check)
Physical	<i>Physical Activity Scale for the Elderly (PASE)</i> : continuous, from 0 (no activity) to 793 (most activity)
	<i>Older Americans' Resources and Services Scale (OARS)</i> : ordinal score, from 1 (total functional impairment) to 5 (no functional impairment)*
	<i>Body Mass Index (BMI)</i> : continuous and equal to the ratio between weight in kg and squared height in m (robustness check)
	<i>Life Space Index (LSI)</i> : continuous, from 0 (complete immobility) to 120 (highest level of mobility) (robustness check)
* In the original scale, low values correspond to better health outcomes.	

While objective measures of health have their own limitations, two key concerns are their limited scope (focusing on specific aspects of health or specific health issues) and lack of context (they ignore the broader context of an individual's health). Conversely, the subjective health measures available in the CLSA study also present challenges. These include the influence of personal biases, beliefs, and interpretations; limited medical accuracy, as self-assessments may not align with clinical evaluations or medical diagnoses; and the potential for reporting or information bias, which could arise from memory lapses or social desirability concerns. Despite these limitations, subjective measures provide unique insights into individuals' perceptions and experiences of their health, offering valuable information for understanding health-related behaviors, quality of life, and healthcare utilization. Furthermore, evidence from [Coe & Zamarro \(2011\)](#) suggests that self-reported general health consistently serves as a significant predictor of mortality, even when empirical models account for more objective health characteristics.

For completeness, however, I employ two health indices that combine objective and subjective health characteristics, following the weighting approach in [Insler \(2014\)](#) but adding health characteristics. Specifically, I use the self-reported health variable, which is categorical and ranges between 1

(excellent health) and 5 (poor health), and nine objective health variables, which are binary and record the presence of: (1) heart problems (heart attack, coronary heart disease, angina, or congestive heart failure), (2) high blood pressure or hypertension, (3) stroke or transient ischemic attack, (4) diabetes or high blood sugar, (5) chronic lung disease (aside from asthma), (6) arthritis or rheumatism, (7) cancer (aside from benign skin cancer), (8) psychological problems (emotional, nervous, or psychiatric problems), and (9) obesity (a body mass index in excess of 30).

For each binary outcome, I estimate

$$P(y_{ij} = 1 | \mathbf{X}_{ij}) = \Phi(\mathbf{X}_{ij}\boldsymbol{\beta}_j), \quad (4.1)$$

where y is the binary health outcome, with 1 corresponding to presence of the health condition, \mathbf{X} is a vector of explanatory variables (remaining nine health characteristics), $\boldsymbol{\beta}$ is a vector of coefficients, $\Phi(\cdot)$ is the cumulative density function (CDF) of the standard normal distribution, and subscripts i and j denote respondent and wave, respectively. For each individual, $\Phi(\mathbf{X}_{ij}\widehat{\boldsymbol{\beta}}_j)$ represents the estimated probability of having the health condition.

For the ordinal outcome, I estimate

$$P(y_{ij} = k | \mathbf{X}_{ij}) = \Phi(\tau_k - \mathbf{X}_{ij}\boldsymbol{\beta}_j) - \Phi(\tau_{k-1} - \mathbf{X}_{ij}\boldsymbol{\beta}_j), \quad (4.2)$$

where τ_k is the cut-off point (threshold) for category k estimated from the data. Instead of producing a single probability, the ordered probit model provides a probability distribution across all possible categories. To obtain a single predicted value, I compute the expected value of the ordinal outcome as

$$E(y_{ij} | \mathbf{X}_{ij}) = \sum_k k [\Phi(\tau_k - \mathbf{X}_{ij}\widehat{\boldsymbol{\beta}}_j) - \Phi(\tau_{k-1} - \mathbf{X}_{ij}\widehat{\boldsymbol{\beta}}_j)]. \quad (4.3)$$

Since the raw predictions from the probit and ordered models are on different scales, I normalize them to ensure that the rescaled values fall between 0 and 1. Additionally, since higher predictions correspond to worse health (e.g., higher likelihood of disease, lower self-reported health), I invert the scales. Therefore, for each predicted value, I apply reverse min-max normalization as

$$\tilde{y}_{ij} = 1 - \frac{\hat{y}_{ij} - \min(\hat{y}_j)}{\max(\hat{y}_j) - \min(\hat{y}_j)}, \quad (4.4)$$

where $\min(\cdot)$ and $\max(\cdot)$ are the minimum and maximum predicted values across all individuals within wave j . Finally, I compute the health index by averaging the normalized predictions across all health characteristics, that is,

$$HI = \frac{1}{10} \sum_{h=1}^{10} \tilde{y}_{ijh}, \quad (4.5)$$

where h denotes the health characteristic. The final index provides a composite measure of health that integrates both subjective (self-reported health) and objective (diagnosed diseases) characteristics, with higher values indicating better overall health.

For the second index, I add the following three (two binary and one ordinal) variables to the aforementioned health characteristics: (1) an overall classification of a respondent's capacity to perform basic and instrumental activities of daily living on a 5-point scale, with 1 representing no functional impairment and 5 total functional impairment;¹³ (2) an indicator for positive depression based on a CES-SD score of 10 or higher; (3) an indicator for spending a night at a hospital over the previous 12 months. To compute the index, I implement the same steps as I describe above and average the normalized inverted predictions across 13 health characteristics.

Outside of the two indices, the other health variables come directly from the CLSA study, and a few additional details, beyond those in [Table 4.5](#), are in order for some of them. Specifically, for mental health measures, besides perceived mental health, I have the Center for Epidemiological Studies Short Depression (CES-SD) scale, which screens for depressive symptoms, with scores ranging from 0 to 24 (8-item version) or 0 to 30 (10-item version). Respondents rate each item on a 0 to 3 scale, based on symptom frequency over the previous week, with 0–4 reflecting minimal symptoms, 5–9 mild, 10–14 moderate, and 15+ severe. A score of 10 or higher (10-item version) often signals significant depressive symptoms, and the positive depression result (indicator), which I use in the expanded health index, records precisely the presence of a score of 10 or higher. Importantly, the CES-SD scale identifies at-risk individuals but does not diagnose depression.

In terms of physical health, the Older Americans' Resources and Services (OARS) scale assesses the functional abilities of older adults in performing Activities of Daily Living (ADLs) and Instrumental

¹³ Activities of daily living (ADL) include eating, dressing, bathing, toileting, transferring (getting in and out of a chair), continence (bladder control), and mobility (walking). Instrumental activities of daily living (IADL) include meal preparation, housekeeping, managing finances, managing medications, transportation, shopping, and managing communication with others.

Activities of Daily Living (IADLs).¹⁴ The variable classifies a respondent's ability to perform activities of daily living based on the 5-point scale, ranging from 1 (no functional impairment) to 5 (total impairment) in the CLSA study, although the original OARS scale, described in [Fillenbaum \(2013\)](#), ranges from 2 (excellent/good) to 6 (total impairment).

For physical health, I also use the Physical Activity Scale for the Elderly (PASE) score, which quantifies activity levels by evaluating the frequency and duration of various activities across three main domains: occupation (e.g., work-related tasks), household (e.g., housework, gardening), and leisure (e.g., walking, sports). The PASE score ranges between zero and 793, with higher values indicating better physical fitness, and depends on the weight assigned to each activity, which reflects the activity's intensity, the frequency (i.e., days per week) of the activity, and the duration of the activity (i.e., hours per day). The final score for individual i in wave j is then equal to

$$\text{PASE}_{ij} = \sum_{a=1}^5 w_a f_{ija} + \sum_{b=1}^6 w_b f_{ijb} + w_c f_{ijc}, \quad (4.6)$$

where a , b , and c denote leisure, household, and work-related activities, respectively, w is the weight assigned to each activity based on its intensity,¹⁵ and f represents the activity frequency value, which differs across the three types of activities. Specifically, f_a ranges from 0, indicating no engagement in the activity, to 4.29, representing frequent weekly engagement in the activity for more than four hours per day; f_b is equal to 0 with no engagement and 1 with engagement; f_c is zero when there are no work hours or when job involves primarily sitting with minimal arm movement, and it equals the number of work hours per week divided by seven in the other cases. The upper bound of the PASE score is thus 793 with a conservative number of work hours per week of 40, which gives a value of 5.71 for f_c .

To ensure the robustness of my results, I incorporate a third general health index that relies exclusively on objective health characteristics as covariates, following the methodologies outlined by [Bound et al. \(1999\)](#) and [Coe & Zamarro \(2011\)](#). For each wave, I estimate equation (4.2), where y represents SAH and X denotes a set of objective health factors. These factors include the same chronic conditions featured in the first index, an ordinal measure for functional impairment, a depression indicator, the PASE score, and a hospitalization indicator reflecting admissions within the

¹⁴ Activities of daily living (ADLs) include bathing, dressing, personal hygiene, toileting, feeding, ambulating, and continence. Instrumental activities of daily living (IADLs) include meal preparation, housekeeping, laundry, managing finances, managing medications, shopping, and transportation and communication management.

¹⁵ See [Table B.4.1](#) for the weights assigned to the 12 activities included in the PASE score.

past 12 months. I then calculate the average predicted values using (4.3) and apply min-max normalization to adjust the index values to fall between 0 and 1. Given that all covariates reflect objective health characteristics, any variation in the index would be attributable to individual differences in these characteristics.

Additionally, I incorporate alternative measures for both mental and physical health. To assess mental health, I use the Kessler Psychological Distress Scale (K-10), available exclusively for the COM cohort. This tool consists of ten self-reported questions that measure the frequency of psychological distress symptoms experienced over the previous four weeks on a 5-point Likert scale, ranging from 1 (never) to 5 (always).¹⁶ I aggregate these scores to produce a total ranging from 10 to 50 and categorize the psychological distress levels as follows: 10–19 (low distress), 20–24 (mild distress), 25–29 (moderate distress), and 30–50 (severe distress, indicating a strong likelihood of a clinical disorder). For physical health, I use two indicators: the Body Mass Index (BMI) and the Life Space Index (LSI). BMI evaluates body weight relative to height by dividing weight (in kilograms) by the square of height (in meters). This metric is used as a basic screening tool to categorize individuals into different weight-related health risk groups, with underweight (BMI < 18.5) associated with malnutrition and overweight (BMI ≥ 25.0) linked to heightened risks of cardiovascular disease, diabetes, and other chronic conditions. The LSI, on the other hand, measures mobility by assessing how frequently and independently an individual moves through five spatial zones over the previous four weeks: within the home, outside the home, within the neighborhood, across the town, and beyond the town. Scores range from 0 (complete immobility, meaning the individual does not leave their bedroom) to 120 (maximum mobility, meaning they travel beyond their town or city daily without assistance).

4.3.2 Treatment Variables

My primary explanatory variable is (subjective) retirement. At baseline, 18,912 of the 51,134 Canadian residents report being completely retired, whereas 4,859 report being partially retired. Beyond subjective retirement status, I take advantage of the depth of the CLSA data to develop a more objective measure of retirement, drawing on the standard definition used in Canada, according to which, an individual is classified as retired if they meet the following criteria: (i) are over the age of

¹⁶ Questions are about how often one felt (1) tired out for no good reason, (2) nervous, (3) so nervous that nothing could calm them down, (4) hopeless, (5) restless or fidgety, (6) so restless that they could not sit still, (7) depressed, (8) that everything was an effort, (9) so sad that nothing could cheer them up, and (10) worthless. See [Kessler et al. \(2003\)](#) for more details about the K-10 scale.

54 years, (ii) are not in the labor force, and (iii) receive 50 percent or more of their income from retirement-related sources. The CLSA provides detailed information on age, employment status, and income information (including retirement income). Using these criteria, I construct a retirement indicator that identifies individuals aged 55 and over who are not working and receive a substantial portion of their income from retirement sources. This objective measure is then incorporated into my robustness checks.

Table 4.6: Retirement Status in the Last Wave by Health-Related Reasons for Retirement

		Subjective Retirement		Objective Retirement	
		With Health Reasons	Without Health Reasons	With Health Reasons	Without Health Reasons
One Wave	Not Retired	3,673	4,899	4,563	5,565
	Partial Retired	644	692		
	Completely Retired	3,083	2,080	2,827	2,054
Two Waves	Not Retired	1,571	2,703	2,887	3,718
	Partial Retired	433	512		
	Completely Retired	4,412	3,048	3,875	2,800
Three Waves	Not Retired	13,383	13,383	17,823	16,409
	Partial Retired	3,180	2,220		
	Completely Retired	19,216	13,491	17,384	12,461
Total		49,595	43,028	49,359	43,007

When examining participants across the three waves, I categorize them into three distinct groups: (1) those who participated only in wave 1 (7,400, with 3,727 in subjective retirement, including 644 in partial retirement, and 2,827 in objective retirement); (2) those present in both waves 1 and 2 but absent in wave 3 (6,416, with 4,845 in subjective retirement, including 433 in partial retirement, and 3,875 in objective retirement); and (3) those who consistently participated across all three waves (35,799, with 22,396 in subjective retirement, including 3,180 in partial retirement, and 17,384 in objective retirement). The discrepancies between subjective and objective retirement counts are likely due to missing income data or measurement error, which is necessary for calculating the objective retirement indicator.

While I can retain all participants for the cross-sectional analysis, regardless of the number of waves they appear in or whether they return to work after a period in retirement, the longitudinal analysis requires excluding certain participants. Specifically, I remove those who participated in only one wave and those who transitioned out of retirement or shifted from complete to partial retirement, resulting in a final dataset of 49,595 or 49,359 participants, depending on whether I use the subjective or objective retirement measure. [Table 4.6](#) presents the retirement status of these

participants in their most recent available wave of data, both with and without excluding individuals who retired for health-related reasons.

When using the subjective retirement measure, I differentiate between partial and complete retirement; complete retirement following a period of partial retirement; and complete retirement following no retirement. I also distinguish between voluntary and involuntary retirement, with data available only within the TRM sub-sample. To further explore potential differences in the impact of voluntary versus involuntary retirement across the full sample, I classify retirement reasons into pull and push factors. Pull factors (agreement with a spouse or partner, completion of pension-qualifying years, financial readiness, employer incentives, personal interests, and a desire to stop working) encourage voluntary retirement, which I expect to be associated with better health outcomes by promoting a sense of control, reducing stress, and supporting healthier lifestyle choices. Conversely, push factors (health problems, disability, stress, job loss, caregiving duties, and mandatory retirement policies) are likely to force retirement and may negatively affect health by removing personal choice, triggering stress and emotional strain, and reducing well-being.

4.3.3 Other Explanatory Variables

Additional controls I account for across all empirical specifications capture economic, social, demographic, and contextual dimensions. At the individual level, I include sociodemographic variables such as age, education, gender, immigrant status, marital status, and race. To capture the possibility of a non-linear relationship between age and health, I incorporate a squared term for age. At the household level, I control for economic factors such as household income and contextual variables like dwelling ownership, geographic location (urban versus rural), household size, and the retirement status of a spouse, if applicable. These factors can influence financial stability, daily routines, social interactions, and overall lifestyle, all of which have implications for health and well-being. Finally, I account for regional variation by including provincial indicators.

Furthermore, I introduce variables that measure social engagement and social support to capture key dimensions of well-being. For social engagement, I use the frequency of participation in eight community-based activities over the past 12 months. Participants rate their involvement on a scale from 0 (no participation) to 4 (daily participation). These activities include religious gatherings, membership in clubs or fraternal organizations, participation in associations, attendance at educational or cultural events, involvement in recreational activities, engagement with family or friends outside the household, participation in sports or physical activities, and involvement in

volunteer or charitable work. I expect social engagement to positively influence both physical and mental health by fostering social connections and enhancing a sense of community belonging.

For social support, I rely on a multidimensional functional social support measure derived from the self-administered Medical Outcomes Study (MOS) Social Support Survey. This measure consists of 19 items distributed across four main subscales: (1) Emotional/Informational Support, which captures the availability of comfort, understanding, and advice (eight items); (2) Tangible Support, which measures access to practical and material assistance (four items); (3) Affectionate Support, which assesses expressions of love and emotional closeness (three items); and (4) Positive Social Interaction, which evaluates companionship and engagement in enjoyable activities (four items). Each item is rated on a 5-point Likert scale, ranging from 1 (“never”) to 5 (“always”). To construct the overall social support measure, I calculate the average score across the four subscales, range from 0–100 as provided in the CLSA dataset,¹⁷ multiply the transformed average of each subscale by the relevant number of items, sum the products across the four subscales, and divide the result by 19. I expect that higher levels of social support will enhance well-being by providing emotional resilience and strengthening social bonds, which may reduce the risk of depression and improve mental health outcomes.¹⁸

4.4 Identification Strategy

When analyzing the relationship between retirement and health, I must address potential endogeneity, as the key explanatory variable (i.e., retirement) might correlate with the error term due to factors such as omitted variable bias, measurement error, and reverse causality. Omitted variable bias arises when the model excludes relevant factors—such as socioeconomic status, personality traits, or access to healthcare—that influence both health and retirement decisions. Measurement error arises when individuals inaccurately report their health status or retirement timing, leading to biased estimations. Reverse causality, or simultaneity, which likely represents the most significant source of endogeneity, where retirement and health mutually influence each other: declining health may lead to early retirement, while retirement itself can affect health through changes in stress levels, physical activity, and social engagement. This dynamic creates a feedback loop, complicating efforts to establish clear causal relationships.

¹⁷ The transformed score equals 100 multiplied by the ratio of the difference between the observed score and the minimum possible score to the difference between the maximum and minimum possible scores.

¹⁸ See Appendix B, [Table B.4.1](#), for a complete list of variables with detailed descriptions, and [Table B.4.2](#), for their weighted summary statistics at recruitment (i.e., using the first wave).

The existing literature employs several econometric methods to address endogeneity, with the most prominent being fixed effects (FE) models, instrumental variable (IV) models, FE-IV combinations, and regression discontinuity design (RDD). Each approach targets specific sources of bias through different mechanisms. Specifically, FE models address time-invariant unobserved heterogeneity but remain vulnerable to time-varying omitted variables, measurement error, and simultaneity. IV models mitigate endogeneity by isolating exogenous variation in retirement, though they require strong instruments to avoid bias. FE-IV models combine FE and IV approaches, controlling for both unobserved heterogeneity and simultaneity but requiring valid instruments and sufficient within-individual variation. RDD exploits policy thresholds to estimate local treatment effects, effectively addressing reverse causality and omitted variable bias, though its generalizability is limited.

The richness of the CLSA dataset permits a more direct approach for addressing endogeneity without relying on specialized econometric techniques. I utilize the inclusion of retirement reasons to exclude participants who report retiring due to health-related reasons, thus reducing the risk of reverse causality and providing a clearer identification of retirement's causal effect on health. Moreover, having access to more objective measures for both retirement and health helps me mitigate measurement error as a potential source of endogeneity. The longitudinal structure of the dataset enables me to control for omitted variable bias through repeated observations and by incorporating individual-specific, time-invariant unobserved heterogeneity using fixed or random effects.

To appropriately model the relationship between retirement and health, I employ an ordered logit model with fixed effects for analyzing self-reported health outcomes and a Generalized Estimating Equations (GEE) framework for health indices. The ordered logit model accounts for the ordinal nature of self-reported health status while controlling for individual-specific heterogeneity. Meanwhile, the GEE framework addresses the correlation between repeated observations in longitudinal health indices. Both models are well-suited for the panel data structure.

As a baseline, I assume a linear model for all outcomes:

$$y_{ij} = \mathbf{X}_{ij}\boldsymbol{\beta} + \alpha_i + \varepsilon_{ij}, \quad (4.7)$$

where y_{ij} is the health outcome of individual i in wave j , \mathbf{X}_{ij} is a vector of time-varying explanatory variables, $\boldsymbol{\beta}$ is the vector of the coefficients of interest, α_i is the individual-specific fixed effect (time-invariant unobserved heterogeneity), and ε_{ij} is the idiosyncratic error term with zero mean and constant variance. Since α_i is fixed over time, it can correlate with \mathbf{X}_{ij} , violating the exogeneity assumption in pooled OLS.

The FE Linear Regression

The FE estimator is a common panel data estimation technique that removes individual-specific time-invariant heterogeneity by eliminating its influence through transformation and focusing on within-individual variation. This method is particularly useful when the individual-specific effects are correlated with the regressors, making traditional ordinary least squares (OLS) estimation biased and inconsistent.

To eliminate α_i in (4.7), the FE estimator applies the within transformation (demeaning at the individual level) and regresses the within-individual deviation of y_{ij} from its mean on the within-individual deviations of \mathbf{X}_{ij} , that is,

$$\tilde{y}_{ij} = \tilde{\mathbf{X}}_{ij}\boldsymbol{\beta} + \tilde{\varepsilon}_{ij}, \quad (4.8)$$

where $\tilde{y}_{ij} = y_{ij} - \bar{y}_i$, $\tilde{\mathbf{X}}_{ij} = \mathbf{X}_{ij} - \bar{\mathbf{X}}_i$, and $\tilde{\varepsilon}_{ij} = \varepsilon_{ij} - \bar{\varepsilon}_i$.

The FE linear regression model works well for continuous health outcomes but is less suitable for categorical ones, as it does not respect the bounded nature of these outcomes and may produce invalid predictions. However, it remains a useful benchmark by approximating a linear probability model, offering straightforward coefficient interpretations and enabling comparisons with non-linear models. As a baseline, it offers a simple yet informative reference before I apply more specialized models for categorical health outcomes, such as the FE ordered logistic regression.

The FE Ordered Logistic Regression

For ordinal health outcomes (SAH, SAHA, PMH, OARS), I estimate the probability of individual's health outcome falls into category k or below using the fixed-effects ordinal logit model. Specifically, I estimate

$$P(y_{ij} \leq k | \mathbf{X}_{ij}, \alpha_i) = \frac{\exp(\tau_k - \mathbf{X}_{ij}\boldsymbol{\beta} - \alpha_i)}{1 + \exp(\tau_k - \mathbf{X}_{ij}\boldsymbol{\beta} - \alpha_i)}, \quad (4.9)$$

where τ_k denotes the threshold parameter for category k . By including fixed effects, the model controls for time-invariant individual characteristics, such as genetic predispositions or long-term health conditions, that could confound the relationship between time-varying explanatory variables and health outcomes. A positive coefficient on an explanatory variable suggests that an increase in the predictor reduces the probability of being in lower health categories, shifting individuals toward better health outcomes, whereas a negative coefficient implies the opposite. This model preserves

the ordinal nature of the dependent variable, avoiding the loss of information that would result from treating ordinal outcomes as binary or continuous, while also accounting for potential endogeneity by differencing out fixed individual-specific effects (α_i).

The FE ordinal logit model estimates parameters using conditional maximum likelihood estimation (CMLE), which removes individual-specific fixed effects by conditioning on the sufficient statistics of the data. Instead of directly estimating the fixed effects, the model focuses on transitions between ordinal categories over time for each individual. By conditioning on the outcomes across all waves, the model eliminates the fixed effects and consistently estimates the coefficients of the time-varying explanatory variables (β) and threshold parameters (τ_k). The estimation proceeds through iterative numerical optimization methods to maximize the conditional likelihood function, ensuring robust and unbiased parameter estimates.

Generalized Estimating Equations with Gamma/Gaussian Distribution and Log Link

Generalized Estimating Equations (GEE) represent a semi-parametric approach for analyzing correlated data, such as longitudinal (repeated measures) or clustered observations. Unlike traditional regression models that assume independent errors, GEE accounts for within-subject correlation while estimating population-averaged effects rather than subject-specific effects. As a semi-parametric approach, GEE assumes a specific mean-variance relationship but does not fully specify the outcome distribution. This flexibility is especially useful for bounded indices and right-skewed continuous outcomes (i.e., PASE), for which a fully parametric approach (such as assuming normality) may misrepresent the data, leading to biased estimates or poor model fit.

A GEE model follows the general structure of a Generalized Linear Model (GLM), with the mean response $\mu_y \equiv \mathbb{E}(y_{ij} | \mathbf{X}_{ij})$ linked to the linear predictors through a link function as

$$g(\mu_y) = \mathbf{X}_{ij}\beta, \tag{4.10}$$

where $g(\cdot)$ represents the link function. A key feature of GEE is its ability to specify a working correlation matrix, which defines how repeated observations are related within each subject, without requiring a fully specified likelihood. Common choices for correlation structure include independent (no correlation, treating all observations as independent), exchangeable (constant correlation between all repeated measures within a subject), autoregressive (correlation decays over time), and unstructured (each pair of repeated measures has its own correlation). The chosen structure affects efficiency but does not impact the consistency of parameter estimates, making GEE a robust method even if the correlation structure is mis-specified.

To compare the fit of different GEE models—considering the choice of distribution and correlation structure—I use the Quasi-likelihood under the Independence Model Criterion (QIC). This criterion extends the Akaike Information Criterion (AIC) to models with correlated observations, such as those found in panel or longitudinal data, providing a more appropriate measure of model fit for such data structures. Like AIC, QIC balances model goodness-of-fit (how well the model explains the data) with model complexity (to avoid overfitting), with lower values indicating a better model. Based on this criterion, I select the Gaussian distribution with a log link function for HI-1 and HI-2 and the Gamma distribution with a log link function for PASE; in both instances, I adopt an exchangeable correlation structure.

For HI-1 and HI-2, which are continuous indices bounded between 0 and 1, the Gaussian distribution with a log link function provides the most suitable modeling approach. The log link ensures that predictions remain within the valid range by preventing negative fitted values and capturing the multiplicative nature of changes in index values. This choice effectively accounts for the characteristics of the indices while maintaining computational efficiency within the GEE framework. Similarly, for PASE, which is continuous and strictly positive, the Gamma distribution with a log link function offers the best fit. The Gamma distribution appropriately accounts for the right-skewness of PASE, while the log link ensures that predictions remain positive and allows for a multiplicative relationship between predictors and the outcome.

With a log link in both instances, the model to estimate is

$$\log(\mu_y) = \mathbf{X}_{ij}\boldsymbol{\beta}, \quad (4.11)$$

which gives

$$\mu_y = e^{\mathbf{X}_{ij}\boldsymbol{\beta}}, \quad (4.12)$$

with $y_{ij} \sim N(\mu_y, \sigma_y^2)$ when I work with the health indices and $y_{ij} \sim \Gamma(\pi, \phi)$, where π is the shape parameter and ϕ is the scale parameter, when I work with PASE.

In addition to the above strategies, which leverage the panel data structure and reasons for retirement in the dataset, I employ a fuzzy regression discontinuity (RD) design as a robustness check to obtain a precise local treatment effect of retirement on health, specifically for individuals near the cutoff (e.g., retirement age). While excluding individuals retiring for health-related reasons helps mitigate reverse causality and panel data models control for unobserved heterogeneity and selection bias, RD's quasi-experimental design directly compares individuals who are very similar except for their retirement status, offering a more rigorous causal inference. By focusing on individuals near the

cutoff, a fuzzy RD design reduces potential bias from unobserved variables or confounding factors. Furthermore, when the retirement cutoff is externally defined, a fuzzy RD design provides more precise estimates, overcoming limitations in other methods requiring assumptions about functional forms or distributions that may introduce residual bias. In this way, a fuzzy RD design strengthens the causal interpretation of the impact of retirement on health, especially when assignment to retirement depends on an exogenous cutoff.

4.5 Empirical Results

The complete set of results for the main models is presented in [Appendix C, Table C.4.1](#) and [Table C.4.2](#). For ease of reference, however, I summarize the estimated coefficients of retirement in [Table 4.7](#), covering both linear and non-linear regression models. These coefficients represent marginal effects in the linear regressions, odds ratios in the ordinal logistic regressions, and exponentiated coefficients in the GEE regressions.¹⁹ Focusing on the direction and statistical significance of the estimated coefficients, I find that retirement is generally associated with improvements in self-assessed general health (**SAH** and **SAHA**) and mental health (**PMH**), while it corresponds with a decline in physical activity (**PASE**). I rely on PASE as an indicator of physical health due to its positive correlation with better mobility, reduced frailty risk, and lower likelihood of disability. However, it is important to acknowledge its limitations, as it does not fully capture clinically validated physical health markers such as body composition, cardiovascular health, blood parameters, flexibility, or strength ([Logan et al., 2013](#)). In contrast, the OARS measure, which evaluates an individual's ability to perform daily activities across multiple domains, shows an increasing trend in retirement. This aligns with the patterns observed in self-assessed health measures. Additionally, the two general health indices and the CES-SD further support the presence of a positive relationship between retirement and both general and mental health, even though the effects observed on the health indices are relatively small. Specifically, regarding the CES-SD, the odds ratio of 0.81 suggests that, on average, retirees are 19% less likely to suffer from depression.

¹⁹ With the GEE models, $\mathbb{E}(y_{ij}|\tilde{\mathbf{X}}_{ij}) = e^{\beta_k} \mathbb{E}(y_{ij}|\mathbf{X}_{ij})$, where $\tilde{\mathbf{X}}$ is the same as \mathbf{X} but with X_k increased by 1. Hence, $100(e^{\beta_k} - 1)$ gives the percentage change in the expected value of y_{ij} from a unit increase in X_k .

Table 4.7: Effects of Retirement on Health

		SAH	SAHA	HI-1	HI-2	PMH	CES-SD	PASE	OARS	
FE LRM	1.	Subjective	0.040**	0.063***	0.002	0.003**	0.048***	-0.047**	-15.554***	0.031***
		Objective	0.024			0.003*	0.056***		-13.575***	
	2.	COM	0.061***			0.004**	0.066***		-14.995***	
		TRM	0.013			0.004**	0.030		-16.111***	
	3.	Partial	0.037*			0.002	0.087***		-13.994***	
		Complete	0.058***			0.004***	0.088***		-21.234***	
	4.	NR to CR	0.065***			0.004***	0.094***		-20.726***	
		PR to CR	0.008			0.002	-0.021		-7.138***	
	5.	Voluntary	0.066***			0.004***	0.079***		-17.398***	
		Involuntary	-0.026			0.004	-0.050		-14.893***	
	6.	Short-Run	0.044**			0.003*	0.031		-19.664***	
		Long-Run	0.026			0.003*	0.071***		-4.412**	
	FE Ordinal Logit		1.151**	1.249***			1.173***	0.808**		1.453***
	GEE Model				1.006***	1.006***			0.840***	

Notes: robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

In [Table 4.7](#), I present the estimated effects of retirement on self-assessed health, the second health index, perceived mental health, and PASE using the objective measure of retirement, while accounting for various factors such as survey methodology (in-home vs. phone), the distinction between complete and partial retirement, voluntary (pull) vs. involuntary (push) retirement, transitions from no retirement to complete retirement vs. transitions from partial to complete retirement, and short- vs. long-run retirement. The full set of estimates is available in [Appendix C](#), including [Table C.4.3](#), which examines differences based on collection methodologies; [Table C.4.4](#), which presents results using the objective retirement measure; [Table C.4.5](#), which explores the differences between short- and long-term retirement; and [Table C.4.6](#), which focuses on distinctions between complete and partial retirement, voluntary vs. involuntary retirement, and complete retirement following no retirement vs. complete retirement following partial retirement, where CR refers to complete retirement, PR to partial retirement, and NR to no retirement.

The additional results presented in [Table 4.7](#), offer meaningful insights. First, retirement consistently leads to a significant reduction in physical activity, regardless of its type or duration, though the magnitude of this decline varies. Complete retirees experience a steeper drop compared to those who retire partially, likely reflecting the loss of work-related movement and structured routines—a finding supported by the much smaller decline observed among individuals transitioning from partial to complete retirement. Involuntary retirees demonstrate a more moderate reduction in PASE

than voluntary retirees, suggesting that those who retire by choice disengage more from work-related physical activity, while those retiring involuntarily may maintain activity levels through alternative routines or ongoing job-seeking efforts. The short-run effects are particularly pronounced, with an immediate decline in physical activity following retirement; however, over time, retirees appear to adapt by incorporating alternative forms of exercise, which helps to offset some of the initial reductions in PASE.²⁰

Second, although the effects of objective retirement mirror those of subjective retirement, they display weaker significance in the general health regressions. Third, the evidence underscores that complete retirement has a stronger impact on health than partial retirement; however, the initial decision to retire plays the most critical role. Transitioning from non-retirement to either partial or complete retirement significantly influences health, while moving from partial to complete retirement offers no additional benefits. Fourth, the voluntary nature of retirement proves to be particularly relevant, as involuntary retirement shows no significant effect on general or mental health. Fifth, beyond the previously observed distinction between the short- and long-term effects of retirement on physical activity, the results reveal that retirement has a stronger effect on general health in the short run, while its impact on mental health becomes more pronounced over time.

The estimated coefficients for age and age squared highlight the complex relationship between aging and health. Age tends to improve self-assessed general health, as indicated by the SAH and SAHA measures, although this positive effect weakens as individuals grow older. Initially, individuals perceive their health more favorably with age, but this improvement slows and may eventually reverse. A similar pattern appears in the health indices (HI-1 and HI-2), where age exerts a modest positive influence that diminishes over time.

Mental health outcomes reveal a more nuanced trajectory. The negative coefficient for age in the PMH regression suggests that older individuals perceive a decline in their mental health. In contrast, the CES-SD estimates indicate a reduction in depressive symptoms with age, although this improvement slows in later years. These findings imply that, even as depressive symptoms lessen, older adults may still perceive a decline in overall well-being, potentially due to factors such as cognitive decline, social isolation, or heightened concerns about aging.

Physical health also reveals distinct patterns across measures. The negative and significant coefficient on age squared in PASE suggests that changes in physical activity vary based on initial

²⁰ To examine whether retirement duration matters, I distinguish between individuals retired for only one wave (short run) and those retired for at least two waves (long run).

activity levels, with more active individuals experiencing a larger absolute decline as they age. In contrast, the OARS measure, which captures functional health, shows a small but positive effect of age, indicating slight improvements or stability in functional abilities, though these gains appear to diminish over time.

Marital status exhibits limited statistical significance across health measures; however, widowed individuals consistently experience worse outcomes in general (SAHA, HI-1, and HI-2), mental (PMH), and physical (PASE) health compared to those who are married or in common-law relationships. Single and divorced or separated individuals also display some negative effects, though these are less frequent and less consistent. These findings suggest that the loss of a spouse has the most pronounced impact on well-being, whereas being single or divorced is associated with weaker and less consistent health effects.

Household income also exhibits minimal statistical significance across health measures, indicating a generally weak or inconsistent relationship with health. However, when significant, individuals in lower-income groups tend to report worse health compared to those with higher incomes. The most notable effects appear in mental health, where individuals earning between \$100,000 and \$149,999 report better outcomes, suggesting that financial security may play a role in enhancing well-being.

Other household characteristics generally show statistically insignificant effects. There is some indication that larger households may contribute to stress or other challenges that negatively impact general health. Homeownership and urban residence, however, do not appear to influence health outcomes. Notably, having a retired spouse is strongly associated with lower levels of physical activity, potentially reflecting lifestyle adjustments or shared routines that reduce overall activity.

Social support stands out as one of the most consistent determinants of health, exerting a positive influence across all general health measures (SAH, SAHA, HI-1, and HI-2), enhancing mental health by improving PMH scores and reducing depressive symptoms (CES-SD), and strengthening functional health (OARS). However, it shows no effect on physical activity (PASE). Similarly, social engagement contributes to improvements in general and functional health but appears unrelated to mental health, as indicated by the consistently insignificant coefficients in the PMH and CES-SD regressions across all engagement levels. Like social support, social engagement does not significantly affect physical activity.

Finally, the absence of significant differences across most provinces suggests that health outcomes are relatively consistent nationwide, likely reflecting the influence of national healthcare policies and

common social determinants of health. The only notable exception is New Brunswick (NB), where residents consistently report better general health compared to those in Ontario.

4.6 Robustness Results

To ensure the robustness of my findings, I apply several validation strategies. First, I use alternative measures for both retirement and health. For retirement, I adopt an objective measure derived from details within the CLSA dataset. For health, I incorporate an index that considers only objective health characteristics (HI-3) as a measure of general health, the Kessler Psychological Distress Scale for mental health, and BMI for physical health. Second, I conduct subsample analyses to explore variations in the effects of retirement on health. I distinguish between voluntary and involuntary retirement, partial and complete retirement, and short-term and long-term retirement to assess whether the impact differs based on the nature of the transition. I also test for heterogeneous effects by gender, education, and occupation type to determine whether certain groups experience different outcomes. Third, I employ a regression discontinuity design (RDD) to strengthen the causal interpretation of the results. By leveraging age-based pension eligibility thresholds, I compare health outcomes of individuals just above and below the retirement cutoff, thereby reducing concerns about self-selection and endogeneity. Additionally, I performed extra tests within the RDD framework by adjusting bandwidths and applying different polynomial specifications to ensure the validity of the estimates. I chose to report the 7-year bandwidth model, as it proved to be optimal for all outcomes, despite testing alternative bandwidths. These robustness checks and methodological refinements enhance the reliability of my analysis and offer a more nuanced understanding of the relationship between retirement and health.

4.6.1 Alternative Health Measures and Heterogenous Effects

To confirm the validity of my results, I adopt alternative health measures. Specifically, I introduce an index (HI-3) constructed solely from objective health characteristics, ensuring that any variation reflects individual differences in these attributes. I also assess mental health using the Kessler Psychological Distress Scale (K-10), which categorizes psychological distress based on self-reported symptoms, and measure physical health through the Body Mass Index (BMI), which classifies individuals according to weight-related health risks, and the Life Space Index (LSI), which evaluates mobility across different spatial areas. Furthermore, beyond subjective retirement, I define an objective measure by classifying individuals as retired if they are over 54, not in the labor force, and

derive at least 50% of their income from retirement-related sources. Finally, I replace household income with individual income. In [Table 4.8](#), I present the key findings from these new regressions alongside the original regressions for easy comparison.

Table 4.8: Effects of Retirement on Health with Alternative Health, Income, Retirement Measures

			SAH	HI-2	HI-3	PMH	K-10	PASE	BMI	LSI
<i>FELRM</i>	1.	Subjective	0.0403**	0.0032**		0.0479***		-15.554***		
		Objective	0.0238	0.0022*		0.0559***		-13.575***		
	2.	Household	0.0403**	0.0032**		0.0479***		-15.554***		
		Individual	0.0581***	0.0040***		0.0638***		-15.724***		
<i>FE LRM</i>			0.0403**	0.0032**	0.0005	0.0479***	-0.0095	-15.554***	-0.1004**	-1.1302**
<i>FE Ordinal Logit</i>			1.1512**			1.1732***				
<i>GEE Model</i>				1.0056***	1.0027**		0.9664***	0.8397***	0.9932***	0.9737***

Notes: robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

As previously noted, the effects of objective retirement generally mirror those of subjective retirement, though the former shows weaker significance for general health. The distinction between household income and individual income proves inconsequential, as the effects of retirement remain consistent in both validity and magnitude. Regarding additional health measures, the GEE estimates reinforce the findings of improved general health and deteriorating physical health, regardless of whether the analysis uses BMI or LSI; however, they also reveal a decline in mental health. In contrast, the FE LRM estimates are less encouraging, indicating no significant effects on general or mental health while confirming a decline in physical health. These results suggest a reasonable degree of robustness, as key effects persist across different income measures and health indicators. Nevertheless, the sensitivity of general and mental health outcomes to the estimation method and measurement choice highlights some limitations.

Table 4.9: FE LRM Effects of Retirement on Health

			SAH	HI-2	PMH	PASE
Gender	Female		0.0226	0.0038*	0.0360	-15.7138***
	Male		0.0606**	0.0023	0.0640***	-15.4940***
Education	Less Than Post-Secondary		-0.0466	-0.0011	0.0162	-20.5858***
	Post-Secondary		0.0707***	0.0046***	0.0608***	-14.3014***
Occupation	White Collar		0.0468**	0.0015	0.0385*	-17.5034***
	Blue Collar		0.0907	0.0061	0.0304	-7.4608

Notes: robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[Table 4.9](#) results reveal that the health effects of retirement differ across gender, education, and pre-retirement occupation. Men experience improvements in self-assessed health and perceived mental well-being, while women show significant effects only for the health index; however, both genders

face a decline in physical activity. Higher education is associated with gains in self-assessed health, the health index, and perceived mental health, whereas lower education shows no significant effects. Moreover, individuals with lower education levels experience a sharper decline in physical activity compared to their higher-educated counterparts. Retirees from white-collar job report improvements in self-assessed health and perceived mental health, while those from blue-collar backgrounds exhibit no significant effects across any health category. At the same time, former white-collar workers experience a decline in physical activity, whereas blue-collar retirees do not.

The observed differences likely arise from disparities in financial security, lifestyle adjustments, and access to post-retirement opportunities. For instance, higher education and white-collar occupations often provide greater financial stability, better healthcare access, and more knowledge about maintaining health, which may help explain why these groups experience improved self-assessed health and mental well-being after retirement. In contrast, blue-collar workers, who typically engage in physically demanding roles, may not experience the same health benefits upon retirement, as they lose work-related physical activity without necessarily adopting alternative forms of exercise. Similarly, individuals with lower levels of education may face limited resources and possess less health-related knowledge, making it more challenging to maintain well-being in retirement.

4.6.2 The RDD Framework

The Regression Discontinuity Design (RDD) assigns treatment based on institutional rules that rely on an assignment variable with a defined threshold. Individuals who surpass the threshold receive the treatment, while those just below it do not. A discontinuity in outcomes at this threshold indicates a causal effect of the treatment under relatively mild assumptions ([Lee & Lemieux, 2010](#)). In this study, age serves as the assignment variable for retirement. While no formal retirement age exists in Canada—since mandatory retirement was abolished in 2009—statutory pension schemes create strong incentives for retirement at specific ages, with eligibility thresholds set at 60 for early retirement and 65 for full retirement. Because age does not directly determine retirement but substantially increases the likelihood of retiring at these thresholds, a fuzzy RDD approach is applied. This method identifies a Local Average Treatment Effect (LATE), measuring the impact on individuals who retire upon reaching the specified age threshold.

The RDD approach relies on several key assumptions to ensure valid causal inference. First, the outcome variable must follow a smooth function of the assignment variable, meaning that, in the absence of treatment, individuals just above and below the threshold would be expected to have

similar outcomes. Second, individuals must lack precise control over their position relative to the threshold, as any manipulation could introduce selection bias. Third, other characteristics should not display systematic shifts at the threshold, ensuring that unobserved factors do not influence the estimated effect. Fourth, there must be a sufficient density of observations near the cutoff to enable a valid comparison between treated and untreated groups.

Since individuals cannot manipulate their age, the second assumption holds naturally. To evaluate the first and third assumptions, I plot health outcomes and other key characteristics (e.g., education, gender) against age, fitting smooth trend lines—both local and quadratic—to observe their trajectories before the retirement threshold. A gradual, continuous evolution of health outcomes supports the first assumption, ensuring that any observed discontinuity at the threshold reflects a treatment effect rather than pre-existing trends. Similarly, the third assumption holds if predetermined characteristics do not exhibit abrupt changes at the threshold, indicating that unobserved factors are unlikely to influence the estimated effect. To verify the fourth assumption, I examine the distribution of observations around the cutoff using a histogram or kernel density plot. A smooth age distribution near the threshold confirms the presence of a sufficient sample for valid comparisons between treated and untreated groups.

Figure 4.4 displays plots of various health outcomes against age, with local averages and quadratic trend lines fitted across different age ranges. In most cases, I observe that health outcomes follow a smooth trajectory on both sides of the retirement threshold, although some measures exhibit moderate variability. Especially, plots for SAH, SAHA, PMH, and CES-SD show visible discontinuities at the threshold, suggesting potential treatment effects. In contrast, the plot for PASE appears to be the most significant exception, showing a steady decline without any abrupt change at retirement. The presence of discontinuities across multiple outcomes supports the validity of the RDD approach, as it indicates a break in the trend that correspond to the retirement threshold. Nonetheless, some fluctuations in the data, particularly in self-reported measures, may reflect factors unrelated to retirement itself, such as measurement error, cohort effects, or anticipation effects.

Figure 4.4: Plots of Health Outcomes Against Age with Local and Quadratic Trend Lines

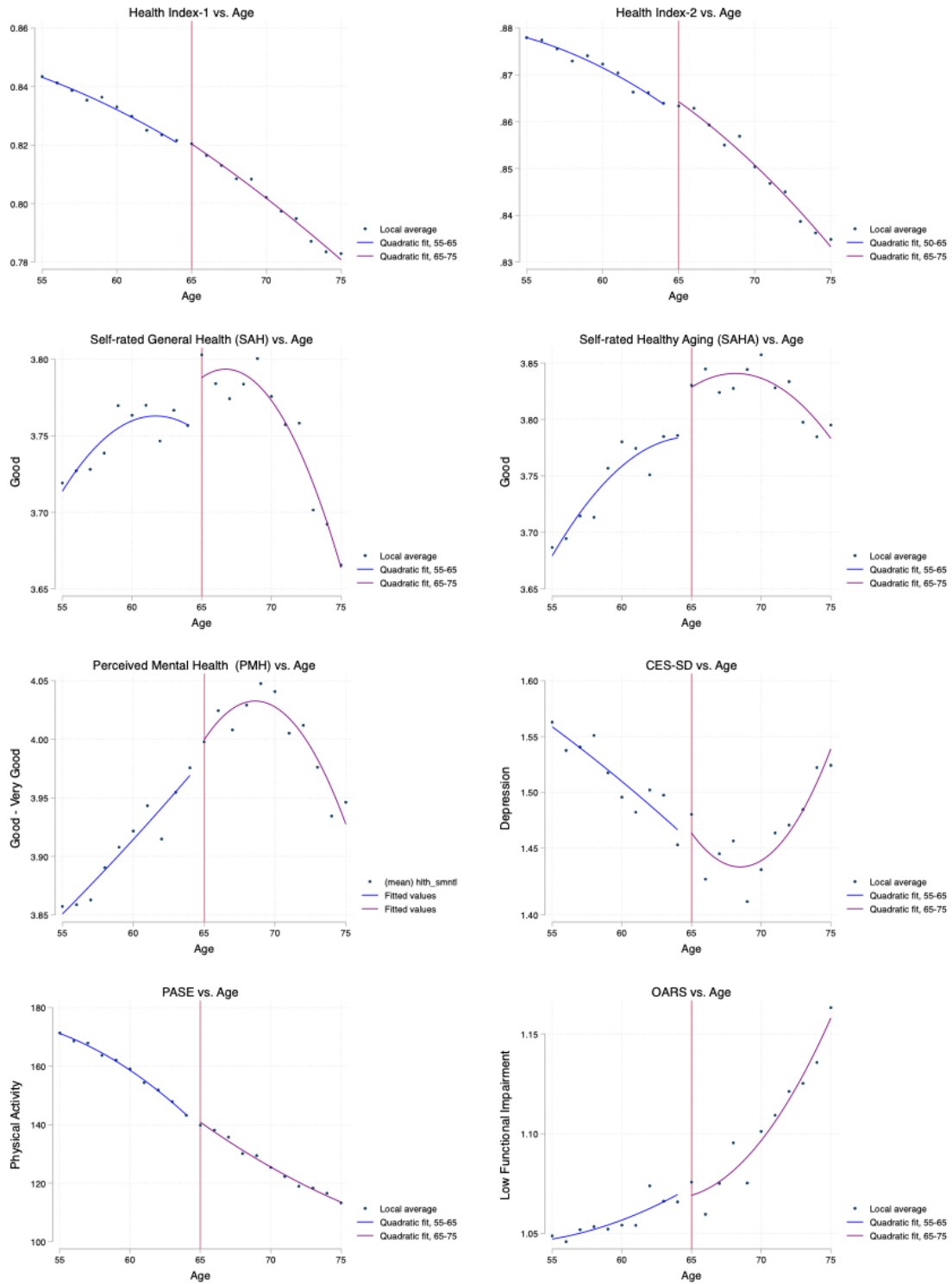


Figure 4.5 shows the relationship between education, gender, marital status, and household income with age. A key requirement for RDD validity is that individuals just above and below the pension eligibility threshold must be comparable in all respects except for retirement status. However, I observe that the quadratic trend lines reveal noticeable shifts in gender composition, marital status, and education at this threshold, while household income remains relatively stable. Such discontinuities suggest potential selection effects that could bias the estimated impact of retirement on health. If individuals with different education levels or marital statuses retire at different rates, retirement status may correlate with unobserved characteristics that influence health, introducing potential endogeneity. These discontinuities also imply that the effect of retirement on health may vary across subgroups, highlighting the need for stratified analyses. To assess the extent of this concern, I examine local averages, which provide a clearer picture of changes near the threshold. Unlike the quadratic trends, local averages suggest that shifts in marital status and education are less pronounced. The polynomial fits may exaggerate discontinuities due to overfitting, whereas local averages offer a more reliable depiction of how these characteristics evolve around the threshold. Given these observations, I find that a fuzzy RDD approach remains appropriate, though it must account for discontinuous covariates to ensure that compositional shifts do not confound the results. To address this, I include RDD estimates stratified by gender, marital status, and education, while flexibly controlling for these variables to mitigate potential biases.

Figure 4.5: Plots of Selected Covariates Against Age with Local and Quadratic Trend Lines

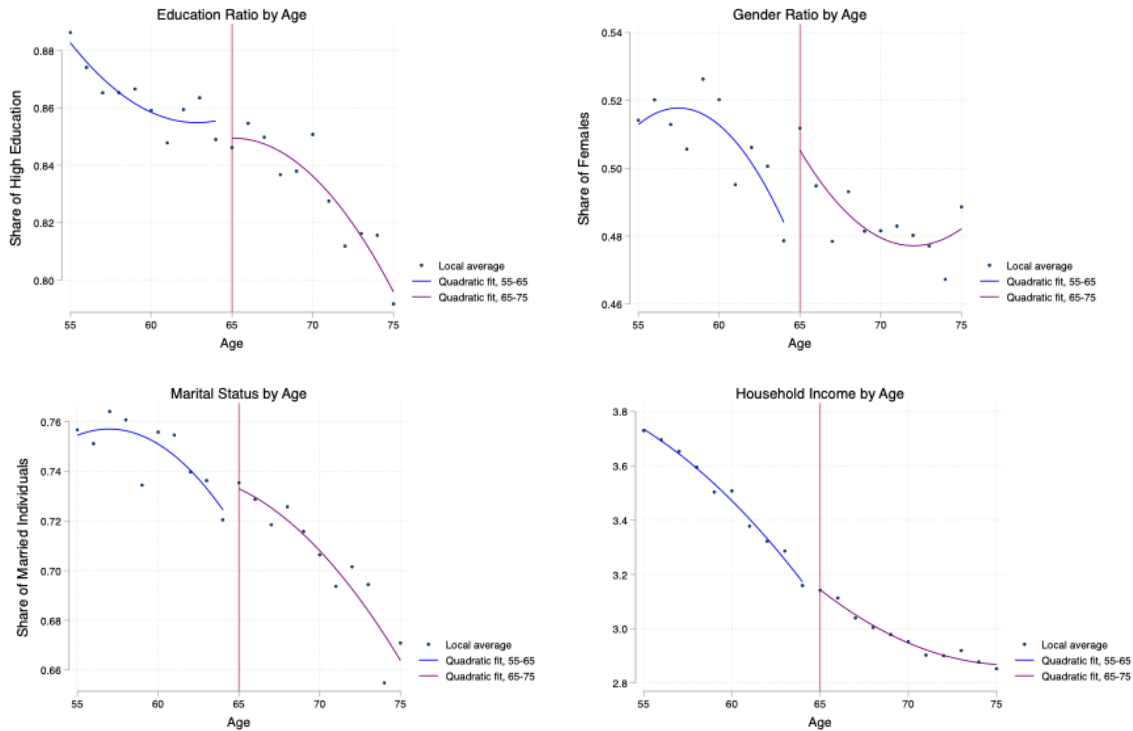
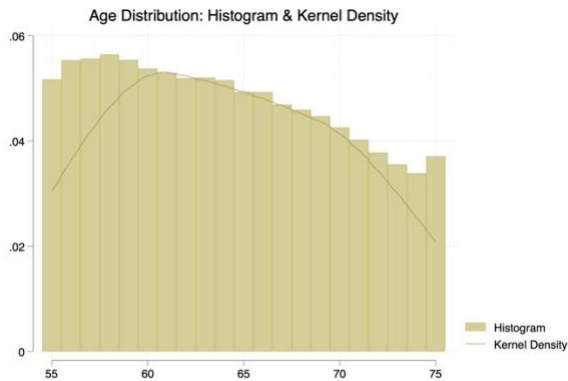


Figure 4.6: Age Distribution



Finally, the histogram and kernel density estimate (KDE) presented in Figure 4.6 indicate that the age distribution remains relatively consistent around the pension eligibility thresholds. The KDE follows a steady trend without any significant peaks or sudden drops in this range, suggesting that age is evenly distributed and well-distributed and that individuals are not clustering around the cutoff points. Any sharp jumps or discontinuities in the density could imply

potential manipulation, such as individuals misreporting their age, which would compromise the validity of the analysis. Since the fuzzy RDD focuses on estimating the local average treatment effect for individuals near the eligibility cutoffs, maintaining a smooth distribution ensures that the estimated effect reflects the impact of treatment rather than irregular patterns in the data.

Following these assessments, I move forward by estimating the following equation:

$$y_i = \mathbf{Z}_i \boldsymbol{\beta}_Z + \tau A_i^{65} + \sum_{h=1}^{\bar{h}} \beta_h (A_i - 65)^h + \sum_{h=1}^{\bar{h}} \gamma_h A_i^{65} (A_i - A_i^{65})^h + \varepsilon_i, \quad (4.13)$$

where \mathbf{Z}_i is a vector of individual characteristics, A_i is age in years, A_i^{65} is an indicator for being at least 65 years of age, and \bar{h} represents the polynomial order (usually linear or quadratic). The key parameter of interest (τ) is the average treatment effect at the cutoff, which gives the difference in expected health outcome immediately to the right and to the left of 65 years of age. Specifically,

$$\tau = \lim_{A_i \rightarrow 65^+} \mathbb{E}(y_i | A_i, \mathbf{Z}_i) - \lim_{A_i \rightarrow 65^-} \mathbb{E}(y_i | A_i, \mathbf{Z}_i), \quad (4.14)$$

which can be interpreted as the causal effect of retirement on health.

Instead of fitting a global regression, I estimate separate polynomial functions on either side of the cutoff, using a weighted kernel to assign more weight to observations near the cutoff. Hence, I estimate

$$\mathbb{E}(y_i | A_i < 65, \mathbf{Z}_i) = \mathbf{Z}_i \boldsymbol{\beta}_Z + \sum_{h=1}^{\bar{h}} \beta_h (A_i - 65)^h, \quad (4.15)$$

to model the relationship to the left of the cutoff, and

$$\mathbb{E}(y_i | A_i \geq 65, \mathbf{Z}_i) = \mathbf{Z}_i \boldsymbol{\beta}_Z + \tau A_i^{65} + \sum_{h=1}^{\bar{h}} \beta_h (A_i - 65)^h, \quad (4.16)$$

to model the relationship to the right of the cutoff. The difference in predicted health at 65 years of age gives τ , which captures the estimated effect of retirement.

As local polynomial regression estimates suffer from finite-sample bias, particularly when using higher-order polynomials, I implement a bias-corrected estimator following the framework of [Calonico et al. \(2014\)](#). Specifically, I compute the bias-corrected estimator as

$$\hat{\tau}_{BC} = \hat{\tau} - \left\{ \frac{b^2}{2} [f''(65^+) - f''(65^-)] \right\}, \quad (4.17)$$

where b denotes the bandwidth (i.e., the range of values around the cutoff used to estimate the treatment effect) and $f(\cdot) = \mathbb{E}(y_i | A_i, \mathbf{Z}_i)$ represents the conditional expectation function. The second

derivative $f''(\cdot)$ captures the curvature or concavity/convexity of the health-age relationship, and the difference between $f''(65^+)$ and $f''(65^-)$ measures the discontinuity in the second derivative at the cutoff, which induces bias in local polynomial estimation. The bias correction adjusts for this discontinuity, improving the accuracy of the estimated treatment effect. Additionally, I employ robust standard errors to account for the bias correction's effect on variability. This approach strengthens inference reliability, mitigates overfitting, and provides more precise confidence intervals.

Table 4.10: Fuzzy RDD Effects of Retirement on Health

		SAH	HI-2	PMH	PASE
Main Model		0.3480*	0.0153	0.4873**	-41.672***
Gender	Female	0.2691	0.0189	0.3611	-33.723***
	Male	0.4404	0.0114	0.6335	-48.380**
Education	Less Than Post-Secondary	0.5104	0.0339	0.7064	-58.090**
	Post-Secondary	0.3157*	0.0140	0.4025**	-32.752***
Marital Status	Married	0.2787	0.0038	0.4773	-44.929***
	Not Married	0.3627**	0.0245	0.4747***	-34.675***

Notes: robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The fuzzy RDD estimates for my treatment variable, based on regressions (when $\bar{h} = 1$) in [Table 4.10](#) for both the full sample (main model) and sub-samples categorized by gender, education, and marital status. The main model indicate that retirement significantly improves mental health while reducing physical activity levels. The sub-group analysis provides evidence of heterogeneous effects, supporting the notion that men tend to experience greater reduction in physical activity from retirement compared to women. When stratifying by education, individuals with post-secondary education experience a significant increase in general and mental health, whereas those with lower education levels exhibit a notable decline in physical activity. Differences by marital status reveal that non-married individuals report higher general and mental health following retirement, while both married and non-married individuals experience a decline in physical activity. These findings suggest that while retirement is associated with improvements in some aspects of well-being, it also leads to a reduction in physical activity

4.7 Conclusion

This study contributes to the growing body of literature on the relationship between retirement and health by utilizing the rich data from the Canadian Longitudinal Study on Aging (CLSA). To rigorously address potential endogeneity, measurement error, and reverse causality, several robust methodological approaches were employed. The main models included a linear fixed effects (FE)

model, which controlled for time-invariant unobserved heterogeneity and provided insights into within-individual variations over time. A fixed effects ordered logistic regression was also applied to effectively analyze ordinal health outcomes, such as self-reported general and mental health measures, while accounting for unobserved individual-specific effects. Additionally, Generalized Estimating Equations (GEE) were utilized for continuous and skewed outcomes, employing a Gaussian distribution with a log link for bounded health indices (HI-1 and HI-2) and a Gamma distribution with a log link for the Physical Activity Scale for the Elderly (PASE), using an exchangeable correlation structure to capture within-subject correlations. As a robustness check, a fuzzy regression discontinuity design (FRDD) was implemented to estimate the local treatment effects around retirement age cutoffs, enhancing the causal interpretation of retirement's impact on health.

The results reveal that retirement tends to improve self-assessed general and mental health, highlighting the potential benefits of reduced work-related stress and increased opportunities for social engagement and personal well-being. However, these gains are accompanied by a decline in physical activity, as reflected in lower PASE scores, suggesting that retirement may reduce physical movement associated with occupational routines. The analysis further demonstrates that the health effects of retirement are heterogeneous, varying across retirement type, voluntariness, and sociodemographic factors. Notably, complete retirement exerts a stronger positive influence on health compared to partial retirement, but the transition from partial to complete retirement does not yield additional benefits. The voluntariness of retirement plays a critical role, with voluntary retirement leading to significant health improvements, while involuntary retirement shows no significant effects on general or mental health. Moreover, the health impacts of retirement evolve over time, with general health improving in the short run and mental health benefits becoming more pronounced in the long run. The heterogeneity analysis further indicates that factors such as gender, education, and pre-retirement occupation influence these health outcomes. The findings also emphasize the significance of social support and engagement in enhancing well-being across health dimensions, whereas household and regional factors exhibit minimal effects.

These findings carry important policy implications. They suggest that facilitating voluntary retirement through supportive policies and providing opportunities for social engagement post-retirement can enhance retirees' well-being. Moreover, addressing the observed decline in physical activity post-retirement through targeted programs could help mitigate potential health deterioration. Programs encouraging physical exercise among retirees and community engagement

initiatives could be instrumental in maintaining overall health and reducing the risk of age-related health deterioration.

Future research should build upon these findings by incorporating additional waves of CLSA data, allowing for the examination of long-term health trajectories following retirement. Further analysis could delve deeper into the roles of financial security, pre-retirement occupation, and health behaviors such as smoking, alcohol consumption, and exercise patterns, and how these factors interact with social support networks to shape retirement's health effects. Overall, this study underscores the multifaceted nature of retirement's impact on health and highlights the importance of considering individual, social, and economic factors. As Canada's population continues to age, these insights are essential for informing policies that promote healthy aging and enhance the quality of life for retirees.

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Appendix A for Chapter 4

Table A.4.1: Summary of the Literature on Health and Retirement

	Authors	Outcome(s)	Country	Data	Time Span	Id. Strategy	Effects				Heterogeneity
							HI	SAH	MH	PH	
1.	Abeliansky & Strulik (2023)	HI	10 Eur. Countries	SHARE	2004-2015	FE, FE-IV	+				G: + (F, M: LE, HE); O: + (F, M: BC, WC)
2.	Apouey et al. (2019)	SAH, MH, PH	Australia	HILDA	2001-2014	FE		+	+	+	G: + (F, M)
3.	Atalay & Barrett (2014)	SAH, MH, PH	Australia	NHSs	1995-2008	IV		0	+	+	G: + (F), 0 (M)
4.	Atalay et al. (2019)	MH	Australia	HILDA	2012-2016	FD-IV			-		G: 0 (F), - (M)
5.	Barschkett et al. (2022)	MH, PH	Germany	Administrative Data	2009-2018	DiD			-	-	(only women)
6.	Bauer & Eichenberger (2021)	SAH, PH	Switzerland	Swiss LFS	1991-2009	DiD		-		-	(only men)
7.	Behncke (2012)	SAH, MH, PH	UK	ELSA	2002-2007	IV, PSM		-	0	-	
8.	Belloni et al. (2016)	MH	10 Eur. Countries	SHARE	2004-2013	FE-IV			+		G: 0 (F), + (M); O: 0 (BC, WC)
9.	Bertoni & Brunello (2017)	MH	Japan	JPSS	2008-2013	IV			-		
10.	Bianchini & Borella (2016)	MH	10 Eur. Countries	SHARE	2004-2012	FE-IV			+		RD: +
11.	Binh Tran & Zikos (2019)	SAH, MH, PH	Australia	HILDA	2002-2015	FE-IV		+	+	+	G: + (F, M); RD: + (F: SAH, MH, PH), + (M: MH, PH)
12.	Blake & Garrouste (2019)	SAH, MH, PH	France	Health Barometer	2005	DiD		-	0	0	E: - (LE: SAH), 0 (HE: SAH), 0 (LE, HE: MH, PH)
13.	Bonsang & Klein (2012)	SAH	Germany	GSOEP	1995-2010	FE-IV		+			V: + (Y, N)
14.	Bonsang et al. (2012)	MH	USA	HRS	1998-2008	FE-IV			-		
15.	Butterworth et al. (2006)	MH	Australia	NSMHWB	1997	Other			+		G: 0 (F), + (M)
16.	Calvo et al. (2013)	SAH, MH	USA	HRS	1992-2010	FE-IV		+	+		
17.	Carmel & Tur-Sinai (2022)	MH	12 Eur. Countries	SHARE	2005-2011	Other			-		
18.	Carrino et al. (2020)	SAH, MH, PH	UK	Understanding Society	2009-2016	DiD		0	+	0	(only women) O: + (BC: SAH, MH, PH), 0 (WC: SAH, MH, PH)
19.	Celidoni et al. (2017)	MH	11 Eur. Countries	SHARE	2004-2010	IV			+		
20.	Che & Li (2018)	HI, SAH	China	CHNS	1991-2006	IV	+	+			(only men)
21.	Chen et al. (2024)	SAH, MH, PH	Japan	JSTAR	2007-2013	FE-IV		0	+	-	(only men)
22.	Chung et al. (2009)	PH	USA	HRS	1992-2002	FE-IV				-	O: - (BC), 0 (WC)
23.	Clouston & Denier (2017)	MH	USA	HRS	1998-2012	RDD			+		

	Authors	Outcome(s)	Country	Data	Time Span	Id. Strategy	Effects				Heterogeneity
							HI	SAH	MH	PH	
24.	Coe & Lindeboom (2008)	SAH, MH, PH	USA	HRS	1992-2004	IV		+	0	0	O: 0 (BC: SAH, MH, PH), + (WC: SAH), 0 (WC: MH, PH); RD: + (SR: SAH), 0 (SR: MH, PH), 0 (LR: SAH, MH, PH)
25.	Coe & Zamarro (2011)	HI, SAH, MH	11 Eur. Countries	SHARE	2004-2007	IV	+	+	0		(only men)
26.	Coe et al. (2012)	MH	USA	HRS	1996-2008	IV			+		(only men) O: + (BC), 0 (WC)
27.	Dave et al. (2008)	SAH, MH, PH	USA	HRS	1992-2005	FE-IV		-	-	-	O: - (BC: PH), 0 (BC: MH), - (WC: PH, MH); V: - (Y, N: PH); 0 (Y, N: SAH, MH)
28.	Dayaram & McGuire (2019)	MH, PH	Australia	HILDA	2003-2015	PSM			+	0	G: + (F: MH), 0 (F: PH), 0 (M: MH, PH)
29.	De Grip et al. (2012)	MH	Netherlands	Administrative Data	1997-2006	RDD			+		(only men)
30.	Drentea (2002)	MH	USA	ASOC, NSFH	1995; 1987-1988	Other			+		
31.	Eibich (2015)	SAH, MH, PH	Germany	GSOEP	2002-2009	RDD		+	+	+	G: 0 (F: SAH, MH), + (M: SAH, MH), + (F: PH), 0 (M: PH); E: 0 (LE: SAH, MH, PH), - (HE: SAH, PH), 0 (HE: MH); O: 0 (BC: SAH, MH), + (BC: PH), 0 (WC: SAH, MH, PH)
32.	Eyjólfssdóttir et al. (2019)	SAH, PH	Sweden	LISA, LNU, SWEOLD	2004-2014	PSM		0		0	
33.	Fé & Hollingsworth (2016)	SAH, MH, PH	UK	BHPS	1991-2005	RDD		0	0	0	
34.	Feng et al. (2020)	PH	China	CHARLS	2011-2015	RDD				-	G: 0 (F), - (M); E: 0 (LE, HE: F), - (LE: M), 0 (HE: M)
35.	Fleischmann et al. (2020)	MH	UK	Whitehall II Cohort Study	1985-2016	Other			+		
36.	Fonseca et al. (2014)	MH	13 Eur. Countries	SHARE	2004-2010	Other			0		
37.	Fonseca et al. (2024)	MH	USA	PSID	2007-2015	IV			+		G: + (F, M); O: + (BC), 0 (WC)
38.	Gill et al. (2006)	MH	Australia	HILDA	2002-2003	Other			0		(only men)
39.	Godard (2016)	PH	8 Eur. Countries	SHARE	2004-2011	FE-IV				-	G: 0 (F), - (M); O: 0 (BC: F), - (BC: M), 0 (WC: F, M)
40.	Gorry & Slavov (2021)	SAH, MH, PH	UK	ELSA	2002-2015	FE-IV		+	+	-	
41.	Gorry et al. (2018)	SAH, MH, PH	USA	HRS	1992-2014	FE-IV		+	+	+	
42.	Gosselin & Boller (2022)	MH	Canada	CLSA	2010-2015	PSM			-		
43.	Grøtting & Lillebø (2020)	PH	Norway	NORLAG	2002-2012	RDD				+	G: 0 (F), + (M); E: + (LE), 0 (HE); O: + (BC), 0 (WC)
44.	Hagani et al. (2024)	MH	Australia, USA China	HILDA, HRS CHARLS	2008-2019	Other			- +		V: + (Y), - (N)
45.	Han (2021)	SAH, MH	USA	HRS	1998-2016	Other		0	0		
46.	Heller-Sahlgren (2017)	MH	10 Eur. Countries	SHARE	2004-2012	FE-IV			0		G: 0 (F, M); E: 0 (LE, HE); O: 0 (BC, WC)

	Authors	Outcome(s)	Country	Data	Time Span	Id. Strategy	Effects				Heterogeneity
							HI	SAH	MH	PH	
47.	Hessel (2016)	SAH, PH	12 Eur. Countries	EU-SILC	2009-2012	FE-IV		+		+	E: + (LE, HE: F, M); G: + (F, M)
48.	Horner & Cullen (2016)	MH, PH	USA	Administrative Data	1997-2009	IV			0	0	
49.	Insler (2014)	HI	USA	HRS	1992-2010	FE-IV	+				
50.	Johnston & Lee (2009)	SAH, MH, PH	UK	HSE	1997-2005	RDD		+	+	0	(only men)
51.	Jokela et al. (2010)	MH, PH	UK	Whitehall II Cohort Study	1991-2006	Other			+	0	
52.	Kajitani et al. (2017)	MH	Japan	NSJE	1987-2002	FE-IV			0		(only men)
53.	Kämpfen & Maurer (2016)	PH	USA	HRS	2004-2010	FE-IV				+	G: + (F, M); E: 0 (LE, HE)
54.	Kesavayuth et al. (2018)	PH	10 Eur. Countries	SHARE	2004-2013	FE-IV				+	G: + (F, M); O: + (WC), 0 (BC)
55.	Kettlewell & Lam (2022)	MH	Australia	HILDA	2011-2018	FE-IV			+		G: + (F), 0 (M)
56.	Kim & Koh (2020)	SAH	Singapore	SLP	2015-2019	RDD		+			
57.	Kim & Moen (2002)	MH	USA	Cornell Retirement Study	1994-1999	Other			0		G: 0 (F, M)
58.	Kolodziej & García-Gómez (2019)	MH	11 Eur. Countries	SHARE	2004-2013	IV			+		G: + (F, M); O: + (BC, WC)
59.	Kuusi et al. (2020)	MH, PH	Finland	Statistics Finland	2000-2012	FE-IV			+	+	G; O: + (F, BC, WC: MH, PH), + (M, BC: MH), 0 (M, WC: MH), 0 (M, BC: PH), + (M, WC: PH)
60.	Lahdenperä et al. (2022)	MH	Finland	FIREA	2014-2019	Other			+		
61.	Latif (2011)	MH	Canada	CNPHS	1994-2006	FE-IV			+		G: + (F, M)
62.	Latif (2012)	SAH	Canada	CNPHS	1994-2006	FE-IV		0			G: 0 (F, M)
63.	Lei & Liu (2018)	MH	China	CHARLS	2011-2015	FE-IV			+		G: - (F), + (M); O: - (BC: F), 0 (WC: F), + (BC, WC: M)
64.	Leimer & Ewijk (2022)	SAH, MH, PH	10 Eur. Countries	SHARE	2004-2016	FE-IV		+	+	+	G: + (F, M: SAH, PH), + (F: MH), 0 (M: MH); O: + (BC, WC: SAH, PH), 0 (BC: MH), + (WC: MH)
65.	Li & Nowrouzi-Kia (2024)	MH, PH	Canada	CDHS	2021	Other			+	-	
66.	Mandal & Roe (2007)	MH	USA	HRS	1992-2002	IV			+		G: + (F, M); V: + (Y, N)
67.	Mazzonna & Peracchi (2012)	MH	11 Eur. Countries	SHARE	2004-2006	IV			-		G: - (F, M)
68.	Mazzonna & Peracchi (2017)	MH, HI	10 Eur. Countries	SHARE	2004-2006	FD-IV	0		0		G: 0 (F, M); O: + (BC), 0 (WC)
69.	Mein et al. (2003)	MH, PH	UK	Whitehall II Cohort Study	1991-1995	Other			+	0	G: + (F, M: MH), 0 (F, M: PH)
70.	Messe & Wolff (2019a)	SAH, PH	France	INSEE	2012	IV		0		0	G: 0 (F, M)
71.	Messe & Wolff (2019b)	SAH, PH	France	LFS	2013-2016	DiD		+		+	G: + (F, M: SAH), 0 (F: PH), + (M: PH); O: 0 (BC: SAH), + (WC: SAH), 0 (BC, WC: PH)
72.	Mizuochi (2024)	MH, PH	Japan	LSMOA	2005-2019	FE-IV			+	0	G: 0 (F: MH), + (M: MH), 0 (F, M: PH); O: + (BC, WC: MH), 0 (BC: PH), + (WC: PH)

	Authors	Outcome(s)	Country	Data	Time Span	Id. Strategy	Effects				Heterogeneity
							HI	SAH	MH	PH	
73.	Mojon-Azzi et al. (2007)	SAH, MH, PH	Switzerland	SHP	1999-2003	Other		+	+	+	
74.	Mosca & Barrett (2016)	MH	Ireland	TILDA	2009-2013	PSM			-		V: 0 (Y), - (N)
75.	Mountian & Diaz (2020)	HI, SAH, MH, PH	Brazil	SABE	2000-2010	FE-IV	+	0	0	+	G: 0 (F: HI), + (M: HI), 0 (F, M: SAH, MH), 0 (F: PH), + (M: PH)
76.	Müller & Shaikh (2018)	SAH, PH	19 Eur. Countries	SHARE	2004-2013	RDD		+		+	
77.	Neuman (2008)	SAH, MH, PH	USA	HRS	1992-2004	IV		+	0	0	G: + (F, M: SAH), 0 (F, M: MH, PH)
78.	Nielsen (2019)	PH	Denmark	Administrative Data	1980-2010	IV, RDD				+	G: + (F, M)
79.	Oksanen et al. (2011)	MH	Finland	National Records	1995-2004	Other			+		
80.	Oshio & Kan (2017)	SAH, MH	Japan	PSMOA	2005-2014	FE-IV		+	+		G: 0 (F: SAH), + (M: SAH), + (F, M: MH)
81.	Picchio & van Ours (2020)	MH	Netherlands	LISS	2007-2018	RDD			+		G: 0 (F), + (M)
82.	Rhee et al. (2016)	SAH, MH	USA	HRS, RAND	2006-2010	Other		0	0		V: 0 (Y, N)
83.	Rijs et al. (2012)	SAH	Netherlands	LASA	1992-2006	Other		+			
84.	Roberts et al. (2011)	MH	UK	Whitehall II Cohort Study	1985-1988	Other			0		
85.	Rohwedder & Willis (2010)	MH	13 Eur. Countries, USA	ELSA, HRS, SHARE	2004	IV			-		
86.	Rose (2020)	SAH, MH, PH	UK	ELSA, BHPS, HSE	1990-2013	FE-IV, RDD		+	0	0	G: + (F, M: SAH), 0 (F, M: MH, PH)
87.	Schmitz & Westphal (2021)	MH	22 Eur. Countries, USA	ELSA, HRS, SHARE	1995-2020	Other			-		G: - (F, M)
88.	Shiba et al. (2017)	MH	Japan	JAGES	2010-2013	FD			-		G: - (F, M)
89.	Syse et al. (2017)	MH, PH	Norway	NORLAG	2002-2007	Other			+	0	
90.	Wang et al. (2024)	SAH, MH, PH	China	CHARLS	2011-2018	RDD		0	0	0	G: 0 (F, M); E: 0 (LE, HE)
91.	Westerlund et al. (2009)	SAH	France	GAZEL	1990-2006	Other		+			G: + (F, M); O: + (BC, WC)
92.	Yu et al. (2023)	PH	China	SPHED	2017-2020	RDD				+	G: + (F, M)
93.	Yuan et al. (2023)	PH	China	CFPS	2018	IV, RDD				-	G: - (F), 0 (M)
94.	Zhu (2016)	HI, SAH, MH, PH	Australia	HILDA	2001-2011	FE-IV	+	+	+	+	(only women)

Id. (Identification) Strategy: **DiD** = Difference-in-Differences; **FE** = Fixed Effects; **FD** = First Difference; **IV** = Instrumental Variables; **PSM** = Propensity Score Matching; **RDD** = Regression Discontinuity Design; **Other** = Ordinary Least Squares, Duration Model, Logit, Multinomial Logit, Ordered Probit, Ordinal Logit, Structural Equation Modeling.

Outcome: **HI** = health index; **SAH** = self-assessed/general health; **MH** = mental health; **PH** = physical health.

Heterogeneity: **G** = gender (**F** = females; **M** = males); **E** = education (**LE** = low education, **HE** = high education); **O** = occupation (**BC** = blue collar, **WC** = white collar); **RD** = retirement duration (in years; **SR** = short-run, **LR** = long-run); **V** = voluntariness (**Y** = voluntary; **N** = involuntary).

Appendix B for Chapter 4

Table B.4.1: Descriptions of Variables

Variable	Description
Outcome Variables	
General health	<p>Five measures</p> <ul style="list-style-type: none"> • Self-rated general health (SAH): ordinal variable ranging from 1 (poor) to 5 (excellent) • Self-rated healthy aging (SAHA): ordinal variable ranging from 1 (poor) to 5 (excellent) • Index 1 (HI-1): continuous variable (0 to 1), computed as the average of normalized predictions of categorical self-rated general health and binary heart problems (heart attack, coronary heart disease, angina, or congestive heart failure), high blood pressure or hypertension, stroke or transient ischemic attack, diabetes or high blood sugar, chronic lung disease (aside from asthma), arthritis or rheumatism, cancer (aside from benign skin cancer), psychological problems (emotional, nervous, or psychiatric problems), obesity (body mass index in excess of 30) • Index 2 (HI-2): same as HI-1 with 3 additional health characteristics (an overall classification of a respondent's capacity to perform basic and instrumental activities of daily living on a 5-point scale, with 1 representing no functional impairment and 5 total functional impairment, an indicator for positive depression based on a CES-SD score of 10 or higher, an indicator for spending a night at a hospital over the previous 12 months) • Index 3 (HI-3): continuous variable (0 to 1), computed as the normalized weighted prediction (by ordered probit) of self-rated general health as a function of the binary health characteristics included in Index 1, an ordinal measure of functional impairment, an indicator for depression, the PASE score, an indicator for hospitalization over the previous 12 months
Mental health	<p>Three measures</p> <ul style="list-style-type: none"> • Perceived mental health (PMH): ordinal variable ranging from 1 (poor) to 5 (excellent) • Center for Epidemiological Studies Short Depression Scale (CES-SD): sum of scores across 10 questions assessing symptom frequencies over the previous week on a 0 to 3 scale <ul style="list-style-type: none"> – Classification: 0–4 (minimal symptoms), 5–9 (mild), 10–14 (moderate), 15+ (severe) – Positive depression result: indicator if score is 10 or higher • Kessler Psychological Distress Scale (K-10): sum of scores across 10 questions assessing how often individuals experience various symptoms of distress over the previous 4 weeks on a 5-point Likert scale, ranging from 1 (never) to 5 (always) (only available in the COM dataset) <ul style="list-style-type: none"> – Questions: about how often one felt (1) tired out for no good reason, (2) nervous, (3) so nervous that nothing could calm them down, (4) hopeless, (5) restless or fidgety, (6) so restless that they could not sit still, (7) depressed, (8) that everything was an effort, (9) so sad that nothing could cheer them up, (10) worthless – Classification: 10–19 (low distress), 20–24 (mild distress), 25–29 (moderate distress), 30–50 (severe distress)
Physical health	<p>Four measures</p> <ul style="list-style-type: none"> • Physical Activity Scale for the Elderly (PASE): sum of the amounts of time spent in each of 12 activities over past week multiplied by the corresponding activity weights <ul style="list-style-type: none"> – Activities: (1) walking outside; (2/3/4) light, moderate, or strenuous sport or recreational activities; (5) muscle strength or endurance exercises; (6/7) light or heavy housework; (8) home repairs; (9) lawn work or yard care; (10) outdoor gardening; (11) caring for another person; (12) work for pay or as a volunteer – Weights corresponding to above activities: (1) 20; (2) 21; (3) 23; (4) 23; (5) 30; (6) 25; (7) 25; (8) 30; (9) 36; (10) 20; (11) 35; (12) 21 • Older Americans' Resources and Services Scale (OARS): classification of a respondent's ability to perform activities of daily living based on the 5-point scale, ranging from 1 (no functional impairment) to 5 (total impairment) <ul style="list-style-type: none"> – Activities of daily living (ADLs) include bathing, dressing, personal hygiene, toileting, feeding, ambulating, continence – Instrumental activities of daily living (IADLs) include meal preparation, housekeeping, laundry, managing finances, managing medications, shopping, transportation and communication management • Body Mass Index (BMI): ratio of weight in kg to the squared value of height in m • Life-Space Index (LSI): sum of scores across 5 life spaces (home, outside home, neighborhood, town/city, beyond town/city, where score per space = value of space times frequency value times adjustment value <ul style="list-style-type: none"> – Values of life spaces: 1 for home; 2 for outside home; 3 for neighborhood, 4 for town, 5 for beyond town – Values for travel frequency: 1 for less than weekly, 2 for a few times per week, 3 for daily – Values for assistance adjustment: 1 for no assistance, 0.5 for usage of equipment (e.g., cane, wheelchair), 0 for needing personal help

Variable	Description
Explanatory Variables	
Retirement	Two measures <ul style="list-style-type: none"> • Subjective measure: two indicators for completely retired and partially retired • Objective measure (derived): one indicator for completely retired
Reasons for retirement	Binary indicators for reasons for retiring: (1) agreement with spouse/partner; (2) health/disability/stress; (3) organizational restructuring; (4) completion of required years to qualify for pension; (5) financially feasible; (6) employer offered special incentives; (7) caring for a family member or friend; (8) mandatory retirement policy; (9) desire to pursue hobbies/activities of personal interest; (10) desire to stop working
Age	Age in years
Education	Indicators: less than secondary (reference indicator); secondary; some post-secondary; post-secondary
Gender	Indicator: female = 1; 0 otherwise
Immigrant status	Indicator: immigrant = 1; 0 otherwise
Individual income	Individual income level in dollars
Marital status	Indicators: married or common law (reference indicator); widow or widower; divorced or separated; single
Race	Indicator: white = 1; 0 otherwise
Retirement status of spouse	Binary indicator for retirement of spouse/partner
Dwelling ownership	Indicator: owner = 1; 0 otherwise
Geographic location	Indicator: urban = 1; 0 otherwise
Household income	Household income level in dollars
Household size	Number of household members
Province	Indicators: 12 provinces; 11 indicators, with Ontario as the reference province
Social engagement	Frequency in any of 8 activities over past 12 months <ul style="list-style-type: none"> • Frequency scores between 0 = no participation; 1 = yearly participation; 2 = monthly participation; 3 = weekly participation; 4 = daily participation • Activities: (1) religious activities; (2) clubs or fraternal organization activities; (3) educational or cultural activities; (4) association activities; (5) other recreational activities; (6) family/friendship activities outside of household; (7) sports or physical activities with others; (8) volunteer or charity work
Social support	Average of responses over the 19 items in the MOS (Medical Outcomes Study) survey covering four aspects of social support: (1) affection (involving expressions of love and affection); (2) emotional or informational support (the expression of positive affect, empathetic understanding, and the encouragement of expressions of feelings, or the offering of advice, information, guidance or feedback); (3) positive social interaction (the availability of other persons to positively interact with); (4) tangible social support (the provision of material aid or behavioral assistance)

Table B.4.2: Weighted Summary Statistics of Predictors at Recruitment (Wave One)

Variable	Obs	Mean/ Proportion	Std. Dev.	Min	Max
<u>Individual Socio-Economic and Demographic Factors</u>					
Age	51,134	59.80	10.23	44	89
Education	51,003			1	4
Less Than Secondary		18.68%	0.39		
Secondary		12.71%	0.33		
Some Post Secondary		8.86%	0.28		
Post Secondary		59.75%	0.49		
Female	51,134	52.04%	0.50	0	1
Immigrant	51,117	14.09%	0.35	0	1
Marital Status	51,121			1	4
Married/Common-Law		75.22%	0.43		
Widow		6.93%	0.25		
Divorced/Separated		10.30%	0.30		
Single		7.55%	0.26		
Personal Income	48,734			1	5
< \$20,000		20.69%	0.41		
\$20,000 - \$49,999		38.21%	0.49		
\$50,000 - \$99,999		30.09%	0.46		
\$100,000 - \$149,999		7.26%	0.26		
\$150,000+		3.75%	0.19		
White	51,134	95.81%	0.20	0	1
<u>Household Contextual Characteristics</u>					
Household Income	47,852			1	5
< \$20,000		6.62%	0.25		
\$20,000 - \$49,999		24.80%	0.43		
\$50,000 - \$99,999		34.78%	0.48		
\$100,000 - \$149,999		18.75%	0.39		
\$150,000+		15.04%	0.36		
Household Size (excluding participant)	51,098	1.45	1.16	0	9
Own Dwelling	50,647	85.09%	0.36	0	1
Urban	51,134	80.67%	0.39	0	1
<u>Retirement Information</u>					
Objective Retirement Status	50,521			0	1
Not Retired		65.54%	0.48		
Completely Retired		34.46%	0.48		
Subjective Retirement Status	51,134			0	2
Retirement Voluntary (based on reasons)		53.51%	0.50		
Retirement Status of Spouse/Partner		9.50%	0.29		
Retirement Status of Spouse/Partner		36.98%	0.48		
Retirement Voluntary (based on reasons)	51,134	60.38%	0.49	0	1
Retirement Status of Spouse/Partner	34,997	36.50%	0.48	0	1
<u>Reasons for Retirement</u>					
An agreement with spouse/partner contributed to	51,129	9.72%	0.30	0	1
Health/disability/stress contributed to retirement	51,129	12.90%	0.34	0	1
Organizational restructuring contributed to retirement	51,129	6.60%	0.25	0	1
Completed the required years of service to qualify for	51,129	13.04%	0.34	0	1
Retirement was financially possible	51,129	19.24%	0.39	0	1
Employer offered special incentives to retirement	51,129	4.53%	0.21	0	1
Providing care to a family member or friend	51,129	4.38%	0.20	0	1
Employer had a mandatory retirement policy	51,129	1.28%	0.11	0	1
Wished to pursue hobbies/activities of personal interest	51,129	11.47%	0.32	0	1

Variable	Obs	Mean/ Proportion	Std. Dev.	Min	Max
Wanted to stop working	51,129	18.66%	0.39	0	1
Participant never worked/Not applicable	29,569	0.60%	0.08	0	1
<u>Province Information</u>					
Province	51,134			1	10
		9.86%	0.30		
		17.27%	0.38		
		8.99%	0.29		
		2.63%	0.16		
		6.72%	0.25		
		9.06%	0.29		
		21.76%	0.41		
		2.23%	0.15		
		18.78%	0.39		
		2.71%	0.16		
<u>Social Connections</u>					
Social Engagement	51,084			0	4
Never		0.50%	0.07		
Yearly		2.52%	0.16		
Monthly		15.04%	0.36		
Weekly		65.59%	0.48		
Daily		16.35%	0.37		
Social Support	49,451	82.53	17.33	0	100

Appendix C for Chapter 4

Table C.4.1: FE Linear Regression Estimates

	General Health				Mental Health		Physical Health	
	(1) SAH	(2) SAHA	(3) HI-1	(4) HI-2	(5) PMH	(6) CES-SD	(7) PASE	(8) OARS
Retirement	0.0403**	0.0632***	0.0018	0.0032**	0.0479***	-0.0469**	-15.5544***	0.0308***
	(0.0168)	(0.0176)	(0.0016)	(0.0013)	(0.0174)	(0.0202)	(1.4640)	(0.0056)
Age	0.0368***	0.0359***	0.0051***	0.0056***	-0.0210**	-0.0468***	-0.4828	0.0540***
	(0.0081)	(0.0088)	(0.0007)	(0.0006)	(0.0090)	(0.0089)	(0.7756)	(0.0037)
Age squared	-0.0005***	-0.0004***	-0.0001***	-0.0001***	-0.0000	0.0003***	-0.0117**	-0.0005***
	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0057)	(0.0000)
Marital status	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Widow	-0.0443	-0.1266**	-0.0106*	-0.0125***	-0.1718**	0.0499	-12.4458**	-0.0111
	(0.0641)	(0.0578)	(0.0058)	(0.0048)	(0.0674)	(0.0626)	(5.0563)	(0.0252)
Divorced/separated	-0.0554	-0.0860	-0.0076	-0.0093**	-0.1283*	-0.0555	3.7901	-0.0133
	(0.0630)	(0.0535)	(0.0054)	(0.0044)	(0.0668)	(0.0558)	(5.4253)	(0.0172)
Single	-0.0552	-0.0042	-0.0127**	-0.0122**	-0.0537	-0.0819	3.1190	-0.0100
	(0.0691)	(0.0732)	(0.0060)	(0.0048)	(0.0758)	(0.0658)	(5.8720)	(0.0217)
Household income								
\$20,000 to \$49,999	-0.0636*	-0.0332	-0.0028	-0.0027	0.0172	-0.0521	4.1284	-0.0176
	(0.0376)	(0.0420)	(0.0032)	(0.0031)	(0.0476)	(0.0506)	(3.2201)	(0.0202)
\$50,000 to \$99,999	-0.0453	-0.0127	-0.0004	0.0005	0.0767	-0.0819	3.9499	-0.0027
	(0.0396)	(0.0430)	(0.0033)	(0.0032)	(0.0497)	(0.0546)	(3.5159)	(0.0201)
\$100,000 to \$149,999	-0.0492	-0.0153	-0.0013	0.0002	0.0820	-0.0954*	4.3720	0.0053
	(0.0418)	(0.0451)	(0.0034)	(0.0034)	(0.0511)	(0.0561)	(3.8294)	(0.0206)
\$150,000+	-0.0670	-0.0309	-0.0014	0.0012	0.1048**	-0.1185**	5.7088	0.0045
	(0.0440)	(0.0471)	(0.0036)	(0.0035)	(0.0531)	(0.0580)	(4.0088)	(0.0209)
Household size	-0.0029	-0.0218***	-0.0010	-0.0009*	-0.0074	-0.0011	0.5502	0.0024
	(0.0072)	(0.0070)	(0.0006)	(0.0006)	(0.0070)	(0.0074)	(0.7086)	(0.0022)
Own dwelling	-0.0371	0.0221	-0.0026	-0.0022	-0.0056	0.0218	6.1512**	0.0102
	(0.0263)	(0.0289)	(0.0024)	(0.0021)	(0.0301)	(0.0304)	(2.4330)	(0.0117)
Urban	0.0120	0.0158	0.0016	0.0010	-0.0294	0.0223	-3.3678*	0.0049
	(0.0189)	(0.0200)	(0.0016)	(0.0016)	(0.0203)	(0.0218)	(1.8932)	(0.0075)
Retirement of spouse	0.0238	0.0178	0.0020	0.0013	0.0138	0.0105	-4.1769***	0.0083
	(0.0148)	(0.0154)	(0.0012)	(0.0011)	(0.0161)	(0.0155)	(1.4391)	(0.0051)
Social support	0.0012***	0.0027***	0.0001***	0.0002***	0.0045***	-0.0090***	-0.0114	0.0005**
	(0.0004)	(0.0004)	(0.0000)	(0.0000)	(0.0005)	(0.0005)	(0.0386)	(0.0002)
Social engagement								
Yearly	0.0971	0.0553	0.0094	0.0122*	0.0305	-0.0202	2.9798	0.1207***
	(0.0650)	(0.0707)	(0.0073)	(0.0063)	(0.0776)	(0.0817)	(5.6262)	(0.0351)
Monthly	0.1028*	0.0442	0.0120*	0.0144**	0.0174	0.0312	3.8340	0.1321***
	(0.0618)	(0.0680)	(0.0070)	(0.0060)	(0.0737)	(0.0803)	(5.2422)	(0.0340)
Weekly	0.1436**	0.0743	0.0147**	0.0172***	0.0624	-0.0099	6.2143	0.1307***
	(0.0613)	(0.0671)	(0.0069)	(0.0059)	(0.0736)	(0.0803)	(5.1817)	(0.0339)
Daily	0.1651***	0.0893	0.0162**	0.0172***	0.0894	-0.0240	8.8246*	0.1253***
	(0.0626)	(0.0681)	(0.0070)	(0.0060)	(0.0749)	(0.0812)	(5.2611)	(0.0341)
Province								
AB	-0.0371	0.0980	-0.0000	-0.0013	-0.0888	0.0877	6.7906	-0.0393*
	(0.0909)	(0.0987)	(0.0070)	(0.0063)	(0.0943)	(0.0917)	(12.1734)	(0.0208)
BC	-0.0909	-0.0017	0.0017	-0.0014	-0.0973	0.1234	24.8291**	-0.0268
	(0.0970)	(0.0933)	(0.0065)	(0.0051)	(0.0896)	(0.0805)	(11.1405)	(0.0177)
MB	-0.0182	-0.0502	0.0031	-0.0025	-0.1855	0.2284*	30.7400	-0.0159
	(0.0982)	(0.1285)	(0.0066)	(0.0050)	(0.1588)	(0.1292)	(24.3863)	(0.0257)

	General Health				Mental Health		Physical Health	
	(1) SAH	(2) SAHA	(3) HI-1	(4) HI-2	(5) PMH	(6) CES-SD	(7) PASE	(8) OARS
NB	0.3383*** (0.1034)	0.0364 (0.1932)	0.0198** (0.0095)	0.0182** (0.0086)	0.0839 (0.2204)	0.0060 (0.1184)	16.5764 (14.5621)	-0.0037 (0.0372)
NL	-0.0654 (0.1349)	-0.0283 (0.1207)	0.0017 (0.0099)	0.0084 (0.0076)	-0.3105 (0.1957)	0.1202 (0.1350)	3.0236 (19.4124)	-0.0210 (0.0161)
NS	-0.0690 (0.1173)	0.0593 (0.0952)	-0.0006 (0.0086)	0.0035 (0.0078)	-0.1325 (0.1294)	0.1975* (0.1023)	20.4845 (13.3697)	0.0079 (0.0197)
PE	0.0536 (0.1718)	0.2468 (0.1576)	0.0085 (0.0123)	0.0154 (0.0124)	-0.1860 (0.1996)	0.1375 (0.1906)	23.2738* (13.5780)	0.0337 (0.0750)
QC	0.2406 (0.1603)	0.2049* (0.1165)	0.0104 (0.0101)	0.0079 (0.0081)	-0.0403 (0.1230)	0.1351 (0.1515)	9.1701 (10.8123)	-0.0038 (0.0363)
SK	-0.1659 (0.1998)	-0.1094 (0.1894)	0.0010 (0.0113)	-0.0100 (0.0090)	-0.1914 (0.1690)	0.1198 (0.1145)	13.0486 (16.2437)	-0.0529* (0.0272)
Observations (<i>n</i>)	96,923	96,847	96,371	96,242	96,927	96,364	93,755	95,837
Groups (<i>n_g</i>)	42,119	42,107	42,091	42,014	42,120	42,065	39,991	42,052

Notes: robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C.4.2: FE Ordered Logistic and GEE Regression Estimates

	General Health				Mental Health		Physical Health	
	(1) SAH	(2) SAHA	(3) HI-1	(4) HI-2	(5) PMH	(6) CES-SD	(7) PASE	(8) OARS
Retirement	1.1512**	1.2491***	1.0056***	1.0056***	1.1732***	0.8084**	0.8397***	1.4531***
	(0.0720)	(0.0772)	(0.0017)	(0.0014)	(0.0724)	(0.0674)	(0.0054)	(0.2095)
Age	1.1205***	1.1307***	0.9992	1.0010*	0.9377**	0.8303***	1.0246***	1.4299***
	(0.0328)	(0.0334)	(0.0007)	(0.0006)	(0.0280)	(0.0278)	(0.0032)	(0.0942)
Age squared	0.9984**	0.9988**	1.0000**	1.0000**	0.9998	1.0013***	0.9997***	0.9959***
	(0.0002)	(0.0002)	(0.0000)	(0.0000)	(0.0002)	(0.0003)	(0.0000)	(0.0005)
Female			1.0077***	0.9988			0.8526***	
			(0.0018)	(0.0014)			(0.0048)	
Marital status								
Widow	0.8607	0.6270**	1.0023	1.0020	0.5775**	1.0724	1.0056	0.9300
	(0.2068)	(0.1261)	(0.0059)	(0.0048)	(0.1261)	(0.2597)	(0.0264)	(0.4222)
Divorced/separated	0.8311	0.7206*	0.9997	1.0008	0.6424**	0.8243	1.0513*	0.7285
	(0.1964)	(0.1359)	(0.0055)	(0.0045)	(0.1418)	(0.1980)	(0.0273)	(0.3448)
Single	0.8494	0.9524	0.9912	0.9939	0.8111	0.7330	0.9991	0.8637
	(0.2162)	(0.2249)	(0.0059)	(0.0047)	(0.1895)	(0.1895)	(0.0278)	(0.4748)
White			1.0227**	1.0089**			1.0265*	
			(0.0051)	(0.0042)			(0.0161)	
Immigrant			1.0122***	1.0085***			0.9892	
			(0.0026)	(0.0021)			(0.0076)	
Education								
Secondary			1.0486***	1.0446***			1.0167	
			(0.0052)	(0.0042)			(0.0143)	
Some post-secondary			1.0489***	1.0422***			1.0213	
			(0.0055)	(0.0044)			(0.0155)	
Post-secondary			1.0652***	1.0559***			1.0064	
			(0.0049)	(0.0039)			(0.0130)	
Household income								
\$20,000 to \$49,999	0.8377	0.8941	1.0161***	1.0144***	1.0420	0.9120	1.1057***	0.8305
	(0.1012)	(0.1098)	(0.0040)	(0.0038)	(0.1313)	(0.1176)	(0.0180)	(0.1693)
\$50,000 to \$99,999	0.8900	0.9601	1.0259***	1.0232***	1.2738*	0.8412	1.1289***	1.0109
	(0.1148)	(0.1232)	(0.0041)	(0.0038)	(0.1744)	(0.1176)	(0.0186)	(0.2263)
\$100,000 to \$149,999	0.8715	0.9472	1.0304***	1.0271***	1.2869*	0.7951	1.1358***	1.3155
	(0.1201)	(0.1289)	(0.0042)	(0.0039)	(0.1843)	(0.1183)	(0.0198)	(0.3324)
\$150,000+	0.8165	0.8981	1.0357***	1.0322***	1.3905**	0.7018**	1.1096***	1.2978
	(0.1195)	(0.1286)	(0.0044)	(0.0040)	(0.2092)	(0.1135)	(0.0196)	(0.3596)
Household size	0.9942	0.9264***	0.9985**	0.9985**	0.9794	1.0009	1.0163***	1.0379
	(0.0257)	(0.0223)	(0.0006)	(0.0005)	(0.0237)	(0.0293)	(0.0034)	(0.0619)
Own dwelling	0.8572*	1.0668	1.0204***	1.0161***	0.9423	1.1165	1.1314***	0.8935
	(0.0775)	(0.0919)	(0.0025)	(0.0021)	(0.0849)	(0.1170)	(0.0107)	(0.1477)
Urban	1.0412	1.0525	0.9968**	0.9947***	0.9038	1.1102	0.9529***	1.1864
	(0.0728)	(0.0720)	(0.0016)	(0.0014)	(0.0641)	(0.0912)	(0.0064)	(0.2127)
Retirement of spouse	1.0901	1.0635	1.0031**	1.0018	1.0539	1.0009	0.9782***	0.9822
	(0.0612)	(0.0569)	(0.0014)	(0.0012)	(0.0594)	(0.0685)	(0.0063)	(0.1313)
Social support	1.0042***	1.0090***	1.0004***	1.0005***	1.0138***	0.9709***	1.0009***	1.0081***
	(0.0015)	(0.0014)	(0.0000)	(0.0000)	(0.0015)	(0.0017)	(0.0002)	(0.0031)
Social engagement								
Yearly	1.2735	1.1763	1.0252**	1.0260***	1.0336	0.9033	1.1184***	2.5003***
	(0.2641)	(0.2585)	(0.0101)	(0.0086)	(0.2256)	(0.2223)	(0.0455)	(0.8247)
Monthly	1.2664	1.1270	1.0389***	1.0369***	0.9846	1.0693	1.1884***	2.3682***
	(0.2427)	(0.2366)	(0.0098)	(0.0083)	(0.2018)	(0.2533)	(0.0460)	(0.7095)
Weekly	1.4510*	1.2432	1.0523***	1.0492***	1.1364	0.9311	1.2402***	2.3104***
	(0.2760)	(0.2585)	(0.0099)	(0.0083)	(0.2315)	(0.2202)	(0.0476)	(0.6910)

	General Health				Mental Health		Physical Health		
	(1) SAH	(2) SAHA	(3) HI-1	(4) HI-2	(5) PMH	(6) CES-SD	(7) PASE	(8) OARS	
Province	Daily	1.5638** (0.3051)	1.3179 (0.2787)	1.0578*** (0.0100)	1.0526*** (0.0084)	1.2477 (0.2610)	0.8631 (0.2110)	1.3225*** (0.0511)	1.9122** (0.5953)
	AB	0.8648 (0.3075)	1.3552 (0.4593)	0.9995 (0.0035)	0.9973 (0.0028)	0.6936 (0.2550)	1.4902 (0.6202)	0.9963 (0.0110)	0.1188*** (0.0972)
	BC	0.7397 (0.2520)	0.9697 (0.3002)	1.0042 (0.0027)	0.9995 (0.0021)	0.6621 (0.2201)	1.8408 (0.7071)	1.0157* (0.0088)	0.1660*** (0.1110)
	MB	1.0874 (0.5190)	0.7707 (0.3898)	0.9983 (0.0035)	1.0001 (0.0027)	0.4840 (0.2336)	3.1980** (1.8154)	1.0101 (0.0116)	0.4511 (0.4492)
	NB	3.9542*** (1.7713)	1.0777 (0.5624)	0.9873* (0.0067)	0.9926 (0.0055)	1.3291 (1.0064)	0.6332 (0.4922)	0.9849 (0.0176)	0.7579 (0.5703)
	NL	0.7199 (0.3535)	0.8543 (0.4123)	0.9901** (0.0041)	0.9980 (0.0032)	0.3451* (0.2067)	1.6185 (0.7174)	0.9926 (0.0124)	0.2282 (0.2545)
	NS	0.7147 (0.3076)	1.2443 (0.4965)	0.9994 (0.0032)	1.0017 (0.0025)	0.5495 (0.2394)	2.8757** (1.2577)	0.9990 (0.0104)	1.1388 (0.7613)
	PE	1.1557 (0.7053)	2.4657 (1.4208)	1.0026 (0.0056)	1.0130*** (0.0043)	0.5117 (0.2779)	1.0600 (0.7954)	1.0361* (0.0213)	1.6833 (1.8812)
	QC	2.0096 (1.0405)	2.1229* (0.8731)	1.0092*** (0.0028)	1.0060*** (0.0021)	0.8497 (0.3661)	1.7215 (1.1577)	0.9778*** (0.0084)	2.2896 (1.7932)
	SK	0.6251 (0.3845)	0.6824 (0.4349)	1.0028 (0.0054)	1.0030 (0.0042)	0.4894 (0.2809)	1.7946 (1.0368)	1.0240 (0.0192)	0.0132*** (0.0176)
	Observations (<i>n</i>)	53,284	56,082	96,159	96,030	55,258	39,838	93,552	11,605
Groups (<i>n_g</i>)	19,405	20,422	41,987	41,910	20,127	14,676	39,893	4,365	

Notes: FE ordered logistic regression applies to (1), (2), (5), (6), and (8); GEE regression applies to (3), (4), and (7); robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C.4.3: FE Linear Regression Estimates by Data Collection Methodology

	TRM (Phone)				COM (In-Home)			
	(1) SAH	(2) HI-2	(3) PMH	(4) PASE	(5) SAH	(6) HI-2	(7) PMH	(8) PASE
Retirement	0.0127	0.0041**	0.0299	-16.1108***	0.0607***	0.0041**	0.0658***	-14.9952***
	(0.0319)	(0.0016)	(0.0272)	(2.5655)	(0.0195)	(0.0016)	(0.0223)	(1.7958)
Age	0.0270**	0.0060***	-0.0232*	-1.9808	0.0458***	0.0060***	-0.0182	0.7282
	(0.0126)	(0.0009)	(0.0133)	(1.2071)	(0.0107)	(0.0009)	(0.0120)	(1.0196)
Age squared	-0.0004***	-0.0001***	-0.0000	0.0020	-0.0006***	-0.0001***	-0.0001	-0.0230***
	(0.0001)	(0.0000)	(0.0001)	(0.0089)	(0.0001)	(0.0000)	(0.0001)	(0.0075)
Marital status								
Widow	-0.1024	-0.0141**	-0.2882**	-7.7453	-0.0279	-0.0141**	-0.1208	-13.3846**
	(0.1042)	(0.0056)	(0.1289)	(12.5258)	(0.0762)	(0.0056)	(0.0756)	(5.3768)
Divorced/separated	-0.1297	-0.0108**	-0.2490**	10.4031	-0.0327	-0.0108**	-0.0901	1.6879
	(0.1022)	(0.0054)	(0.1237)	(12.8208)	(0.0752)	(0.0054)	(0.0796)	(6.0824)
Single	-0.1964*	-0.0082	-0.1583	21.0552	0.0116	-0.0082	-0.0286	-5.4115
	(0.1188)	(0.0056)	(0.1442)	(13.3203)	(0.0798)	(0.0056)	(0.0867)	(6.6183)
Household income								
\$20,000 to \$49,999	-0.1017	-0.0015	0.1464*	3.4245	-0.0527	-0.0015	-0.0415	3.3795
	(0.0626)	(0.0037)	(0.0879)	(5.4230)	(0.0467)	(0.0037)	(0.0544)	(3.9052)
\$50,000 to \$99,999	-0.1300**	0.0033	0.1623*	2.3987	-0.0040	0.0033	0.0516	3.8043
	(0.0655)	(0.0038)	(0.0885)	(5.7437)	(0.0490)	(0.0038)	(0.0576)	(4.3482)
\$100,000 to \$149,999	-0.1405**	0.0031	0.1687*	3.0967	-0.0041	0.0031	0.0572	3.9439
	(0.0697)	(0.0040)	(0.0917)	(6.1892)	(0.0515)	(0.0040)	(0.0592)	(4.7682)
\$150,000+	-0.1696**	0.0035	0.1544	4.7409	-0.0157	0.0035	0.0993	5.3077
	(0.0743)	(0.0042)	(0.0961)	(6.6046)	(0.0541)	(0.0042)	(0.0615)	(4.9590)
Household size	-0.0006	-0.0008	-0.0021	0.7859	-0.0041	-0.0008	-0.0112	0.3846
	(0.0133)	(0.0007)	(0.0120)	(1.2989)	(0.0086)	(0.0007)	(0.0085)	(0.8399)
Own dwelling	-0.0452	-0.0030	0.0026	8.9152**	-0.0346	-0.0030	-0.0148	4.6822
	(0.0439)	(0.0024)	(0.0538)	(4.3904)	(0.0326)	(0.0024)	(0.0351)	(2.8469)
Urban	-0.0276	0.0037*	-0.0366	-2.3023	0.0558**	0.0037*	-0.0130	-4.5432*
	(0.0270)	(0.0020)	(0.0280)	(2.6896)	(0.0263)	(0.0020)	(0.0292)	(2.6986)
Retirement of spouse	0.0172	0.0009	0.0237	-4.7683*	0.0286	0.0009	0.0109	-3.8221**
	(0.0244)	(0.0014)	(0.0244)	(2.4777)	(0.0186)	(0.0014)	(0.0209)	(1.7657)
Social support	0.0010	0.0002***	0.0047***	-0.0500	0.0014**	0.0002***	0.0043***	0.0221
	(0.0006)	(0.0001)	(0.0007)	(0.0573)	(0.0005)	(0.0001)	(0.0006)	(0.0518)
Social engagement								
Yearly	0.1103	0.0031	0.1385	-2.7028	0.0711	0.0031	-0.0995	9.7007
	(0.0911)	(0.0089)	(0.1179)	(7.8980)	(0.0891)	(0.0089)	(0.0867)	(7.7901)
Monthly	0.1199	0.0061	0.0891	0.5566	0.0618	0.0061	-0.0962	8.5676
	(0.0871)	(0.0083)	(0.1127)	(7.2332)	(0.0838)	(0.0083)	(0.0802)	(7.3355)
Weekly	0.1813**	0.0099	0.1761	1.0401	0.0899	0.0099	-0.0760	12.0970*
	(0.0858)	(0.0082)	(0.1130)	(7.2552)	(0.0835)	(0.0082)	(0.0794)	(7.1530)
Daily	0.2208**	0.0087	0.2115*	4.5620	0.1039	0.0087	-0.0521	14.2673**
	(0.0882)	(0.0082)	(0.1155)	(7.4135)	(0.0849)	(0.0082)	(0.0810)	(7.2418)
Province								
AB	-0.0128	0.0026	-0.0289	1.3637	-0.0445	0.0026	-0.1448	11.8115
	(0.1259)	(0.0091)	(0.1231)	(14.2048)	(0.1303)	(0.0091)	(0.1428)	(18.7269)
BC	-0.1684	0.0034	-0.0770	24.8939*	-0.0216	0.0034	-0.1128	25.0585
	(0.1346)	(0.0068)	(0.1282)	(14.8253)	(0.1351)	(0.0068)	(0.1237)	(16.0222)
MB	0.0724	-0.0020	0.0391	1.5792	-0.0361	-0.0020	-0.2852	43.9424
	(0.2002)	(0.0063)	(0.2622)	(33.5518)	(0.1160)	(0.0063)	(0.1887)	(31.8769)
NB	0.2998**	0.0264***	-0.1216	5.9314	0.4530***	0.0264***	0.3461	33.7796*
	(0.1480)	(0.0082)	(0.2497)	(20.7890)	(0.1414)	(0.0082)	(0.3598)	(19.6321)
NL	-0.0140	0.0112	-0.1760	20.9071	-0.1165	0.0112	-0.4042	-8.0687
	(0.1788)	(0.0106)	(0.2575)	(33.2068)	(0.1826)	(0.0106)	(0.2521)	(23.2732)

	TRM (Phone)				COM (In-Home)			
	(1) SAH	(2) HI-2	(3) PMH	(4) PASE	(5) SAH	(6) HI-2	(7) PMH	(8) PASE
NS	-0.0866 (0.1731)	0.0087 (0.0101)	-0.2310 (0.1790)	30.6367* (18.3194)	-0.0813 (0.1477)	0.0087 (0.0101)	-0.1109 (0.1548)	14.6335 (17.7295)
PE	-0.0030 (0.1983)	0.0357** (0.0147)	-0.3045 (0.2278)	29.7659* (15.7070)	0.4433 (0.3224)	0.0357** (0.0147)	0.2046 (0.3785)	-14.1140 (31.0609)
QC	0.4654** (0.1864)	0.0070 (0.0149)	0.1311 (0.1537)	4.5089 (17.6281)	-0.0573 (0.2317)	0.0070 (0.0149)	-0.2588 (0.1744)	12.7843 (11.9235)
SK	0.0614 (0.2046)	-0.0142 (0.0137)	-0.1070 (0.1726)	12.9586 (19.9138)	-0.4472 (0.2932)	-0.0142 (0.0137)	-0.2549 (0.3118)	10.9510 (25.6920)
Observations (<i>n</i>)	36,054	60,048	36,062	34,137	60,688	60,048	60,684	59,444
Groups (<i>n_g</i>)	17,139	24,870	17,140	15,712	24,947	24,870	24,947	24,249

Notes: robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C.4.4: FE Linear Regression Estimates with Objective Retirement or Personal Income

	Objective Retirement				Personal Income			
	(1) SAH	(2) HI-2	(3) PMH	(4) PASE	(5) SAH	(6) HI-2	(7) PMH	(8) PASE
Retirement	0.0238	0.0022*	0.0559***	-13.5746***	0.0581***	0.0040***	0.0638***	-15.7242***
	(0.0162)	(0.0013)	(0.0166)	(1.3896)	(0.0169)	(0.0013)	(0.0174)	(1.4866)
Age	0.0366***	0.0056***	-0.0199**	-0.4662	0.0358***	0.0055***	-0.0207**	-0.4130
	(0.0082)	(0.0007)	(0.0090)	(0.7806)	(0.0080)	(0.0007)	(0.0089)	(0.7668)
Age squared	-0.0005***	-0.0001***	-0.0000	-0.0122**	-0.0005***	-0.0001***	-0.0000	-0.0128**
	(0.0001)	(0.0000)	(0.0001)	(0.0058)	(0.0001)	(0.0000)	(0.0001)	(0.0057)
Marital status								
Widow	-0.0008	-0.0083**	-0.1408**	-11.9344**	-0.0550	-0.0138***	-0.1634**	-14.9845***
	(0.0501)	(0.0042)	(0.0635)	(5.0834)	(0.0635)	(0.0047)	(0.0678)	(4.9938)
Divorced/separated	-0.0107	-0.0052	-0.0949	4.9659	-0.0498	-0.0113**	-0.1227*	0.3381
	(0.0482)	(0.0037)	(0.0626)	(5.4248)	(0.0623)	(0.0044)	(0.0662)	(5.3505)
Single	-0.0064	-0.0075*	-0.0179	4.2187	-0.0511	-0.0129***	-0.0305	-0.5204
	(0.0555)	(0.0042)	(0.0722)	(5.9102)	(0.0679)	(0.0047)	(0.0751)	(5.7540)
Income								
\$20,000 to \$49,999	-0.0618	-0.0016	0.0289	4.3559	0.0471**	0.0049**	0.0201	4.9782***
	(0.0386)	(0.0030)	(0.0484)	(3.2486)	(0.0203)	(0.0021)	(0.0189)	(1.6373)
\$50,000 to \$99,999	-0.0420	0.0019	0.0914*	4.3961	0.0789***	0.0067***	0.0671***	6.9443***
	(0.0406)	(0.0032)	(0.0501)	(3.5478)	(0.0234)	(0.0022)	(0.0233)	(1.9170)
\$100,000 to \$149,999	-0.0470	0.0016	0.0984*	4.7811	0.0664**	0.0066***	0.0804***	6.0003**
	(0.0429)	(0.0033)	(0.0516)	(3.8680)	(0.0290)	(0.0025)	(0.0285)	(2.6316)
\$150,000+	-0.0725	0.0023	0.1191**	5.9118	0.0359	0.0077***	0.0883**	3.0637
	(0.0449)	(0.0035)	(0.0534)	(4.0451)	(0.0396)	(0.0029)	(0.0368)	(3.2383)
Household size	-0.0042	-0.0009	-0.0081	0.4719	-0.0042	-0.0010*	-0.0065	0.5548
	(0.0073)	(0.0006)	(0.0070)	(0.7149)	(0.0072)	(0.0005)	(0.0069)	(0.6981)
Own dwelling	-0.0386	-0.0021	-0.0082	5.9483**	-0.0392	-0.0016	-0.0089	6.0810**
	(0.0265)	(0.0022)	(0.0302)	(2.4588)	(0.0258)	(0.0021)	(0.0300)	(2.3963)
Urban	0.0128	0.0012	-0.0207	-3.8061**	0.0061	0.0011	-0.0252	-3.9900**
	(0.0190)	(0.0016)	(0.0203)	(1.8910)	(0.0185)	(0.0016)	(0.0198)	(1.8382)
Retirement of spouse	0.0241	0.0019*	0.0069	-4.1911***	0.0268*	0.0016	0.0074	-4.0193***
	(0.0148)	(0.0011)	(0.0160)	(1.4585)	(0.0146)	(0.0011)	(0.0157)	(1.4208)
Social support	0.0012***	0.0002***	0.0043***	-0.0007	0.0012***	0.0002***	0.0044***	-0.0330
	(0.0004)	(0.0000)	(0.0005)	(0.0390)	(0.0004)	(0.0000)	(0.0005)	(0.0385)
Social engagement								
Yearly	0.0861	0.0119*	-0.0009	3.7618	0.1066*	0.0132**	0.0854	0.8943
	(0.0644)	(0.0063)	(0.0715)	(5.7271)	(0.0618)	(0.0060)	(0.0807)	(5.6476)
Monthly	0.1006	0.0145**	-0.0101	4.3643	0.1000*	0.0144**	0.0653	1.5965
	(0.0623)	(0.0061)	(0.0676)	(5.3442)	(0.0589)	(0.0057)	(0.0774)	(5.3146)
Weekly	0.1455**	0.0176***	0.0394	6.5918	0.1426**	0.0174***	0.1130	3.5519
	(0.0617)	(0.0060)	(0.0672)	(5.2841)	(0.0584)	(0.0056)	(0.0781)	(5.2293)
Daily	0.1715***	0.0179***	0.0713	9.0241*	0.1607***	0.0169***	0.1406*	6.0870
	(0.0628)	(0.0061)	(0.0688)	(5.3635)	(0.0596)	(0.0057)	(0.0804)	(5.2894)
Province								
AB	-0.0308	-0.0003	-0.0775	6.5343	-0.0247	-0.0001	-0.0679	4.7156
	(0.0919)	(0.0066)	(0.0962)	(12.2841)	(0.0918)	(0.0064)	(0.0934)	(11.8626)
BC	-0.1253	-0.0025	-0.0913	19.3859*	-0.0970	-0.0012	-0.0902	22.0776**
	(0.0979)	(0.0052)	(0.0915)	(10.9199)	(0.0948)	(0.0051)	(0.0887)	(10.5567)
MB	-0.0377	-0.0027	-0.1692	36.8202	-0.0285	-0.0039	-0.1979	40.7700*
	(0.1004)	(0.0051)	(0.1618)	(22.7318)	(0.1015)	(0.0050)	(0.1563)	(20.9587)
NB	0.3613***	0.0172*	0.0562	20.4384	0.3366***	0.0146	0.0640	20.0806
	(0.1050)	(0.0088)	(0.2202)	(14.4661)	(0.1091)	(0.0089)	(0.2159)	(14.0013)
NL	-0.0328	0.0106	-0.1899	10.1685	0.0127	0.0114	-0.0873	-2.4315
	(0.1389)	(0.0075)	(0.1849)	(20.8521)	(0.1218)	(0.0070)	(0.1332)	(19.4371)

	Objective Retirement				Personal Income			
	(1) SAH	(2) HI-2	(3) PMH	(4) PASE	(5) SAH	(6) HI-2	(7) PMH	(8) PASE
NS	-0.0433 (0.1155)	0.0041 (0.0078)	-0.1144 (0.1233)	22.7615* (13.7805)	-0.1241 (0.1100)	-0.0000 (0.0075)	-0.2182** (0.1030)	25.0785* (13.0004)
PE	0.0672 (0.1719)	0.0156 (0.0125)	-0.1718 (0.1979)	24.0917* (13.5657)	0.0199 (0.1785)	0.0114 (0.0122)	-0.2031 (0.1999)	25.8809* (13.3240)
QC	0.2356 (0.1648)	0.0073 (0.0083)	-0.0385 (0.1252)	8.2297 (10.9995)	0.2329 (0.1597)	0.0087 (0.0079)	-0.0482 (0.1239)	13.5768 (9.5343)
SK	-0.1702 (0.1959)	-0.0095 (0.0088)	-0.1722 (0.1662)	11.1005 (15.6873)	-0.1626 (0.1944)	-0.0097 (0.0088)	-0.1849 (0.1562)	11.5004 (15.9760)
Observations (<i>n</i>)	95,776	95,106	95,780	92,663	98,142	97,458	98,146	94,917
Groups (<i>n_g</i>)	41,832	41,729	41,833	39,740	42,280	42,167	42,278	40,126

Notes: robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C.4.5: FE Linear Regression Estimates by Retirement Duration

	Short Run				Long Run			
	(1) SAH	(2) HI-2	(3) PMH	(4) PASE	(5) SAH	(6) HI-2	(7) PMH	(8) PASE
Retirement	0.0438**	0.0027*	0.0310	-19.6639***	0.0255	0.0033*	0.0708***	-4.4120**
	(0.0204)	(0.0017)	(0.0207)	(1.7859)	(0.0256)	(0.0020)	(0.0274)	(2.1613)
Age	0.0366***	0.0056***	-0.0213**	-0.3670	0.0368***	0.0056***	-0.0207**	-0.4287
	(0.0081)	(0.0006)	(0.0090)	(0.7762)	(0.0081)	(0.0006)	(0.0090)	(0.7767)
Age squared	-0.0005***	-0.0001***	-0.0000	-0.0131**	-0.0005***	-0.0001***	-0.0000	-0.0146**
	(0.0001)	(0.0000)	(0.0001)	(0.0057)	(0.0001)	(0.0000)	(0.0001)	(0.0057)
Marital status								
Widow	-0.0445	-0.0125***	-0.1723**	-12.3875**	-0.0448	-0.0125***	-0.1721**	-12.2099**
	(0.0641)	(0.0048)	(0.0674)	(5.0426)	(0.0641)	(0.0048)	(0.0675)	(5.0329)
Divorced/separated	-0.0563	-0.0095**	-0.1308**	3.9224	-0.0587	-0.0096**	-0.1311**	5.1802
	(0.0630)	(0.0044)	(0.0668)	(5.4202)	(0.0630)	(0.0044)	(0.0667)	(5.4163)
Single	-0.0559	-0.0123**	-0.0557	3.1783	-0.0579	-0.0124***	-0.0559	4.2353
	(0.0691)	(0.0048)	(0.0758)	(5.8716)	(0.0690)	(0.0048)	(0.0758)	(5.8690)
Household income								
\$20,000 to \$49,999	-0.0633*	-0.0027	0.0169	3.9290	-0.0646*	-0.0028	0.0158	4.5753
	(0.0376)	(0.0031)	(0.0478)	(3.2081)	(0.0376)	(0.0031)	(0.0476)	(3.2598)
\$50,000 to \$99,999	-0.0455	0.0005	0.0749	3.7772	-0.0484	0.0003	0.0735	5.2444
	(0.0396)	(0.0032)	(0.0497)	(3.5015)	(0.0397)	(0.0032)	(0.0495)	(3.5616)
\$100,000 to \$149,999	-0.0502	0.0000	0.0782	4.3968	-0.0546	-0.0002	0.0770	6.6958*
	(0.0417)	(0.0034)	(0.0511)	(3.8115)	(0.0418)	(0.0034)	(0.0510)	(3.8786)
\$150,000+	-0.0685	0.0010	0.0996*	5.7717	-0.0744*	0.0007	0.0981*	8.8609**
	(0.0439)	(0.0035)	(0.0529)	(3.9919)	(0.0439)	(0.0035)	(0.0527)	(4.0497)
Household size	-0.0028	-0.0009*	-0.0072	0.5356	-0.0027	-0.0009	-0.0072	0.4495
	(0.0072)	(0.0006)	(0.0070)	(0.7083)	(0.0072)	(0.0006)	(0.0070)	(0.7107)
Own dwelling	-0.0372	-0.0022	-0.0055	6.2347**	-0.0366	-0.0022	-0.0050	5.9987**
	(0.0263)	(0.0021)	(0.0301)	(2.4289)	(0.0263)	(0.0021)	(0.0301)	(2.4287)
Urban	0.0118	0.0009	-0.0298	-3.3176*	0.0115	0.0009	-0.0297	-3.1110
	(0.0189)	(0.0016)	(0.0204)	(1.8934)	(0.0189)	(0.0016)	(0.0203)	(1.8973)
Retirement of spouse	0.0248*	0.0015	0.0166	-4.3314***	0.0274*	0.0016	0.0168	-5.7048***
	(0.0148)	(0.0011)	(0.0161)	(1.4352)	(0.0147)	(0.0011)	(0.0159)	(1.4374)
Social support	0.0012***	0.0002***	0.0045***	-0.0105	0.0012***	0.0002***	0.0045***	-0.0116
	(0.0004)	(0.0000)	(0.0005)	(0.0386)	(0.0004)	(0.0000)	(0.0005)	(0.0387)
Social engagement								
Yearly	0.0975	0.0123*	0.0312	2.8347	0.0975	0.0122*	0.0306	2.7791
	(0.0650)	(0.0063)	(0.0776)	(5.6180)	(0.0650)	(0.0063)	(0.0776)	(5.6339)
Monthly	0.1033*	0.0145**	0.0182	3.6749	0.1033*	0.0145**	0.0175	3.5778
	(0.0618)	(0.0060)	(0.0737)	(5.2351)	(0.0618)	(0.0060)	(0.0738)	(5.2499)
Weekly	0.1446**	0.0172***	0.0640	5.9153	0.1449**	0.0172***	0.0629	5.5837
	(0.0613)	(0.0059)	(0.0736)	(5.1741)	(0.0613)	(0.0059)	(0.0736)	(5.1900)
Daily	0.1662***	0.0173***	0.0915	8.4761	0.1668***	0.0173***	0.0902	7.9908
	(0.0626)	(0.0060)	(0.0749)	(5.2538)	(0.0626)	(0.0060)	(0.0749)	(5.2685)
Province								
AB	-0.0380	-0.0014	-0.0893	7.0503	-0.0362	-0.0012	-0.0869	6.6678
	(0.0910)	(0.0063)	(0.0941)	(12.1083)	(0.0912)	(0.0063)	(0.0944)	(12.1760)
BC	-0.0908	-0.0013	-0.0956	24.7693**	-0.0880	-0.0012	-0.0942	23.6654**
	(0.0970)	(0.0051)	(0.0896)	(11.1172)	(0.0973)	(0.0051)	(0.0898)	(11.1651)
MB	-0.0196	-0.0026	-0.1862	31.1303	-0.0169	-0.0023	-0.1827	30.3894
	(0.0983)	(0.0050)	(0.1590)	(24.2935)	(0.0987)	(0.0050)	(0.1593)	(24.3718)
NB	0.3394***	0.0183**	0.0872	16.1385	0.3426***	0.0185**	0.0876	14.1800
	(0.1033)	(0.0086)	(0.2202)	(14.3856)	(0.1039)	(0.0086)	(0.2226)	(14.4673)
NL	-0.0689	0.0082	-0.3128	4.2501	-0.0628	0.0087	-0.3043	2.1721
	(0.1348)	(0.0075)	(0.1960)	(19.3530)	(0.1354)	(0.0076)	(0.1963)	(19.3385)

	Short Run				Long Run			
	(1) SAH	(2) HI-2	(3) PMH	(4) PASE	(5) SAH	(6) HI-2	(7) PMH	(8) PASE
NS	-0.0699 (0.1172)	0.0035 (0.0077)	-0.1328 (0.1294)	20.8363 (13.3181)	-0.0679 (0.1175)	0.0036 (0.0078)	-0.1305 (0.1299)	20.1189 (13.4661)
PE	0.0546 (0.1718)	0.0155 (0.0124)	-0.1858 (0.1998)	22.5947* (13.5386)	0.0522 (0.1722)	0.0153 (0.0125)	-0.1887 (0.2007)	23.8357* (13.6709)
QC	0.2414 (0.1603)	0.0081 (0.0081)	-0.0378 (0.1237)	8.9247 (10.6823)	0.2438 (0.1611)	0.0082 (0.0081)	-0.0375 (0.1240)	7.8262 (10.7288)
SK	-0.1675 (0.2003)	-0.0100 (0.0090)	-0.1873 (0.1694)	14.1661 (16.3538)	-0.1547 (0.1987)	-0.0091 (0.0089)	-0.1775 (0.1701)	8.9682 (15.8564)
Observations (<i>n</i>)	11,441	11,350	11,446	10,480	40,837	40,553	40,843	40,375
Groups (<i>n_g</i>)	6,230	6,183	6,230	5,404	16,322	16,311	16,325	16,268

Notes: robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C.4.6: FE Linear Regression Estimates by Retirement Characteristics

	Partial versus Complete				NR → CR versus PR → CR				Voluntary versus Involuntary			
	(1) SAH	(2) HI-2	(3) PMH	(4) PASE	(5) SAH	(6) HI-2	(7) PMH	(8) PASE	(9) SAH	(10) HI-2	(11) PMH	(12) PASE
Retirement												
Partial (PR)	0.0372* (0.0190)	0.0018 (0.0014)	0.0866*** (0.0207)	-13.9943*** (1.7240)								
Complete (CR)	0.0581*** (0.0194)	0.0043*** (0.0015)	0.0875*** (0.0193)	-21.2341*** (1.7206)								
NR to CR transition					0.0650*** (0.0222)	0.0044*** (0.0017)	0.0940*** (0.0216)	-20.7256*** (1.9481)				
PR to CR transition					0.0084 (0.0226)	0.0020 (0.0019)	-0.0206 (0.0257)	-7.1377*** (1.8843)				
Voluntary (pull)									0.0662*** (0.0196)	0.0042*** (0.0016)	0.0786*** (0.0189)	-17.3980*** (1.6232)
Involuntary (push)									-0.0260 (0.0500)	0.0041 (0.0056)	-0.0500 (0.0625)	-14.8927*** (4.5730)
Age	0.0359*** (0.0082)	0.0056*** (0.0007)	-0.0244*** (0.0090)	0.0497 (0.7887)	0.0362*** (0.0082)	0.0056*** (0.0007)	-0.0234*** (0.0090)	-0.2055 (0.7798)	0.0371*** (0.0081)	0.0056*** (0.0006)	-0.0214** (0.0090)	-0.4044 (0.7779)
Age squared	-0.0005*** (0.0001)	-0.0001*** (0.0000)	-0.0000 (0.0001)	-0.0148** (0.0058)	-0.0005*** (0.0001)	-0.0001*** (0.0000)	-0.0000 (0.0001)	-0.0140** (0.0058)	-0.0005*** (0.0001)	-0.0001*** (0.0000)	-0.0000 (0.0001)	-0.0124** (0.0057)
Marital status												
Widow	-0.0392 (0.0643)	-0.0123** (0.0048)	-0.1696** (0.0676)	-12.5674** (5.0697)	-0.0397 (0.0643)	-0.0123** (0.0048)	-0.1708** (0.0677)	-12.3815** (5.0875)	-0.0401 (0.0637)	-0.0124*** (0.0048)	-0.1709** (0.0673)	-12.3109** (5.0704)
Divorced/separated	-0.0502 (0.0633)	-0.0093** (0.0044)	-0.1235* (0.0669)	2.7919 (5.4257)	-0.0516 (0.0633)	-0.0094** (0.0044)	-0.1274* (0.0670)	3.4864 (5.4488)	-0.0521 (0.0623)	-0.0095** (0.0044)	-0.1285* (0.0664)	3.8508 (5.4324)
Single	-0.0484 (0.0692)	-0.0117** (0.0048)	-0.0501 (0.0759)	2.3551 (5.9014)	-0.0492 (0.0693)	-0.0117** (0.0048)	-0.0524 (0.0761)	2.7596 (5.8945)	-0.0499 (0.0684)	-0.0118** (0.0048)	-0.0539 (0.0755)	3.2105 (5.8816)
Income												
\$20,000 to \$49,999	-0.0654* (0.0380)	-0.0022 (0.0030)	0.0222 (0.0478)	3.7503 (3.2454)	-0.0655* (0.0379)	-0.0022 (0.0030)	0.0220 (0.0475)	3.7973 (3.2460)	-0.0659* (0.0381)	-0.0023 (0.0030)	0.0216 (0.0477)	3.9039 (3.2511)
\$50,000 to \$99,999	-0.0443 (0.0399)	0.0014 (0.0032)	0.0859* (0.0496)	3.2529 (3.5347)	-0.0449 (0.0398)	0.0013 (0.0032)	0.0841* (0.0492)	3.5761 (3.5348)	-0.0463 (0.0400)	0.0013 (0.0032)	0.0818* (0.0494)	3.9134 (3.5408)
\$100,000 to \$149,999	-0.0462 (0.0422)	0.0012 (0.0033)	0.0948* (0.0512)	3.0987 (3.8500)	-0.0474 (0.0420)	0.0011 (0.0033)	0.0912* (0.0506)	3.7671 (3.8454)	-0.0489 (0.0421)	0.0010 (0.0033)	0.0879* (0.0509)	4.2535 (3.8530)
\$150,000+	-0.0621 (0.0445)	0.0023 (0.0035)	0.1217** (0.0532)	3.9604 (4.0373)	-0.0639 (0.0443)	0.0022 (0.0035)	0.1162** (0.0526)	5.0016 (4.0272)	-0.0656 (0.0445)	0.0021 (0.0035)	0.1120** (0.0528)	5.6798 (4.0312)
Household size	-0.0031 (0.0073)	-0.0009* (0.0006)	-0.0080 (0.0069)	0.5624 (0.7077)	-0.0031 (0.0073)	-0.0009* (0.0006)	-0.0080 (0.0069)	0.5583 (0.7096)	-0.0031 (0.0072)	-0.0009* (0.0006)	-0.0079 (0.0069)	0.5639 (0.7097)
Own dwelling	-0.0388 (0.0263)	-0.0023 (0.0021)	-0.0100 (0.0300)	6.1941** (2.4504)	-0.0384 (0.0263)	-0.0023 (0.0021)	-0.0091 (0.0300)	6.1132** (2.4414)	-0.0389 (0.0263)	-0.0023 (0.0021)	-0.0098 (0.0300)	6.1741** (2.4393)
Urban	0.0157 (0.0189)	0.0015 (0.0016)	-0.0243 (0.0201)	-3.5652* (1.9058)	0.0157 (0.0189)	0.0014 (0.0016)	-0.0245 (0.0201)	-3.5121* (1.9043)	0.0156 (0.0189)	0.0014 (0.0016)	-0.0248 (0.0201)	-3.3853* (1.9020)
Retirement of spouse	0.0218 (0.0148)	0.0012 (0.0011)	0.0097 (0.0160)	-3.2259** (1.4403)	0.0231 (0.0148)	0.0013 (0.0011)	0.0134 (0.0160)	-3.8266*** (1.4400)	0.0220 (0.0147)	0.0013 (0.0011)	0.0127 (0.0161)	-3.8847*** (1.4422)

	Partial versus Complete				NR → CR versus PR → CR				Voluntary versus Involuntary			
	(1) SAH	(2) HI-2	(3) PMH	(4) PASE	(5) SAH	(6) HI-2	(7) PMH	(8) PASE	(9) SAH	(10) HI-2	(11) PMH	(12) PASE
Social support	0.0012*** (0.0004)	0.0002*** (0.0000)	0.0045*** (0.0005)	-0.0114 (0.0385)	0.0012*** (0.0004)	0.0002*** (0.0000)	0.0045*** (0.0005)	-0.0100 (0.0386)	0.0012*** (0.0004)	0.0002*** (0.0000)	0.0045*** (0.0005)	-0.0094 (0.0386)
Social engagement												
Yearly	0.0998 (0.0647)	0.0128** (0.0063)	0.0369 (0.0779)	2.6429 (5.6203)	0.1002 (0.0646)	0.0128** (0.0063)	0.0375 (0.0776)	2.6211 (5.6431)	0.0983 (0.0646)	0.0128** (0.0063)	0.0345 (0.0777)	2.8895 (5.6315)
Monthly	0.1027* (0.0615)	0.0145** (0.0060)	0.0174 (0.0742)	3.4404 (5.2340)	0.1030* (0.0614)	0.0145** (0.0060)	0.0180 (0.0739)	3.4363 (5.2616)	0.1015* (0.0615)	0.0144** (0.0060)	0.0153 (0.0740)	3.6313 (5.2489)
Weekly	0.1434** (0.0610)	0.0173*** (0.0059)	0.0625 (0.0741)	5.9761 (5.1760)	0.1437** (0.0609)	0.0173*** (0.0059)	0.0632 (0.0738)	5.9305 (5.2007)	0.1426** (0.0610)	0.0172*** (0.0059)	0.0614 (0.0738)	6.0072 (5.1887)
Daily	0.1654*** (0.0623)	0.0173*** (0.0060)	0.0894 (0.0754)	8.5848 (5.2560)	0.1658*** (0.0622)	0.0173*** (0.0060)	0.0903 (0.0751)	8.5180 (5.2805)	0.1645*** (0.0623)	0.0173*** (0.0060)	0.0882 (0.0752)	8.5922 (5.2686)
Province												
AB	-0.0374 (0.0911)	-0.0013 (0.0063)	-0.0862 (0.0943)	6.4438 (12.2465)	-0.0372 (0.0910)	-0.0013 (0.0063)	-0.0860 (0.0945)	6.5538 (12.2508)	-0.0408 (0.0912)	-0.0016 (0.0063)	-0.0912 (0.0944)	7.5507 (12.1713)
BC	-0.0934 (0.0969)	-0.0015 (0.0051)	-0.0954 (0.0897)	24.4773** (11.1882)	-0.0937 (0.0971)	-0.0015 (0.0051)	-0.0959 (0.0896)	24.6676** (11.1660)	-0.0973 (0.0970)	-0.0017 (0.0051)	-0.1004 (0.0900)	25.3880** (11.1456)
MB	-0.0178 (0.0982)	-0.0024 (0.0050)	-0.1799 (0.1591)	30.0663 (24.5652)	-0.0175 (0.0981)	-0.0024 (0.0050)	-0.1799 (0.1590)	30.3062 (24.4788)	-0.0243 (0.0986)	-0.0027 (0.0050)	-0.1899 (0.1588)	31.2587 (24.3427)
NB	0.3362*** (0.1033)	0.0180** (0.0086)	0.0795 (0.2190)	17.7061 (14.5967)	0.3345*** (0.1031)	0.0180** (0.0086)	0.0770 (0.2190)	17.6217 (14.6450)	0.3439*** (0.1049)	0.0181** (0.0086)	0.0929 (0.2248)	16.2843 (14.3407)
NL	-0.0652 (0.1345)	0.0085 (0.0076)	-0.3088 (0.1953)	2.9409 (19.5096)	-0.0660 (0.1346)	0.0084 (0.0076)	-0.3105 (0.1952)	3.3465 (19.4626)	-0.0644 (0.1347)	0.0084 (0.0076)	-0.3076 (0.1958)	3.0783 (19.4289)
NS	-0.0710 (0.1174)	0.0034 (0.0078)	-0.1360 (0.1295)	21.3169 (13.3286)	-0.0709 (0.1175)	0.0034 (0.0078)	-0.1350 (0.1293)	20.9690 (13.2967)	-0.0695 (0.1174)	0.0035 (0.0078)	-0.1313 (0.1295)	20.7890 (13.3476)
PE	0.0574 (0.1713)	0.0157 (0.0124)	-0.1756 (0.1991)	22.9440* (13.6033)	0.0563 (0.1716)	0.0156 (0.0124)	-0.1791 (0.1984)	22.8206* (13.7042)	0.0477 (0.1709)	0.0151 (0.0125)	-0.1908 (0.2005)	25.1440* (13.0934)
QC	0.2388 (0.1599)	0.0079 (0.0081)	-0.0418 (0.1233)	9.3750 (10.7696)	0.2359 (0.1598)	0.0077 (0.0081)	-0.0473 (0.1224)	9.9634 (10.8640)	0.2378 (0.1598)	0.0078 (0.0081)	-0.0419 (0.1227)	9.4019 (10.8112)
SK	-0.1706 (0.1997)	-0.0103 (0.0090)	-0.1978 (0.1666)	14.0479 (16.5822)	-0.1717 (0.2007)	-0.0103 (0.0091)	-0.1983 (0.1676)	13.8309 (16.3888)	-0.1758 (0.2004)	-0.0104 (0.0090)	-0.2002 (0.1681)	13.9817 (16.3174)
Observations (n)	96,742	96,066	96,746	93,581	96,742	96,066	96,746	93,581	96,742	96,066	96,746	93,581
Groups (n _g)	42,086	41,982	42,087	39,961	42,086	41,982	42,087	39,961	42,086	41,982	42,087	39,961

Notes: robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C.4.7: FE Linear Regression Estimates by Gender

	Female				Male			
	(1) SAH	(2) HI-2	(3) PMH	(4) PASE	(5) SAH	(6) HI-2	(7) PMH	(8) PASE
Retirement	0.0226	0.0038*	0.0360	-15.7138***	0.0606**	0.0023	0.0640***	-15.4940***
	(0.0218)	(0.0019)	(0.0246)	(1.9769)	(0.0256)	(0.0018)	(0.0244)	(2.1579)
Age	0.0266**	0.0058***	-0.0363***	-0.7957	0.0469***	0.0054***	-0.0067	-0.3482
	(0.0111)	(0.0009)	(0.0119)	(1.0395)	(0.0118)	(0.0009)	(0.0133)	(1.1507)
Age squared	-0.0004***	-0.0001***	0.0001	-0.0083	-0.0006***	-0.0001***	-0.0001	-0.0139
	(0.0001)	(0.0000)	(0.0001)	(0.0077)	(0.0001)	(0.0000)	(0.0001)	(0.0084)
Marital status								
Widow	0.0893	-0.0142**	-0.0263	-18.4085**	-0.1237	-0.0159**	-0.2460***	-13.0483*
	(0.0675)	(0.0067)	(0.0929)	(7.6262)	(0.0931)	(0.0071)	(0.0840)	(7.0923)
Divorced/separated	0.0740	-0.0100	-0.0138	-0.5447	-0.1192	-0.0110*	-0.1650*	3.8039
	(0.0686)	(0.0064)	(0.0898)	(8.3190)	(0.0859)	(0.0059)	(0.0916)	(7.2133)
Single	0.0901	-0.0173**	0.1026	0.2099	-0.1373	-0.0087	-0.1374	2.2371
	(0.0806)	(0.0073)	(0.1131)	(9.1193)	(0.0917)	(0.0059)	(0.0896)	(7.4805)
Household income								
\$20,000 to \$49,999	-0.0895*	-0.0048	0.0647	8.1953**	-0.0125	0.0015	-0.0802	-3.6912
	(0.0461)	(0.0040)	(0.0577)	(3.7338)	(0.0637)	(0.0042)	(0.0794)	(5.9464)
\$50,000 to \$99,999	-0.0876*	-0.0021	0.1213*	7.9578*	0.0264	0.0052	-0.0150	-3.6768
	(0.0502)	(0.0044)	(0.0622)	(4.0642)	(0.0644)	(0.0042)	(0.0796)	(6.4905)
\$100,000 to \$149,999	-0.1003*	-0.0028	0.1027	7.4344	0.0325	0.0053	0.0171	-2.0860
	(0.0539)	(0.0047)	(0.0656)	(4.6027)	(0.0666)	(0.0044)	(0.0799)	(6.8153)
\$150,000+	-0.1092*	0.0001	0.1434**	6.1200	0.0066	0.0048	0.0240	1.4921
	(0.0572)	(0.0049)	(0.0689)	(4.9255)	(0.0694)	(0.0046)	(0.0820)	(7.0095)
Household size	-0.0034	-0.0006	-0.0150	0.9332	-0.0022	-0.0012	0.0003	-0.0289
	(0.0096)	(0.0008)	(0.0094)	(0.9189)	(0.0107)	(0.0008)	(0.0101)	(1.0736)
Own dwelling	-0.0467	-0.0066**	-0.0157	1.5057	-0.0283	0.0027	0.0071	10.9300***
	(0.0380)	(0.0030)	(0.0464)	(3.2239)	(0.0359)	(0.0030)	(0.0360)	(3.6132)
Urban	0.0222	0.0014	-0.0145	0.0525	0.0004	0.0002	-0.0448*	-7.1047**
	(0.0261)	(0.0025)	(0.0298)	(2.5524)	(0.0273)	(0.0019)	(0.0271)	(2.7966)
Retirement of spouse	0.0374*	0.0013	0.0416*	-2.1358	0.0132	0.0015	-0.0100	-5.6970***
	(0.0221)	(0.0019)	(0.0238)	(1.9429)	(0.0200)	(0.0013)	(0.0215)	(2.0963)
Social support	0.0019***	0.0003***	0.0054***	-0.0232	0.0006	0.0001***	0.0036***	-0.0077
	(0.0006)	(0.0001)	(0.0007)	(0.0526)	(0.0006)	(0.0000)	(0.0006)	(0.0561)
Social engagement								
Yearly	0.0884	0.0123	0.1304	7.7855	0.1053	0.0126**	-0.0487	-0.8474
	(0.1073)	(0.0122)	(0.1345)	(8.0826)	(0.0806)	(0.0062)	(0.0905)	(7.7097)
Monthly	0.1031	0.0198*	0.1246	9.7660	0.1048	0.0103*	-0.0664	-1.1283
	(0.1044)	(0.0117)	(0.1289)	(7.5633)	(0.0748)	(0.0058)	(0.0840)	(7.1653)
Weekly	0.1606	0.0230**	0.1704	11.1123	0.1318*	0.0125**	-0.0220	2.1087
	(0.1037)	(0.0115)	(0.1292)	(7.3483)	(0.0740)	(0.0058)	(0.0832)	(7.1763)
Daily	0.1975*	0.0242**	0.2133	15.2290**	0.1352*	0.0113*	-0.0137	3.1077
	(0.1046)	(0.0116)	(0.1307)	(7.4543)	(0.0770)	(0.0059)	(0.0854)	(7.3106)
Province								
AB	0.0266	0.0030	-0.1576	-2.7282	-0.0836	-0.0047	-0.0479	12.4990
	(0.1347)	(0.0095)	(0.1301)	(16.1390)	(0.1186)	(0.0085)	(0.1318)	(16.2037)
BC	0.0331	0.0009	-0.1515	20.0865	-0.2007	-0.0032	-0.0783	29.2300**
	(0.1396)	(0.0083)	(0.1240)	(14.3797)	(0.1297)	(0.0060)	(0.1274)	(14.6193)
MB	0.0751	0.0010	-0.2060	9.5537	-0.1000	-0.0052	-0.1928	47.1162
	(0.1311)	(0.0075)	(0.1594)	(23.2472)	(0.1448)	(0.0068)	(0.2551)	(35.9408)
NB	0.3899**	0.0173	0.2182	32.2051	0.3089**	0.0189	0.0038	9.3239
	(0.1546)	(0.0114)	(0.1691)	(25.9303)	(0.1353)	(0.0122)	(0.3374)	(17.4007)
NL	-0.2095	-0.0047	-0.6222**	51.9116**	0.0468	0.0200**	-0.0317	-37.7737*
	(0.2086)	(0.0103)	(0.2819)	(26.2511)	(0.1550)	(0.0086)	(0.2102)	(21.2046)

	Female				Male			
	(1) SAH	(2) HI-2	(3) PMH	(4) PASE	(5) SAH	(6) HI-2	(7) PMH	(8) PASE
NS	-0.0522 (0.1590)	0.0096 (0.0112)	-0.1056 (0.1450)	18.3227 (18.5587)	-0.1534 (0.1548)	-0.0095 (0.0083)	-0.2284 (0.2006)	33.6857** (16.4938)
PE	0.1893 (0.1945)	0.0341 (0.0211)	-0.1770 (0.2672)	18.1670 (20.2503)	-0.0836 (0.2694)	-0.0039 (0.0126)	-0.1562 (0.2912)	36.7035** (16.4824)
QC	0.3567 (0.2473)	0.0040 (0.0128)	0.0890 (0.1207)	7.6717 (13.7554)	0.0898 (0.1537)	0.0124 (0.0076)	-0.1674 (0.2242)	17.3970 (17.5507)
SK	-0.0858 (0.3310)	-0.0067 (0.0160)	-0.2663 (0.1724)	12.7634 (19.9228)	-0.2278 (0.2372)	-0.0131 (0.0099)	-0.1324 (0.2709)	10.3566 (26.1378)
Observations (<i>n</i>)	47,439	47,127	47,441	45,901	49,484	49,115	49,486	47,854
Groups (<i>n_g</i>)	20,985	20,935	20,985	19,933	21,134	21,079	21,135	20,058

Notes: robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C.4.8: FE Linear Regression Estimates by Education

	Less Than Post-Secondary				Post-Secondary			
	(1) SAH	(2) HI-2	(3) PMH	(4) PASE	(5) SAH	(6) HI-2	(7) PMH	(8) PASE
Retirement	-0.0466	-0.0011	0.0162	-20.5858***	0.0707***	0.0046***	0.0608***	-14.3014***
	(0.0484)	(0.0040)	(0.0519)	(3.9826)	(0.0151)	(0.0012)	(0.0155)	(1.4373)
Age	0.0510**	0.0048***	-0.0398	4.4525**	0.0353***	0.0054***	-0.0122	-2.0232**
	(0.0221)	(0.0018)	(0.0274)	(2.0943)	(0.0080)	(0.0006)	(0.0082)	(0.8058)
Age squared	-0.0006***	-0.0001***	0.0001	-0.0462***	-0.0005***	-0.0001***	-0.0001*	-0.0002
	(0.0002)	(0.0000)	(0.0002)	(0.0146)	(0.0001)	(0.0000)	(0.0001)	(0.0060)
Marital status								
Widow	-0.3246	-0.0353**	-0.5110***	-5.6222	0.0420	-0.0048	-0.0374	-12.1090**
	(0.2026)	(0.0138)	(0.1889)	(11.8874)	(0.0507)	(0.0041)	(0.0593)	(5.1745)
Divorced/separated	-0.2878	-0.0313**	-0.1604	27.0577*	0.0150	-0.0030	-0.1170**	-2.4835
	(0.2081)	(0.0142)	(0.2061)	(14.2729)	(0.0488)	(0.0037)	(0.0585)	(5.5327)
Single	-0.3028	-0.0348**	-0.1762	20.0520	0.0157	-0.0053	-0.0183	-1.1785
	(0.2214)	(0.0150)	(0.2310)	(14.9874)	(0.0542)	(0.0039)	(0.0624)	(5.8213)
Household income								
\$20,000 to \$49,999	-0.1008	-0.0064	-0.0393	14.2398***	-0.0312	0.0004	0.0595	-4.4754
	(0.0685)	(0.0053)	(0.0879)	(4.4651)	(0.0364)	(0.0034)	(0.0377)	(4.2488)
\$50,000 to \$99,999	-0.0636	-0.0002	0.0633	11.5846**	-0.0234	0.0021	0.0972**	-3.0722
	(0.0762)	(0.0059)	(0.0978)	(5.0911)	(0.0382)	(0.0036)	(0.0398)	(4.6829)
\$100,000 to \$149,999	-0.1031	-0.0025	0.0476	9.9035	-0.0168	0.0023	0.1092***	-2.2868
	(0.0892)	(0.0066)	(0.1063)	(6.6212)	(0.0400)	(0.0037)	(0.0416)	(4.9577)
\$150,000+	-0.1821*	0.0001	0.0948	21.2838***	-0.0259	0.0031	0.1256***	-2.3177
	(0.1037)	(0.0083)	(0.1180)	(8.0364)	(0.0419)	(0.0038)	(0.0438)	(5.0769)
Household size	0.0148	-0.0015	-0.0079	3.8896*	-0.0078	-0.0008	-0.0068	-0.3555
	(0.0224)	(0.0019)	(0.0197)	(2.1539)	(0.0069)	(0.0005)	(0.0070)	(0.7016)
Own dwelling	-0.1069	-0.0088*	0.0153	12.7165**	-0.0090	0.0001	-0.0105	4.0844*
	(0.0711)	(0.0051)	(0.0861)	(6.3231)	(0.0251)	(0.0022)	(0.0257)	(2.3792)
Urban	0.0676	0.0044	-0.0721	-1.6613	-0.0135	-0.0004	-0.0169	-3.7012*
	(0.0429)	(0.0042)	(0.0485)	(4.3558)	(0.0202)	(0.0015)	(0.0206)	(1.9746)
Retirement of spouse	0.0469	0.0030	0.0907*	-10.8515***	0.0170	0.0006	-0.0040	-2.3478
	(0.0428)	(0.0034)	(0.0477)	(3.8567)	(0.0139)	(0.0010)	(0.0146)	(1.4348)
Social support	0.0004	0.0002	0.0029**	0.1098	0.0016***	0.0002***	0.0051***	-0.0667
	(0.0010)	(0.0001)	(0.0012)	(0.0818)	(0.0004)	(0.0000)	(0.0004)	(0.0415)
Social engagement								
Yearly	0.1533	0.0188*	0.1027	12.0928	0.0476	0.0039	-0.0475	-5.2988
	(0.0972)	(0.0103)	(0.1257)	(8.5324)	(0.0858)	(0.0071)	(0.0897)	(7.4663)
Monthly	0.1331	0.0196**	0.0750	8.7135	0.0718	0.0074	-0.0482	-2.4443
	(0.0940)	(0.0098)	(0.1178)	(7.7367)	(0.0821)	(0.0068)	(0.0869)	(7.1498)
Weekly	0.1822**	0.0216**	0.1212	10.7525	0.1101	0.0105	-0.0024	0.0019
	(0.0921)	(0.0094)	(0.1167)	(7.3899)	(0.0816)	(0.0068)	(0.0866)	(7.1559)
Daily	0.1618	0.0166*	0.1746	18.6152**	0.1447*	0.0122*	0.0178	0.9731
	(0.0995)	(0.0098)	(0.1234)	(7.7157)	(0.0823)	(0.0068)	(0.0875)	(7.2221)
Province								
AB	-0.3844*	-0.0084	0.2072	0.0560	-0.0312	-0.0016	-0.1590	6.7886
	(0.2177)	(0.0184)	(0.2412)	(18.4745)	(0.0975)	(0.0067)	(0.0985)	(13.4504)
BC	-0.3961**	-0.0014	-0.0071	36.8763**	-0.0994	-0.0037	-0.1214	19.9063
	(0.1945)	(0.0156)	(0.2266)	(16.1444)	(0.1040)	(0.0054)	(0.0934)	(12.2283)
MB	-0.3426	0.0093	-0.2729	4.2948	-0.0211	-0.0048	-0.2042	31.2013
	(0.2219)	(0.0195)	(0.2488)	(23.1524)	(0.1030)	(0.0052)	(0.1701)	(26.9796)
NB	0.4652*	0.0487	0.5981	28.2401***	0.3155***	0.0125*	-0.0555	20.4322
	(0.2666)	(0.0329)	(0.6541)	(10.0513)	(0.1182)	(0.0073)	(0.1998)	(16.3097)
NL	-1.0116***	-0.0297	-1.2519***	-13.6575	0.0233	0.0132*	-0.1842	0.0243
	(0.3031)	(0.0182)	(0.3563)	(27.8974)	(0.1214)	(0.0069)	(0.1458)	(19.6495)

	Less Than Post-Secondary				Post-Secondary			
	(1) SAH	(2) HI-2	(3) PMH	(4) PASE	(5) SAH	(6) HI-2	(7) PMH	(8) PASE
NS	-0.3512* (0.1823)	-0.0022 (0.0154)	0.2871 (0.1903)	-51.0423*** (13.4224)	-0.0852 (0.1247)	0.0014 (0.0087)	-0.3000*** (0.1047)	39.2965*** (12.7004)
PE	-0.6112*** (0.1901)	-0.0247 (0.0242)	-0.3507* (0.1803)	-8.8621 (24.3356)	0.1465 (0.1828)	0.0196 (0.0136)	-0.2025 (0.2057)	34.2757** (14.2698)
QC	0.5600** (0.2771)	0.0017 (0.0068)	0.2048 (0.1781)	13.1304 (18.6155)	0.1328 (0.1734)	0.0066 (0.0099)	-0.1361 (0.1430)	7.2837 (12.5178)
SK	-0.0289 (0.4782)	-0.0141 (0.0352)	0.7901*** (0.1551)	26.0200 (50.2569)	-0.2143 (0.2109)	-0.0119 (0.0095)	-0.2928* (0.1720)	10.6430 (17.2305)
Observations (<i>n</i>)	14,838	14,723	14,831	14,053	82,085	81,519	82,096	79,702
Groups (<i>n_g</i>)	7,143	7,118	7,141	6,528	34,976	34,896	34,979	33,463

Notes: robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C.4.9: FE Linear Regression Estimates by Occupation

	White Collar				Blue Collar			
	(1) SAH	(2) HI-2	(3) PMH	(4) PASE	(5) SAH	(6) HI-2	(7) PMH	(8) PASE
Retirement	0.0468**	0.0015	0.0385*	-17.5034***	0.0907	0.0061	0.0304	-7.4608
	(0.0230)	(0.0019)	(0.0224)	(2.0458)	(0.0655)	(0.0042)	(0.0716)	(6.3229)
Age	0.0375***	0.0058***	-0.0022	-0.8194	0.0266	0.0039**	-0.0381	3.4645
	(0.0102)	(0.0008)	(0.0105)	(1.0135)	(0.0227)	(0.0018)	(0.0244)	(2.2383)
Age squared	-0.0005***	-0.0001***	-0.0002**	-0.0085	-0.0004**	-0.0001***	0.0001	-0.0440***
	(0.0001)	(0.0000)	(0.0001)	(0.0074)	(0.0002)	(0.0000)	(0.0002)	(0.0163)
Marital status								
Widow	0.0586	-0.0063	-0.0496	-10.7579*	-0.3131**	-0.0358***	-0.3000**	4.1511
	(0.0607)	(0.0054)	(0.0763)	(5.7732)	(0.1529)	(0.0115)	(0.1529)	(14.3035)
Divorced/separated	-0.0226	-0.0056	-0.1252	0.9314	0.0819	-0.0154	-0.0015	13.3677
	(0.0617)	(0.0049)	(0.0790)	(6.3797)	(0.1365)	(0.0122)	(0.2085)	(15.5904)
Single	-0.0308	-0.0090*	-0.0392	1.7353	0.0046	-0.0071	-0.0047	15.3921
	(0.0700)	(0.0054)	(0.0905)	(7.1205)	(0.1426)	(0.0099)	(0.1681)	(16.4409)
Household income								
\$20,000 to \$49,999	-0.0545	0.0005	0.0065	1.6618	0.0620	0.0092	-0.0143	-1.7767
	(0.0505)	(0.0039)	(0.0572)	(3.9474)	(0.1319)	(0.0075)	(0.2017)	(8.2707)
\$50,000 to \$99,999	-0.0140	0.0040	0.0634	1.2982	0.0745	0.0077	-0.0143	-0.9104
	(0.0542)	(0.0041)	(0.0609)	(4.4477)	(0.1388)	(0.0086)	(0.2103)	(8.7189)
\$100,000 to \$149,999	-0.0093	0.0035	0.0661	0.4235	0.0008	0.0039	0.0290	0.9055
	(0.0573)	(0.0042)	(0.0637)	(4.9113)	(0.1432)	(0.0090)	(0.2107)	(9.2307)
\$150,000+	-0.0110	0.0051	0.0872	0.4618	-0.0128	0.0049	0.0577	1.8244
	(0.0590)	(0.0043)	(0.0656)	(5.1439)	(0.1472)	(0.0104)	(0.2131)	(9.9366)
Household size	0.0037	-0.0002	-0.0012	0.0315	-0.0375*	-0.0043**	-0.0118	-2.2452
	(0.0090)	(0.0007)	(0.0083)	(0.9681)	(0.0215)	(0.0020)	(0.0224)	(1.8402)
Own dwelling	-0.0593*	-0.0029	-0.0382	4.6452	0.0523	0.0023	0.1176	10.6040
	(0.0336)	(0.0026)	(0.0341)	(2.8707)	(0.0890)	(0.0059)	(0.0913)	(7.8910)
Urban	-0.0182	-0.0011	-0.0200	-3.3825	0.0782	0.0079	0.0149	-5.5462
	(0.0241)	(0.0020)	(0.0249)	(2.0882)	(0.0501)	(0.0053)	(0.0620)	(5.6056)
Retirement of spouse	0.0209	0.0013	0.0132	-2.3552	-0.0041	-0.0003	0.0041	-5.3060
	(0.0179)	(0.0017)	(0.0200)	(1.7612)	(0.0438)	(0.0030)	(0.0459)	(4.6029)
Social support	0.0012**	0.0002***	0.0038***	-0.1416***	0.0018*	0.0002**	0.0042***	0.2167**
	(0.0005)	(0.0001)	(0.0006)	(0.0467)	(0.0011)	(0.0001)	(0.0012)	(0.0971)
Social engagement								
Yearly	0.1463	0.0187*	0.0500	1.0579	0.1129	0.0016	0.0308	12.5437
	(0.1054)	(0.0104)	(0.1053)	(6.8868)	(0.1221)	(0.0099)	(0.1681)	(11.6224)
Monthly	0.1848*	0.0232**	0.0251	4.5179	0.0651	-0.0010	-0.0085	-0.3179
	(0.1034)	(0.0102)	(0.1020)	(6.2309)	(0.1152)	(0.0090)	(0.1528)	(9.7957)
Weekly	0.2193**	0.0258**	0.0759	6.2787	0.1226	0.0026	0.0302	0.8243
	(0.1029)	(0.0101)	(0.1023)	(6.2298)	(0.1122)	(0.0089)	(0.1494)	(9.6570)
Daily	0.2456**	0.0260**	0.1157	8.1702	0.1512	0.0088	0.0616	7.1456
	(0.1034)	(0.0101)	(0.1042)	(6.3030)	(0.1168)	(0.0092)	(0.1525)	(10.1959)
Province								
AB	-0.1570	0.0049	-0.2745*	-8.6349	0.1578	-0.0040	0.1219	15.2923
	(0.1254)	(0.0094)	(0.1523)	(18.2192)	(0.1949)	(0.0101)	(0.1842)	(26.4990)
BC	-0.0580	0.0001	-0.2302*	6.5410	-0.0530	0.0043	0.2697	23.5344
	(0.1225)	(0.0072)	(0.1246)	(15.0714)	(0.2030)	(0.0106)	(0.2215)	(27.7075)
MB	-0.0254	-0.0009	-0.3578*	46.6093	0.1968	0.0249***	0.3010	-1.2718
	(0.1100)	(0.0061)	(0.1902)	(31.4666)	(0.2578)	(0.0094)	(0.2909)	(30.1451)
NB	0.0764	0.0052	-0.0433	8.2336	0.3458***	0.0254***	1.1796***	20.9198**
	(0.1761)	(0.0090)	(0.2082)	(21.4512)	(0.1324)	(0.0088)	(0.4425)	(8.5319)
NL	-0.2032	0.0128	-0.6067**	-4.1994	0.0522	-0.0040	0.0187	-48.6812
	(0.1801)	(0.0108)	(0.2539)	(21.3055)	(0.2653)	(0.0155)	(0.2647)	(44.3942)

	White Collar				Blue Collar			
	(1) SAH	(2) HI-2	(3) PMH	(4) PASE	(5) SAH	(6) HI-2	(7) PMH	(8) PASE
NS	-0.1051 (0.1497)	0.0073 (0.0111)	-0.1122 (0.1370)	9.5627 (19.0509)	0.4843*** (0.1629)	0.0187 (0.0129)	0.2144 (0.2259)	56.8893 (35.6126)
PE	-0.0869 (0.2710)	0.0112 (0.0174)	-0.3595 (0.3163)	-0.1782 (21.1291)	0.1833 (0.1848)	0.0140 (0.0130)	0.1646 (0.3334)	31.1318 (29.1961)
QC	0.3922* (0.2163)	0.0055 (0.0117)	0.0460 (0.1396)	15.8657 (13.1256)	-0.2398 (0.1755)	0.0063 (0.0104)	-0.2826 (0.3053)	-36.0874* (21.1787)
SK	-0.0787 (0.2267)	0.0058 (0.0110)	0.0060 (0.2170)	3.8886 (20.8637)	-0.3938 (0.5296)	-0.0307 (0.0231)	-0.7984 (0.4918)	-71.3263** (33.2781)
Observations (<i>n</i>)	63,763	63,298	63,774	61,861	15,725	15,626	15,721	15,041
Groups (<i>n_g</i>)	30,195	30,118	30,203	28,887	8,870	8,840	8,867	8,345

Notes: robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C.4.10: FE Linear and GEE Regression Estimates for Additional Health Outcomes

	FE Linear Regressions				GEE Regressions			
	(1) HI-3	(2) K-10	(3) BMI	(4) LSI	(5) HI-3	(6) K-10	(7) BMI	(8) LSI
Retirement	0.0005	-0.0095	-0.1004**	-1.1302**	1.0027**	0.9664***	0.9932***	0.9737***
	(0.0012)	(0.0193)	(0.0438)	(0.4622)	(0.0013)	(0.0058)	(0.0015)	(0.0036)
Age	-0.0070***	-0.0166	0.4193***	0.9569***	0.9921***	0.9820***	1.0173***	1.0125***
	(0.0004)	(0.0104)	(0.0248)	(0.2390)	(0.0004)	(0.0026)	(0.0008)	(0.0017)
Age squared	0.0000***	0.0001*	-0.0033***	-0.0181***	1.0001***	1.0001***	0.9999***	0.9999***
	(0.0000)	(0.0001)	(0.0002)	(0.0019)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Female					1.0017		0.9820***	0.9507***
					(0.0025)		(0.0027)	(0.0027)
Marital status								
Widow	0.0072***	-0.1119	-0.1458	2.8686**	1.0180***	0.9402***	1.0009	1.0398***
	(0.0028)	(0.0698)	(0.1455)	(1.2918)	(0.0036)	(0.0207)	(0.0049)	(0.0139)
Divorced/separated	0.0067**	0.0206	-0.3344**	1.3340	1.0153***	0.9481**	0.9931	1.0308**
	(0.0028)	(0.0446)	(0.1381)	(1.2411)	(0.0035)	(0.0211)	(0.0047)	(0.0127)
Single	0.0067**	0.0220	0.1081	2.8469**	1.0129***	0.9204***	1.0100*	1.0163
	(0.0033)	(0.0482)	(0.1583)	(1.3825)	(0.0042)	(0.0215)	(0.0055)	(0.0131)
White					1.0251***		1.0268***	1.0449***
					(0.0082)		(0.0074)	(0.0097)
Immigrant					1.0078***		0.9791***	0.9903**
					(0.0029)		(0.0038)	(0.0042)
Education					1.0000		1.0000	1.0000
Secondary					1.1658***		0.9712***	0.9987
					(0.0108)		(0.0066)	(0.0079)
Some post-secondary					1.1646***		0.9711***	0.9869
					(0.0114)		(0.0071)	(0.0083)
Post-secondary					1.1904***		0.9517***	0.9982
					(0.0110)		(0.0059)	(0.0073)
Household income								
\$20,000 to \$49,999	0.0003	0.0106	-0.0263	-0.7502	1.0002	0.9186***	0.9968	1.0646***
	(0.0024)	(0.0562)	(0.1147)	(0.8580)	(0.0032)	(0.0124)	(0.0038)	(0.0108)
\$50,000 to \$99,999	0.0002	-0.0162	-0.0349	0.6935	0.9966	0.8786***	0.9947	1.1013***
	(0.0026)	(0.0537)	(0.1150)	(0.9295)	(0.0034)	(0.0119)	(0.0038)	(0.0110)
\$100,000 to \$149,999	0.0002	-0.0306	0.0406	1.7869*	0.9940*	0.8502***	0.9949	1.1181***
	(0.0029)	(0.0540)	(0.1193)	(0.9867)	(0.0036)	(0.0121)	(0.0039)	(0.0113)
\$150,000+	-0.0006	-0.0302	0.0444	2.3490**	0.9919**	0.8267***	0.9915**	1.1254***
	(0.0029)	(0.0559)	(0.1250)	(1.0452)	(0.0036)	(0.0119)	(0.0041)	(0.0116)
Household size	-0.0001	0.0079	-0.0077	0.0966	0.9995	1.0001	1.0008	1.0017
	(0.0003)	(0.0069)	(0.0202)	(0.1842)	(0.0004)	(0.0023)	(0.0007)	(0.0014)
Own dwelling	0.0006	0.0085	0.0260	0.0440	1.0042**	0.9551***	0.9931***	1.0386***
	(0.0013)	(0.0264)	(0.0763)	(0.7798)	(0.0017)	(0.0083)	(0.0025)	(0.0051)
Urban	0.0017**	0.0041	0.0403	0.6796	0.9963***	0.9993	1.0031	0.9864***
	(0.0007)	(0.0191)	(0.0700)	(0.6426)	(0.0008)	(0.0079)	(0.0021)	(0.0044)
Retirement of spouse	0.0000	0.0001	0.0255	-0.0881	0.9987	1.0046	1.0000	1.0029
	(0.0009)	(0.0160)	(0.0425)	(0.3943)	(0.0009)	(0.0060)	(0.0014)	(0.0035)
Social support	-0.0000	-0.0012**	0.0000	0.0187	0.9999***	0.9955***	1.0000	1.0008***
	(0.0000)	(0.0006)	(0.0015)	(0.0117)	(0.0000)	(0.0002)	(0.0000)	(0.0001)
Social engagement								
Yearly	0.0019	0.1269	0.0832	3.7412	1.0055*	1.1263*	1.0025	1.1434***
	(0.0026)	(0.1831)	(0.2334)	(2.3826)	(0.0032)	(0.0700)	(0.0084)	(0.0469)
Monthly	0.0060**	0.1085	0.1630	8.9928***	1.0129***	1.0914	1.0046	1.2698***
	(0.0025)	(0.1813)	(0.2238)	(2.1966)	(0.0030)	(0.0651)	(0.0081)	(0.0502)
Weekly	0.0057**	0.0962	0.1799	10.2064***	1.0156***	1.0634	1.0031	1.3223***
	(0.0025)	(0.1816)	(0.2216)	(2.1808)	(0.0030)	(0.0633)	(0.0080)	(0.0521)

		FE Linear Regressions				GEE Regressions			
		(1) HI-3	(2) K-10	(3) BMI	(4) LSI	(5) HI-3	(6) K-10	(7) BMI	(8) LSI
Province	Daily	0.0054** (0.0025)	0.0626 (0.1824)	0.1352 (0.2246)	10.6935*** (2.1977)	1.0158*** (0.0030)	1.0508 (0.0626)	1.0001 (0.0081)	1.3510*** (0.0533)
	AB	0.0041 (0.0029)	0.0088 (0.0944)	-0.1553 (0.2605)	-4.3448 (3.4786)	0.9801*** (0.0055)	0.9927 (0.0089)	0.9956 (0.0050)	0.9576*** (0.0057)
	BC	0.0032 (0.0029)	-0.1047 (0.0698)	-0.0345 (0.2154)	0.7169 (3.3787)	0.9865*** (0.0034)	0.9720*** (0.0069)	0.9789*** (0.0039)	0.9961 (0.0044)
	MB	0.0055 (0.0076)	-0.1291 (0.1040)	0.9251*** (0.3546)	-10.4350*** (3.3352)	1.0022 (0.0043)	0.9785** (0.0089)	1.0293*** (0.0056)	0.9316*** (0.0052)
	NB	-0.0010 (0.0031)	-0.0465 (0.0987)	0.5718 (0.5340)	-2.7033 (5.3802)	1.0119*** (0.0046)	0.8754* (0.0620)	1.0012 (0.0090)	0.9866 (0.0440)
	NL	-0.0004 (0.0030)	-0.2896 (0.2498)	0.4363 (0.3457)	-0.0295 (4.0709)	0.9948 (0.0047)	0.9572*** (0.0103)	1.0257*** (0.0058)	1.0994*** (0.0069)
	NS	0.0009 (0.0024)	0.2220* (0.1346)	0.3303 (0.2960)	-1.1221 (3.9709)	1.0095*** (0.0030)	0.9749*** (0.0085)	1.0106** (0.0048)	0.9580*** (0.0050)
	PE	-0.0026 (0.0027)	0.1540 (0.1331)	-0.1766 (0.4211)	10.1194 (8.6947)	1.0135*** (0.0041)	0.8108 (0.1045)	0.9993 (0.0084)	0.9471 (0.1259)
	QC	0.0056* (0.0031)	-0.0081 (0.1472)	-0.2539 (0.2389)	1.1293 (4.3120)	1.0129*** (0.0034)	1.0467*** (0.0076)	0.9788*** (0.0037)	1.0153*** (0.0047)
	SK	0.0015 (0.0057)	-0.2463** (0.1106)	0.3105 (0.4144)	-5.9955 (5.5592)	1.0053 (0.0051)	1.0231 (0.0887)	1.0013 (0.0080)	0.8839* (0.0592)
Observations (<i>n</i>)		89,395	51,538	96,422	60,679	89,201	51,626	96,210	60,598
Groups (<i>n_g</i>)		39,494	24,067	42,032	24,945	39,397	24,082	41,928	24,909

Notes: (2) and (6) are based only on COM data; robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.