Ageing with Purpose: Factors Shaping Well-being and Behaviour in Older Lives - Insights From the SHARE Database

By

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Thesis summary

This research, a comprehensive exploration, delves into the factors shaping well-being and behaviour in older adults using data from the Survey of Health, Ageing, and Retirement for Europe (SHARE). It is a collection of three independent papers focusing on European countries. Chapter 1 presents a general introduction to factors that shape well-being and behaviour in older adults, the aim of this thesis, research motivation, the significance of ageing research in economics, the SHARE dataset and the thesis structure.

Chapter 2 (Paper 1) examines the role of locus of control in impacting the participation and frequency of volunteering among adults aged 50 and over in Europe. While multiple studies examine the concept of locus of control and how it impacts health-related behaviour, our understanding of its impact on volunteering for older adults is limited. Our analysis draws on panel data from multiple waves across several European regions (Northern, Central and Southern Europe) covering the period 2010 (Wave 4) to 2019 (Wave 8). We employ a fixed effects (FE) approach to address unobserved individual factors and time-invariant characteristics. We employ a fixed effect instrumental variable (FE-IV) approach to address endogeneity. The results show that locus of control positively and significantly influences volunteering participation and frequency, suggesting that older adults with a high sense of control are more likely to participate and frequently volunteer. When it comes to gender difference, women volunteer more frequently than men. Our heterogeny analysis shows that this relationship varies across Europe. This effect is particularly pronounced in Southern Europe.

Chapter 3 (Paper 2) investigates the impact of emotional closeness on life expectancy among people aged 50 and over in 14 European countries, covering three waves of the SHARE Wave 4 (2010), Wave 6 (2015) and Wave 8 (2019). This is the first economic investigation using emotional closeness as part of social networks. Therefore, we use emotional closeness as the main independent variable in this paper. We employ a fixed effects (FE) approach to address unobserved individual factors and time-invariant characteristics. We employ a fixed effect instrumental variable (FE-IV) approach to address endogeneity. We use network satisfaction as an instrumental variable. We find that a higher level of emotional closeness has a positive causal impact on life expectancy.

Regarding gender differences, our results show that older women are affected by this relationship but not older men. Our regional heterogeny analysis divided European countries into two groups: countries with collectivistic cultures and countries with individualistic cultures. In collectivist European cultures, this connection is particularly strong for women, highlighting the influence of cultural context on health outcomes.

Chapter 4 (Paper 3) examines the impact of retirement on Instrumental Activities of Daily Living (IADLs). Our analysis focuses on how the transition from work to retirement and time spent in retirement affect the ability of older adults to perform those activities independently. We employ a fixed effects (FE) approach to address the time to control unobserved factors and individual characteristics. We use a fixed effect instrumental variable (FE-IV) approach to address endogeneity. We use normal state pension age eligibility as an instrumental variable for transition to retirement. We use retirement duration as an instrumental variable. We find that the transition to retirement increases difficulties. We also find that spending more time in retirement exacerbates those difficulties in IADLs, especially for older men and those in Central Europe and Mediterranean countries.

Declaration

I certify that this thesis:

1. does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university

2. and the research within will not be submitted for any other future degree or diploma without the permission of Flinders University; and

3. to the best of my knowledge and belief, does not contain any material previously published or written by another person except where due reference is made in the text.

Mohammad Almomani

30/05/2025

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Chapter 1: General Introduction

1.1 Overview

This chapter aims to provide relevant background information about factors shaping well-being and behaviour among older people and outline several strategies that have been used to help them improve their health. It provides a summary of the present study including background and rationale. In recent years, there has been an increase in the literature focusing on older people's health and the factors that shape their lives. The natural ageing process and age-related health issues can contribute to a negative impact on health. Factors such as locus of control, emotional closeness and the transition to retirement can also lead to a significant change in physical health, mental health and well-being for older adults. It is crucial to understand these factors, as it can help develop strategies to support positive change and improve the overall health of older adults. This chapter concludes with an outline of the structure of this thesis, which underscores the urgency and importance of this topic.

1.2 Ageing with purpose

The elderly population is not only growing in absolute numbers but is also experiencing significant improvements in health. This phenomenon, known among demographers and health specialists as the "compression of morbidity," indicates that the duration of healthy ageing is on the rise. An increase in life expectancy and a reduction in the duration and onset of illness both contribute to this trend. The overall outcome is a greater number of years in old age spent without major health issues (Bloom, 2011). Natural ageing often introduces health challenges that can impact physical and mental well-being. As individuals grow older, they may encounter chronic diseases, reduced mobility, and cognitive decline, which can all lead to a decrease in independence and overall quality of life. Acknowledging these issues is vital for creating specific strategies to promote healthy ageing. Additionally, these strategies play a crucial role in lowering healthcare expenses related to ageing populations, encouraging healthcare providers, policymakers, and caregivers to stay dedicated to caring for older people.

This emphasises the vital role of healthcare professionals and policymakers in addressing these health trends and supporting the well-being of the elderly population. As many countries worldwide experience changes in their demographic structure, there has been a significant rise in the research and attention to the ageing population. The notable rise in life

expectancy presents several possibilities and challenges, underscoring the urgent need for a comprehensive understanding of the factors that influence the well-being of older adults (Carmel, 2019). This is the most rapidly growing group in the population and the percentage is expected to increase from 12% in 2020 to 22% in 2050 worldwide (WHO, 2022). Psychosocial and social aspects significantly affect the survival rate, acceptance of health-prompting behaviour, and boost quality of life (Feng et al., 2020). The ageing process comes with a significant change that impacts people's lives. As a person accumulates years, complex social, physical and psychological interactions, such as body and cognitive changes, influence behaviour and overall well-being. Evidence shows that older people today have better physical health than prior generations (WHO, 2015). The purpose in later life is more than just having good physical health. Studies show a strong relationship between having a sense of purpose and physical and mental health for the ageing population. It diminishes the factors that increase the mortality rate (Alimujiang et al., 2019) and improves the likelihood of staying alive (Windsor et al., 2015).

This research employs an integrated strategy to investigate many factors that influence the well-being of older persons, using data from the Survey of Health, Ageing and Retirement for Europe (SHARE) Database. The thesis starts by examining the psychological dimension of ageing, specifically evaluating the influence of locus of control on participation in volunteer activities. Examining human agency and societal contribution is essential for comprehending the broader social dynamics discussed in the following sections. Expanding on these psychological foundations, the research subsequently examines the impact of emotional closeness on the life expectancy of older individuals. The complex interplay between individual psychological variables and social interactions provides the foundation for the subsequent investigation, which examines the intergenerational influence of inheritance on mental well-being after retirement. The research provides a comprehensive and interrelated investigation of the many aspects that influence the welfare of older adults. Combining these dimensions effectively presents a nuanced view of ageing with purpose.

1.3 Well-being

Well-being is a complex concept that includes several elements, such as emotional, psychological, and social factors. It greatly enhances one's happiness and contributes to

society's development (Schonfeld, 2017). Ensuring optimal well-being is essential for individual development, significant interpersonal connections, and productive engagement in society. (WTO, 2022). Pursuing happiness and well-being has long been an integral aspect of human existence. Well-being is crucial in shaping an individual's choices, actions, and general quality of life within the framework of their existence. (Diener & Chan, 2011). It is a collection of feelings and encounters with positive emotions such as happiness, satisfaction and having control in a person's life (Ruggeri et al., 2020). It is the emotional assessment of life satisfaction, quality of life and mental health (Peng et al., 2018). Among the older population, challenges in participating in community activities have been linked to self-perceived sadness, negatively affecting mental, social, and physical well-being (Hao et al., 2017). This is more likely to increase the risk of mental health issues due to factors such as physical weakness, disease, social isolation, and the natural process of ageing (Kadariya et al., 2019). Hence, in addition to giving priority to extending their life expectancy, it is important to understand the factors that maintain the well-being of older adults (Wang et al., 2011).

1.4 Ageing in Europe

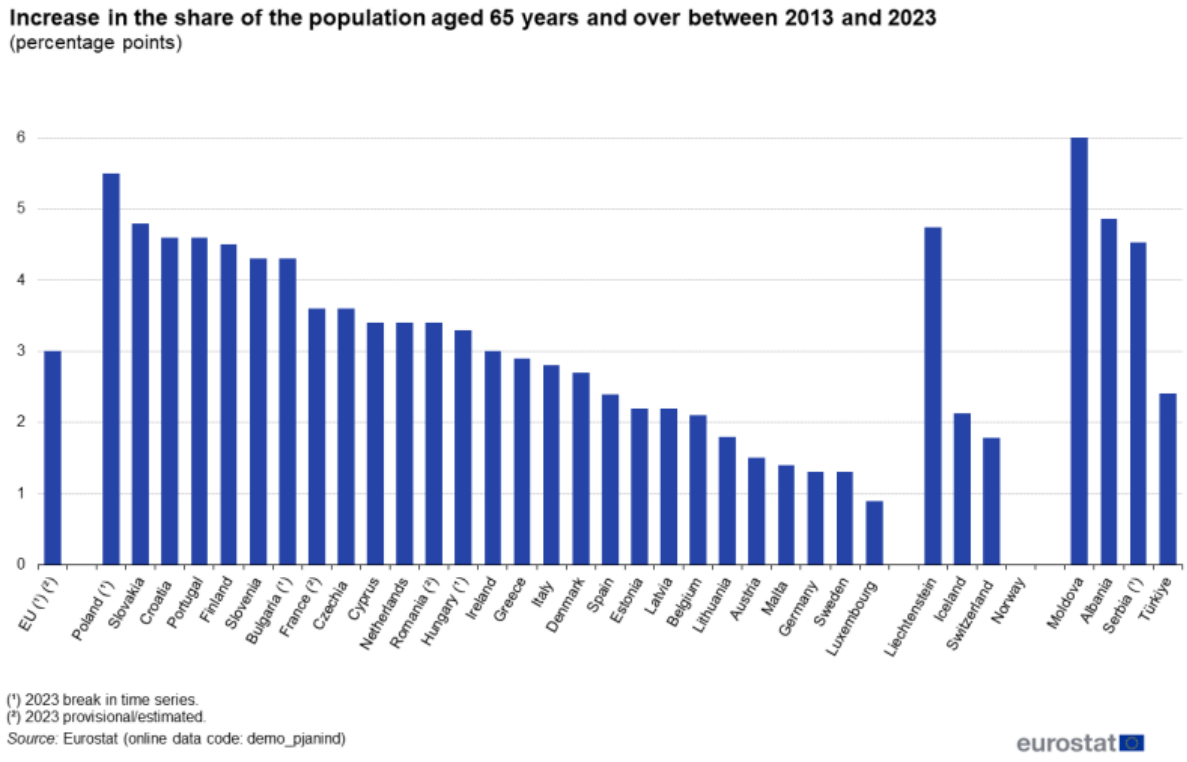
Europeans are living longer than ever before, and this trend is rapidly reshaping our society. Demographic ageing is inevitable, characterised by a decreasing proportion of working-age individuals in the EU and a growing number of older people. This pattern will continue over the next few decades as the post-war baby boom generation fully transitions into retirement. It demands immediate attention due to its significant societal and economic implications (Eurostat, 2020).

The causes of population ageing in Europe differ from country to country. However, three primary factors contribute to this trend. First, the significant increase in older adults aged 65 and over can be attributed to the high fertility rates observed between 1950 and 1960 (UN,2017). The period following World War II saw a significant increase in the social and economic well-being of those in childbearing age, leading to a "baby boom" (Artzrouni and Easterlin, 1982). Second, Migration can significantly impact the size of the working-age population within a given society. An influx of young immigrants can reduce the proportion of the ageing demographic, offering a more optimistic outlook for the future. In countries such as Luxembourg, Switzerland, Norway, Germany, Sweden, Finland, Belgium, Denmark, and

Austria, immigration is expected to help alleviate the challenges associated with population ageing.

On the other hand, when working-age individuals leave, emigration can exacerbate the effects of an ageing population, presenting a distinct set of obstacles (UN,2017). Third, as life expectancy continues to rise, projections suggest that by 2060, the average life span will reach 84.6 years for men and 89.1 years for women—an increase of 7.9 years for men and 6.6 years for women compared to 2010. This shift in the age structure of the population is significant. The future life expectancy of the older population will largely depend on advancements in medicine aimed at preventing the leading causes of death, including ischemic artery disease, stroke, and chronic obstructive pulmonary disease (UN,2017).

Figure 1.1 Increases in European countries' ageing populations



Source: Eurostat website: https://ec.europa.eu/eurostat/statisticsexplained.

The portion of the population aged 65 years and older rose in 20 Member States, highlighting the pressing need for immediate action to address this demographic change. The highest percentages of older individuals were found in Italy (24.0%), Portugal (24.0%), Bulgaria

(23.5%), Finland (23.3%), Greece (23.0%), and Croatia (22.7%). In contrast, Luxembourg (14.9%) and Ireland (15.2%) had the lowest shares of people aged 65 and over. In summary, from 2022 to 2023, the percentage of individuals aged 65 and older increased in 20 Member States. However, it decreased in Estonia, Czechia, and Malta and remained unchanged in Spain, Lithuania, Hungary, and Germany (Eurostat, 2024).

1.5 Research motivation

The ageing population in Europe is experiencing rapid growth, leading to a significant demographic shift that impacts all facets of society, including policy, system services, and communities. The quality of life in later years goes beyond physical health; current evidence indicates that older adults today are not necessarily in better physical health than earlier generations (WHO, 2015). This negatively impacts healthcare costs, social security and labour markets.

Previous literatures have established links between personality traits and volunteering behaviour, highlighting the importance of factors such as self-esteem, self-efficacy, and social connectedness (Brown et al, 2021; Carlo et al., 2005; Clary et al., 1998). However, there is still a need to understand how these traits interact with locus of control and influence volunteering decisions among the elderly. This thesis aims to fill this gap by investigating the psychological, social, and physical factors of ageing, with a particular focus on the role of locus of control in volunteering behaviour.

This thesis addresses the urgent need to understand the factors influencing well-being, health, and social participation across European countries, where there is a gap in previous studies. It aims to address the gap by investigating the psychological, social and physical factors of ageing. Grasping these factors is vital for fostering well-being in later life, empowering older individuals to pursue what matters to them, maintaining their autonomy in decision-making, and upholding their sense of purpose, identity, and independence (WHO, 2020).

Previous literatures have established links between personality traits and volunteering behaviour, highlighting the importance of factors such as self-esteem, self-efficacy, and social connectedness (Brown et al, 2021; Carlo et al., 2005; Clary et al., 1998). However, there is still a need to understand how these traits interact with locus of control and influence

volunteering decisions among the elderly. This thesis aims to fill this gap by investigating the psychological, social, and physical factors of ageing, with a particular focus on the role of locus of control in volunteering behaviour.

Chapter two addresses a gap in the existing literature by examining the relationship between locus of control in influencing volunteering behaviour among the elderly. While previous studies have established connections between personality traits such as self-esteem, self-efficacy, and social connectedness and volunteering behaviour (Brown et al., 2021; Carlo et al., 2005; Clary et al., 1998), there remains a need to understand how these traits interact with locus of control. This thesis aims to fill this gap by investigating the psychological, social, and physical factors of ageing, with a particular focus on the role of locus of control in volunteering decisions.

Chapter three addresses a crucial gap in the existing research by focusing on the specific role of emotional closeness within the economic framework and its causal impact on life expectancy for older adults. While previous research has predominantly examined general social networks and their health consequences, the distinct contribution of emotional closeness has been relatively unexplored. Additionally, this study uniquely investigates cultural differences in this relationship by utilizing the SHARE dataset, allowing for a robust, multi-country analysis

Chapter four fills a gap in the current body of research by examining the causal relationship between retirement and difficulties in Instrumental Activities of Daily Living (IADLs). While previous research has extensively explored the impact of retirement on various health outcomes, such as mental health, physical health, and cognitive functions, there has been no prior study linking retirement with IADLs difficulties.

1.6 Aims of the thesis

The link between psychological factors such as locus of control, emotional closeness and transitions in later life, such as retirement, is an important discussion due to its implications for public health, social security and the labour markets, especially for the European region. This thesis aims to examine those three factors that affect ageing: (1) The importance of locus of control for shaping social behaviour (volunteering), (2) the role of emotional closeness on

life expectancy, and (3) the impact of the transition to retirement on functional independence (Instrumental Activities of Daily Living).

Paper 1 primarily focuses on analysing the influence of locus of control. This psychological concept assesses an individual's perceived degree of control over their lives (Rotter, 1966) in volunteering work among older adults. Volunteering work, defined as the increased focus on volunteering among older adults in recent years, is mainly due to its diverse advantages. Extensive research continually highlights the positive impacts of volunteering on both physical and mental health, promoting enhanced overall well-being (Baumbach, 2022; Sharifi et al., 2024). A study of the impact of locus of control on volunteers is likely to provide insights into the underlying motivations and behaviours that contribute to a sense of purpose and satisfaction in the later years of life.

Paper 2 delves into the causal impact of emotional closeness on the life expectancy of older adults. This chapter aims to investigate European cross-country evidence to uncover the social dynamics that influence the longevity of emotional connections. Understanding the influence of relationships on life expectancy is crucial for developing strategies and initiatives that foster supportive environments for the older population.

Paper 3 four uncovers the link between the transition from work to retirement and Instrumental Activities of Daily Living (IADLs). IADLs are tasks maintaining independence for older adults. It includes making phone calls, taking medications, managing money, shopping for groceries and cooking a hot meal. Retirement is considered a significant transition in older adults' lives. Therefore, in this chapter, we scrutinise the causal impact of retirement on IADLs in European countries.

The study of ageing and well-being has been examined widely. Previous studies focus on psychological factors such as social networks (Cohn-Schwartz; Ding et al., 2023; Vos et al., 2020), mental health (Yen et al., 2024; García-Prado et al., 2022), and life satisfaction (García-Chanes, 2024; An et al., 2023). However, the impact of factors such as locus of control, emotional closeness and retirement on some health outcomes (ex., volunteering, life expectancy and IADL difficulties) remains unexplored. This thesis fills this gap by drawing from economic and physiological frameworks among European countries. Moreover, it contributes by doing the regional heterogeny analysis for those countries and examining the cultural

differences between European regions. These two contributions provide a holistic view of ageing, offering valuable insights to policymakers and stakeholders on fostering well-being in ageing populations across diverse socioeconomic and cultural contexts in Europe.

The study of ageing and well-being has been extensively explored. Previous research has primarily focused on psychological factors, including social networks (Cohn-Schwartz; Ding et al., 2023; Vos et al., 2020), mental health (Yen et al., 2024; García-Prado et al., 2022), and life satisfaction (García-Chanes, 2024; An et al., 2023). However, the effects of factors such as locus of control, emotional closeness, and retirement on health outcomes have remained largely unexamined. This thesis addresses this gap by drawing from economic and physiological frameworks across European countries. Additionally, it contributes by analysing regional heterogeneity within these countries and investigating cultural differences among European regions. These two contributions provide a comprehensive perspective on ageing, offering valuable insights for policymakers and stakeholders. The findings of this research can guide the development of policies and interventions aimed at enhancing well-being in ageing populations across diverse socioeconomic and cultural contexts in Europe.

This thesis also aims to examine the cultural differences between European countries. European countries have distinguished between regions according to ageing population healthcare systems. Northern and Central Europe have well-known pension systems that substantially support old adults, including well-known healthcare systems and high pension payments compared to Southern European countries. In contrast, Southern European countries, which are mostly Mediterranean, have a societal structure emphasising family ties and communities more than government programs (Hofsted, 1980).

1.7 The Importance of Understanding Elderly Volunteering Decisions, Life Expectancy, and IADLs

It is important to understand the relationship between older people's volunteering, life expectancy and Instrumental Activities of Daily Living (IADLs). Research has shown that volunteering among older adults can have significant health benefits, including improved physical and mental well-being, improved cognitive function, and increased life satisfaction (Musick & Wilson, 2008; Luoh & Herzog, 2002). These benefits are not limited to the older

adults themselves but extend to the wider community as older volunteers provide valuable services and support to various organisations and individuals in need (Morrow-Howell, 2010).

Research suggests that volunteering can lead to better health outcomes by promoting social engagement and cognitive stimulation (Carr, 2018), which are essential for maintaining functional health and IADLs. For example, older adults who volunteer regularly are more likely to maintain their independence and perform daily tasks effectively, thereby reducing the risk of disability and improving their overall quality of life (Tomioka, Kurumatani, & Saeki, 2018).

The relationship between volunteering and life expectancy is well-documented. Studies have found that older adults who volunteer tend to have lower mortality rates and a reduced risk of chronic diseases, such as hypertension and heart disease (Gonzales, Suntai, & Abrams, 2019). This suggests that volunteering can play a vital role in promoting longevity and healthy ageing.

Furthermore, the correlation between life expectancy and IADLs is noteworthy. While an increase in life expectancy is generally observed, this does not necessarily translate into more years of healthy living. Research indicates that maintaining IADLs is crucial for ensuring a higher quality of life and reducing the duration of disability in older age (Liao & Chang, 2020). Older adults who can perform IADLs independently are more likely to experience a longer period of disability-free life expectancy, which contributes to overall well-being and reduces the burden on healthcare systems (Johnson et al., 2019).

1.8 Literature reviews

This section summarises previous research on the factors influencing the well-being of older adults, specifically targeting studies pertinent to ageing populations in Europe. The review is structured into three key parts. Firstly, it highlights research on ageing and well-being, examining how individual factors such as health, autonomy, and social support, along with external influences like policy and environmental conditions, contribute to well-being in later life. Secondly, it delves into studies focusing on the European context, considering regional differences in welfare systems, cultural norms, and retirement policies. Lastly, it discusses the invaluable insights gained from the Survey of Health, Ageing, and Retirement in Europe (SHARE) dataset, which provides extensive longitudinal data on health, socioeconomic status, and social networks across various European countries and serves as a cornerstone for

understanding the well-being of older adults. Collectively, these strands of literature lay a robust foundation for comprehending the diverse influences on older adults' well-being and guide the current study's focus.

1.8.1 Ageing and well-being

The study by Silas Amo-Agyei and Maurer (2024) presents a comprehensive examination of the impact of pain on subjective well-being (SWB) and time use among older adults in five low- and middle-income countries. This research utilises the WHO Study on Global Ageing and Adult Health (SAGE) data. The authors focus on two aspects of well-being: evaluative well-being, which reflects overall life satisfaction, and experienced well-being, which captures real-time emotional states and experiences during daily activities. Moreover, the study employs an innovative method using anchoring vignettes as control variables to mitigate self-rating biases in reporting pain and SWB. Results indicate that individuals experiencing pain report significantly lower levels of both evaluative and experienced well-being compared to those who are pain-free. These disparities are primarily linked to poorer emotional experiences during daily activities for those living with pain. Notably, while people with pain spend more time on leisure activities, which typically yield higher affective ratings, these time-use adjustments offer minimal compensatory effects. The research also concludes that differences in SWB related to pain are largely mediated by functional limitations, with variations in pain experiences affecting disability levels. The authors stress the importance of considering both evaluative and experienced well-being to fully understand the impact of pain on quality of life, particularly in these contexts in low- and middle-income countries, highlighting the global relevance of their findings.

Another study by Xu et al. (2023) explores the effects of population ageing on eco-tourism efficiency and the size of the tourism market across six regions in China from 2000 to 2021. The findings reveal that, in most regions, population ageing does not significantly affect eco-tourism efficiency. However, in Northeast and Southwest China, societal ageing has a notable impact on eco-tourism efficiency in both the short and long term. Moreover, population ageing appears to reduce the size of the tourism market, particularly in the short term. The authors suggest several policy measures to address these challenges, including promoting senior tourism, developing virtual tourism services, supporting small and medium enterprises

within the tourism sector, and enhancing eco-literacy among older adults to encourage their participation in sustainable tourism activities. If implemented, these measures could alleviate the negative effects of population ageing and usher in a new era of sustainable and inclusive tourism.

The study by de Albuquerque et al. (2021) explores the effects of population ageing on inflation across 24 countries from 1961 to 2014, employing panel cointegration methods. This research examines whether population ageing serves as a catalyst for inflationary or disinflationary trends, emphasising that the outcome is influenced by the stage of demographic transition and the changing proportions of various age groups. The results reveal a long-term equilibrium relationship between inflation and the distribution of population age shares. It indicates that different age groups—individuals under 20, young adults, middle-aged people, and older seniors—affect inflation in distinct ways. The study highlights which age groups have significant positive or negative impacts on inflation.

Blanchflower (2020) explores the relationship between age and happiness, finding a U-shaped curve in life satisfaction across different countries, including 109 developing nations. The study indicates that happiness decreases until midlife, around age 50, before rising again. This pattern is consistent across various measures of well-being, such as life satisfaction and financial security, and remains robust even after considering factors like education, marital status, and employment. Notably, while the raw data in the U.S. might suggest an M-shaped pattern, the results align with the U-shape when control variables are introduced. The analysis indicates that the midlife low point, or nadir, varies by region—averaging 46.7 years in advanced countries and 49.9 years in developing countries. Blanchflower also addresses the reliability of the U-shaped curve, finding little impact from cohort effects or differences in response rates. Although the study is based on cross-sectional and time-series data and notes some limitations regarding longitudinal studies, the results consistently support the U-shaped pattern of happiness, emphasising its significance in understanding subjective well-being throughout life

Cosco et al. (2017) investigate the role of resilience in fostering healthy ageing and well-being amid adversity, emphasising its significance as populations ages. The study critiques traditional models of healthy ageing, which typically focus solely on high functioning across physical, social, and psychological domains, by incorporating resilience as a vital element. In

this context, resilience refers to the ability to navigate challenges while maintaining high levels of functioning—a concept particularly relevant for ageing populations that are likely to face increasing obstacles. The authors advocate for asset-based approaches that leverage individual, social, and environmental resources to promote resilience at a community level. They highlight the potential of public policy interventions to enhance social and ecological support, thereby improving the well-being of older adults. The study emphasises the necessity of maintaining quality of life in ageing interventions, as the enjoyment of additional years is a key aspect of their value. As a public health concept, resilience carries significant implications, such as alleviating caregiver burdens and enhancing productivity by encouraging well-being in the face of age-related challenges. This approach is deemed essential for both individuals and society as they confront the complexities of an ageing population.

The study by Schwandt (2016) investigates how unmet aspirations contribute to the U-shaped curve of well-being across different ages, utilising data from the German Socioeconomic Panel (SOEP). The research reveals that individuals tend to overestimate their future life satisfaction when they are young, anticipating improvements that ultimately do not occur while underestimating their well-being in older age. These forecasting errors are notable, with expectations differing by 9.8% at age 21 and -4.5% at age 68. Such biases persist over time and are evident across various cohorts and socioeconomic groups. Schwandt posits that unmet expectations, particularly concerning life satisfaction, are crucial in driving the U-shape of well-being throughout life. In youth, elevated aspirations lead to disappointment during midlife; however, as individuals grow older, these aspirations are gradually relinquished, and the negative emotional consequences of unmet expectations lessen. The study demonstrates that forecasts regarding life satisfaction tend to be overly optimistic in young adulthood and that individuals are slow to recalibrate their expectations as they age. This pattern supports the theory that unmet aspirations contribute to the midlife dip in well-being, which tends to improve as people reconcile with their unmet goals. The findings also emphasise that these forecasting errors cannot be easily attributed to observable life circumstances such as divorce or employment status. These have shown minimal explanatory power for the U-shaped curve. Rather, it is the psychological adjustments to unmet expectations, alongside the diminished emotional impact of regret in later life, that influence changes in well-being throughout the life cycle. The study highlights the significance of recognising the cognitive biases—such as

optimism and regret—that shape individuals' predictions about life satisfaction. It suggests that these cognitive patterns may affect crucial life decisions, including career and financial planning, potentially resulting in suboptimal choices. This realisation should make us more cautious and aware when making such decisions.

Steptoe et al. (2015) investigate the relationship between subjective well-being, health, and ageing, emphasising the variations in well-being across different age groups and its connection to survival among older adults. They identify three dimensions of subjective well-being: evaluative (life satisfaction), hedonic (emotions such as happiness and stress), and eudemonic (sense of purpose). Utilising data from the Gallup World Poll, which encompasses over 160 countries, they reveal a U-shaped relationship between evaluative well-being and age in high-income, English-speaking countries, noting that the lowest well-being occurs in individuals aged 45–54. However, this pattern is not uniform globally, as it shows a steady decline in Eastern Europe and little fluctuation in sub-Saharan Africa. Furthermore, leveraging data from the English Longitudinal Study of Ageing (ELSA), the authors explore eudemonic well-being in relation to mortality. They report that 29.3% of individuals in the lowest quartile of eudemonic well-being died during an 8.5-year follow-up, in contrast to just 9.3% in the highest quartile, even after accounting for demographic, physical, and mental health factors. These findings highlight the critical need to prioritise the well-being of older adults in health and economic policy, stressing the urgency of addressing this critical issue.

1.8.2 European Ageing and Well-being

Długosz (2011) examines the ageing population in Europe, using 2005 as a starting point and making projections up to 2045 based on United Nations data. The study identifies key demographic trends, such as the ageing index, which indicates the ratio of elderly to youth and reveals significant social and economic impacts. In 2005, countries like Albania had an ageing index of 33, while Italy's was much higher at 138. By 2045, many countries are expected to see this index double, with Germany and Italy projected to have the highest numbers at 261 and 251, respectively. Rapid ageing is anticipated in Latvia, Ukraine, Estonia, and Russia due to longer life expectancy and lower birth rates. The parent support ratio, which looks at how many children are available to care for ageing parents, varies across countries. Wealthier nations with strong social support systems manage better, while poorer countries depend

more on families to provide care. Economically, the potential support ratio, showing how many working-age people are there to support retirees, is projected to decline. This poses challenges for social security systems. Moreover, the author stresses the importance of proactive policies to tackle these issues, such as encouraging higher birth rates, strengthening family connections, and promoting active ageing. Attracting migrants to return and other economic strategies could help balance the ratio of workers to retirees and lessen the challenges associated with rapid ageing, suggesting a more optimistic outlook for the future.

The study conducted by Grundy (2006) delves into the processes and circumstances that contribute to vulnerability among older adults, with a focus on risks related to diminished quality of life or the likelihood of an untimely and degrading death. It employs a conceptual framework that characterises vulnerable older individuals as those whose physical, psychological, or social reserve capacity is insufficient to handle life's challenges. Taking a demographic perspective, Grundy discusses the increasing proportion of older populations in Europe and the implications this has for family and social support structures. The study highlights that vulnerability in ageing results from a dynamic interplay between an individual's reserves, the challenges they encounter, and the compensatory supports available to them. Grundy advocates for policy interventions at all life stages to mitigate vulnerability, such as encouraging healthy lifestyles, strengthening social connections, and ensuring access to financial and care-related resources in later years. The findings indicate that while certain physical and psychological challenges are unavoidable, others can be alleviated through effective support systems, including acute care, professional social and psychological assistance, and long-term income support. However, the author points out that evidence regarding the effectiveness of such interventions is limited due to a lack of rigorous evaluation studies, highlighting the necessity for further research and its potential implications for policy and support systems.

1.8.3 SHARE dataset ageing and well-being

Using SHARE data, the study conducted by Adena et al. (2023) investigates the well-being of widowed older women by utilising data from the Survey of Health, Ageing and Retirement in Europe (SHARE) and time diaries from various countries, including Poland, the U.S., the U.K., and France. The research emphasises the disparities in well-being between widowed and

partnered women, particularly concerning time use. Results indicate that widowhood leads to a significant decline in mental health and life satisfaction, with a gradual recovery observed over five years. The analysis reveals that the loss of a partner is linked to an increase in time spent alone, which is the primary factor influencing the decline in well-being. This suggests that reducing the time widows spend in solitude could greatly enhance their quality of life. The study employs advanced matching techniques to compare widowed women to non-widowed 'statistical twins,' offering a comprehensive view of well-being before and after the loss of a spouse. This research is innovative in its methodology, combining extensive longitudinal data with time-use information to explore the dynamics of widowhood and its effects on well-being. The implications of this study for public policy and family support are profound, highlighting the necessity of addressing loneliness and promoting social interaction to bolster the mental health of widowed older women. It is sure to resonate with those interested in these critical issues.

The research conducted by Becchetti et al. (2023) explores the relationship between eudaimonic well-being, defined as a sense of purpose in life, and subjective survival probability (SSP), a proxy for self-assessed life expectancy. This study utilises data from the Survey of Health, Ageing, and Retirement in Europe (SHARE), encompassing 220,601 observations covering the period from 2006 to 2015 across various European countries. The methodology is comprehensive, featuring econometric analyses that account for self-assessed health and apply instrumental variable techniques to mitigate potential endogeneity concerns, with the number of children serving as the instrument. The results reveal a robust positive association between eudaimonic well-being and subjective survival probability. Specifically, individuals who report a stronger sense of purpose exhibit significantly higher survival probabilities, with those possessing the highest sense of life indicating a 7% increase in self-assessed survival probability. Additionally, the research suggests that eudaimonic well-being has a noteworthy negative impact on mortality, reinforcing the notion that respondents' elevated survival expectations align with actual survival trends.

The study by Ayala et al. (2021) explores the impact of active and healthy ageing indicators—such as health, social participation, and lifelong learning—on changes in quality of life (QoL) among older adults. Utilising longitudinal data from the Survey of Health, Ageing, and Retirement in Europe (SHARE), the research focuses on a sample of 7,589 participants aged

50 and over from Portugal, Spain, and Sweden, examining data from waves 4 (2011) and 6 (2015). The authors use principal component analysis to categorise variables and linear regression models to evaluate changes in QoL, as measured by the CASP-12 scale. The results reveal country-specific differences in QoL trajectories over the four years: QoL improved in Portugal, declined in Spain, and remained stable in Sweden. Significant interactions were observed, with social participation positively influencing QoL in Spain but not in Portugal or Sweden. Across all countries, physical health, emotional well-being, functional ability, and cognitive and sensory capabilities were consistently linked to changes in QoL. These findings highlight the significance of country-specific factors in shaping QoL outcomes and offer practical insights for developing tailored public health policies to enhance the older population's well-being.

The study investigates the concept of active and healthy ageing across the 28 European Union (EU) countries by introducing the Active Ageing Index (AAI), an innovative quantitative measure. Unlike prior literature that primarily focused on concepts and policy strategies, the AAI assesses the contributions of older adults not only in terms of employment but also through their unpaid familial, social, and cultural roles, as well as their capacity for independent and secure living. This measure reveals disparities among countries, with Sweden occupying the top position, followed by Denmark, the UK, Finland, the Netherlands, and Ireland. In contrast, southern European nations such as Italy, Portugal, Spain, and Malta rank in the middle, while Greece and several Central European countries fall to the bottom, indicating untapped potential and the urgent need for policy reform. The study also highlights the significance of addressing gender disparities, as women generally perform worse than men in most countries. The AAI is a valuable tool for policymakers to identify the social policy mechanisms that drive success in high-ranking countries and pinpoint areas where lower-ranking countries struggle. This research aligns with global policy milestones, including the 2012 European Year for Active Ageing and Solidarity between Generations and the Madrid International Plan of Action on Ageing. It emphasises the necessity of evidence-based strategies to empower older populations, encouraging their ongoing participation in social, economic, and cultural life while promoting autonomy and independence. Overall, this research represents a significant advancement in implementing active ageing policies,

providing actionable insights for governments to tackle the challenges an ageing population poses effectively.

1.8.4 Contributions of this thesis

This thesis makes significant contributions to the existing literature in several ways, advancing our understanding of the relationship between locus of control, volunteering, and health outcomes among older adults, as well as the impact of retirement on functional capacities.

First Chapter: The first chapter explores the role of locus of control in volunteering work, an area previously unexamined among older adults. It extends the existing body of work by investigating how locus of control influences volunteering participation and frequency. Additionally, it provides a comprehensive analysis across different European regions—Northern, Central, and Southern Europe—accounting for cultural and organisational differences. This regional analysis offers valuable insights into how locus of control affects volunteering within various welfare regimes across Europe.

Second Chapter: The second chapter examines the causal impact of retirement on Instrumental Activities of Daily Living (IADLs) difficulties, filling a gap in the literature. While previous studies have focused on the effects of retirement on mental health, physical health, and cognitive functions, none have specifically linked retirement to IADLs. This chapter uses data from the SHARE to provide European evidence on this relationship, highlighting the practical implications for an individual's functional capacity and quality of life post-retirement. Furthermore, it uncovers regional differences in the estimated effects of retirement on IADLs, contributing to a more nuanced understanding of this relationship across Europe.

Third Chapter: The third chapter delves into the stability of locus of control and its potential for change among older adults. It discusses various interventions that can help shape locus of control in later life, emphasizing the policy importance of this research. By linking the stability and malleability of locus of control to policy interventions, this chapter underscores the potential for enhancing older adults' sense of control through targeted programs, thereby promoting better health outcomes and increased volunteering participation.

1.9 Significance of ageing research in economics

Economic studies have recently focused on ageing populations as ageing has become one of the world's biggest challenges over the last two decades. Economic research in ageing seeks to understand how the ageing process can affect people's well-being, productivity, participation in the workforce and physical health so that they can suggest policies that can positively affect ageing programs, social security and economics.

Healthcare costs are a significant challenge that governments face with ageing populations. As people live longer, their need for medical assistance increases while their contribution to the labour force decreases. The inactive age group of the ageing population is the most significant consumer of healthcare services. The costs for individuals over 65 are three to five times higher than for those under 65 (Jacobzone and Oxley, 2002), primarily due to the need for long-term medical services, treatment of chronic diseases, and hospitalisation. However, effectively managing these costs could yield substantial economic savings, offering a hopeful prospect amidst the challenges.

The increasing ageing population is reshaping the labour market. As the proportion of older people grows, there is a noticeable shift in the percentage of the labour force, leading to a decline in productivity. The rising demand for healthcare services and pensions for older adults during their inactive age is a challenge, but it also presents an opportunity for innovation. This places a significant strain on the taxes the labour force contributes to the government, but we can navigate this change with innovative solutions. By exploiting these strategies, policymakers can effectively renavigate the economic impact of ageing on the labour force and productivity.

Pension systems play an important role in the economic implications of an ageing population. Because people live longer, the time spent in retirement increases, putting a strain on pension funds and social security systems. Many pension systems face a challenge because of the increasing number of retirees compared to workers. Therefore, pension systems have financial problems in paying pension benefits for retirees. Governments go through increasing years of contributions in the workforce and decrease pension benefits to face these challenges. One of the most common policies they apply is increasing retirement age. These strategies can

help pension systems to remain sustainable and provide financial support for older adults in their active lives (OECD, 2019).

1.10 Conceptual Framework

This conceptual framework explores the interrelated factors that influence well-being, social engagement, and health in older adults, offering a thorough understanding of the complexities of ageing. Each concept—the locus of control, volunteering, emotional closeness, life expectancy, retirement, and instrumental activities of daily living (IADLs)—represents distinct but interconnected dimensions of the ageing experience. Collectively, they highlight the intricate interplay between personal beliefs and structural influences on quality of life.

Locus of control: locus of control is an individual's belief about life outcomes. It has two orientations. External locus of control where individuals believe external factors cause their life events, such as faith and luck. Internal locus of control where individual beliefs their actions are responsible about their life outcomes (Rotter, 1966).

Volunteering: Providing unpaid services to the community, which has been shown to positively affect mental and physical health, especially for older adults. When people engage in volunteering work, it enhances their social connection, sense of purpose and life satisfaction. Volunteering can reduce loneliness, increase self-confidence and enhance physical and mental health.

Emotional closeness: An individual's feeling about the level of support and connection from their social network's members such as family and friends. It is a crucial mechanism for support and help mental health, particularly for older people who may face social isolation more than any other age group. Emotional closeness can positively influence an older adult's well-being. It also can affect physical health by reducing stress and promoting a healthier lifestyle (Hot-lunstad et al., 2010).

Life expectancy: It is a demographic measure that reflects the average number of years that an individual expects to live. It depends on various factors such as health status, socioeconomic condition and lifestyle (WHO, 2018). It can give an insight into the overall

health status within a country. It represents people's expectations of how long they expect to live.

Retirement: A transition from the labour force is considered a big transition in individuals' lives that impacts all life aspects, including mental and physical health, social networks and overall well-being. It is a big opportunity for older adults to have leisure time. However, it can negatively impact mental health and overall well-being by increasing social isolation and an inactive lifestyle.

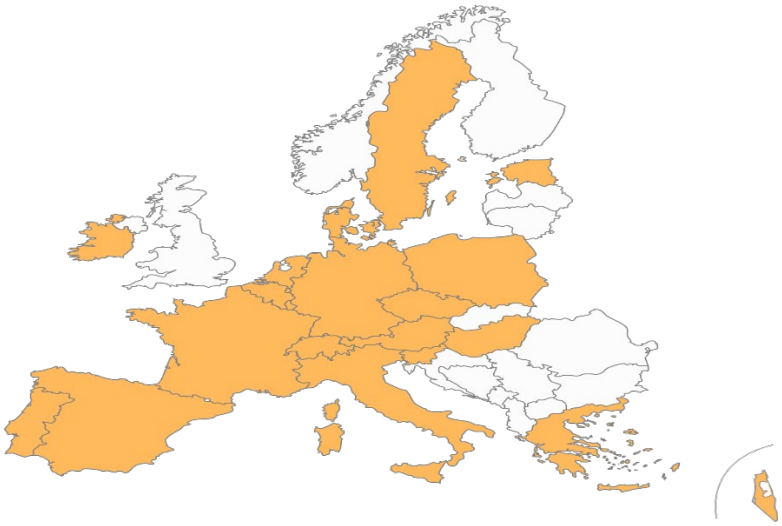
Instrumental activities of daily living (IADLs): Essential tasks that older adults need to live independently, like making phone calls, taking medications, managing finances, shopping for groceries and preparing hot meals. They show good indicators of people's health, as increases in those difficulties are often indicators of deteriorating health, which leads to increased dependency on caregiving services and puts pressure on healthcare systems.

1.11 SHARE dataset

This research investigates critical factors of the ageing process, using data from the Survey of Health, Ageing and Retirement in Europe (SHARE). SHARE data is an international and comprehensive unique panel dataset of microdata that collects microdata on individual health, socioeconomic status, and living conditions. It comprises individuals from 28 European countries and Israel. It examines the consequences of ageing from several perspectives (Börsch-Supan et al., 2013). SHARE interviews 140,000 people aged 50 and over. It interviews the same people to observe the ageing process over time.

The SHARE dataset is a collaborative initiative that provides valuable insights into the ageing population. It includes diverse, cross-national samples from both Western and Eastern European countries, as well as Israel, which allows for cross-country comparisons and a deeper understanding of how different national policies and cultural contexts impact the experiences of older adults. For example, the SHARE data has been crucial in examining the effects of retirement on health, the role of social support networks, and the factors influencing life expectancy across various European regions. This highlights the significance of a collective approach to research on ageing.

Figure 1.2 SHARE dataset map



Source: SHARE dataset

From 2004 (Wave 1), data collection occurred at 2- to 3-year intervals to 2021 (Wave 9). This thesis utilises longitudinal data from a comprehensive and reliable dataset from the Survey of Health, Ageing, and Retirement in Europe (SHARE). The surveys include various topics such as respondents' objective and subjective health status and their prospective partners' and families' economic and social circumstances. The investigations also include issues such as relationships with children and close relatives (Börsch-Supan et al., 2013).

Figure 1.1 presents a map illustrating the geographical coverage of the SHARE project. It includes data from various Western, Central, and Eastern European countries and the Nordic and Mediterranean regions. This diverse representation enables researchers to explore various socioeconomic and cultural environments.

Countries typically involved in SHARE include Austria, Belgium, the Czech Republic, Denmark, Estonia, France, Germany, Greece, Hungary, Israel, Italy, Luxembourg, the Netherlands, Poland, Portugal, Slovenia, Spain, Sweden, and Switzerland. This regional diversity allows for comprehensive cross-national comparisons and provides a better understanding of European ageing processes.

Table 1.1 SHARE Dataset Waves

Wave	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6	Wave 7	Wave 8	Wave 9
Year	2004	2006	2008	2010	2013	2015	2017	2019	2021

Source: SHARE dataset

The SHARE dataset is suited for the research questions in this thesis. Since it focuses on adults aged 50 and older, it is ideal for studying the ageing process, which is the core of this thesis. SHARE dataset is harmonised across multiple European countries in different European regions. This diversity allows us to explore how those regional differences impact the well-being of older adults. In addition, the data for psychological traits allow us to find out the locus of control for older adults. Therefore, we can investigate its influences on older adults' social behaviour, such as volunteering.

Moreover, the variable of emotional closeness within the social network variables allows us to see the level of closeness between older adults and members of their social networks. As a result, we can investigate its impact on life expectancy. In addition, asking older adults about their retirement years allows us to examine the impact of the transition to retirement on Instrumental activities of daily living.

The SHARE dataset fits the purpose of this study for several reasons:

First, it is easily accessible for educational purposes, requiring only an institutional email to access the data.

Second, it has different models that can be easily marge into one big dataset through an individual identification variable. Our study stands out with its use of different models that can be easily merged into one comprehensive dataset using an individual identification variable. This approach allows efficient data analysis from various waves, countries, and models. For this study, we introduce unique variables in the dataset, such as the locus of control statements and volunteering variables. We also incorporate a life expectancy variable measured distinctly and uniquely in SHARE. Furthermore, we introduce the concept of emotional closeness as a unique variable within the social network model, adding an intriguing dimension to our research.

Third, the SHARE survey enables comparisons among European countries. which allows us to analyse regional differences across North, Central, and South Europe through our heterogeneity studies.

1.12 Thesis structure

The remainder of this thesis is organised as follows: chapter two studies locus of control and its impact on volunteering among adults aged 50 and older in Europe. Chapter three provides the impact of emotional closeness on life expectancy in Europe. Chapter 4 studies retirement and its impact on IADLs in Europe. Chapter Five concludes with a summary of the findings, the significance of the contribution, implications and conclusion.

This study will examine factors that shape well-being and behaviour in elderly adults.

Table 1.2 Thesis structure

Chapter	Description
Chapter 1	General introduction to the thesis outlines factors shaping well-being and behaviour in elderly lives. This chapter outlines the importance of the ageing object and this unique group's needs.
Chapter 2 (Paper 1)	Presents locus of control and volunteering work for elderly adults. This relationship has not been examined in the literature
Chapter 3 (Paper 2)	Presents the impact of emotional closeness on life expectancy. In economics, no previous study has used emotional closeness as part of a social network
Chapter 4 (Paper 3)	Presents the impact of a transition to retirement on instrumental activities of daily living IADLs.
Chapter 5	A general conclusion of the thesis outlines the key findings of the three papers.

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Chapter 2: Locus of Control and Volunteering among Older Individuals in Europe

Abstract

This paper examines the empirical link between locus of control and volunteering work of older adults, using cross-country panel data from the Survey of Health, Ageing, and Retirement in Europe (SHARE). Using data covering the periods from 2010 to 2019, we find a positive and statistically significant impact of internal locus of control on both volunteering participation and frequency. While there is little gender difference in the results for volunteering participation, internal locus of control is more strongly related to the volunteering frequency of women than that of men. Our heterogeneity results show that in all European regions (North, Central and South), the association between internal control and volunteering participation is positive and statistically significant. By contrast, the correlation is statistically significant only in southern Europe.

Key Words: Volunteering, Locus of control, Older adults, SHARE

2.1 Introduction

As the population of older adults increases in developed countries, the associated economic, social, and healthcare costs also grow (Brown et al., 2011). This is particularly challenging for Europe. European older populations are growing and need more social support and community involvement (OECD, 2020). The population of 65+ in Europe was 20.3% in 2019 and is projected to reach 30.3% in 2070 (Age Platform Europe, 2023). This demographic change provides unique challenges, social isolation and age-related health concerns that affect older adults' well-being (Cohen-Mansfield & Parpura-Gill, 2007).

In response to these challenges, volunteering has emerged as a potent mechanism for alleviating the adverse effects of ageing, enabling older adults to maintain active connections within society (Morrow-Howell, 2010). Volunteering involves individuals in their nearby communities and enhances social capital, which can provide public health advantages, including enhanced health and general well-being (Jenkinson et al., 2013). When individuals engage in volunteering, they establish significant social connections and demonstrate the ability to adapt and persevere in the face of difficulties encountered in life (Ehlers et al., 2011). Older people are attracted to volunteering because it gives them a sense of purpose (Haski-Leventhal, 2009). By giving them socially meaningful tasks, volunteering adds value to their lives (Menzel, 2021). Volunteering promotes older people's well-being more than religious services, exercise, and physical activity (Oman et al., 1999). Studies show that volunteering for older adults improves physical and mental health, which improves overall well-being (Meier & Stutzer, 2008; Baumbach, 2022; Sharifi et al., 2024). The involvement of older volunteers improves their life satisfaction and highlights the broader social importance of their contributions.

Volunteering work, defined as the increased focus on volunteering among older adults in recent years, is mainly due to its diverse advantages. Extensive research continually highlights the positive impacts of volunteering on both physical and mental health, promoting enhanced overall well-being (Baumbach, 2022; Sharifi et al., 2024). Those studies have shown that engaging in selfless activities may significantly influence an individual's sense of happiness and satisfaction, offering a complete approach to enhancing mental and emotional well-being. Furthermore, participating in volunteer work serves as a means by which individuals are given

socially important duties, increasing a sense of purpose and value in their lives (Menzel, 2021). The involvement of elderly volunteers improves their satisfaction and highlights the broader social importance of their contributions. Meier and Stutzer's (2008) study emphasise the substantial influence of volunteering on the overall health of elderly adults. It emphasises the significance of volunteering as a valuable avenue for engagement and satisfaction in later stages of life.

The concept of locus of control is critical to our investigation, particularly when examining the dynamics of ageing. It provides a basis for understanding how people view the many aspects that impact their living situations, which might illuminate their engagement in volunteer activities as they get older. This concept, first proposed by Julian B. Rotter nearly half a century ago, explores people's viewpoints on the influences that determine their life experiences (Rotter, 1966). The idea of locus of control suggests that people's views of the connection between their actions and the consequences they experience may be classified into two main orientations: "internal" and "external". (Rotter, 1966). Individuals with an internal locus of control ascribe their life circumstances to their own volition and the ability to influence their destinies.

Conversely, individuals with an external locus of control tend to attribute life events to external factors such as luck, fate, chance, or external influences (Mendolia and Walker, 2014). Much research conducted in economics and psychology has repeatedly shown a robust and positive correlation between possessing an internal locus of control and attaining personal benefits (Boone et al., 1999; 2002; Carpenter and Seki, 2011; Malacarne, 2023). Individuals with a strong internal locus of control tend to effectively implement tactics that provide more personal rewards and advantages. This phenomenon may be attributed to a conviction in their ability to exert control over circumstances in a manner that would yield favourable outcomes (Fanghella et al., 2023). On the other hand, the external locus of control has been linked to negative effects on well-being (Yin, 2022) and investment in risky assets (Salamanca et al., 2020). In this chapter, we undertake an extensive examination of the influence of locus of control on the participation of older adults in volunteer endeavours as part of a scholarly inquiry.

The relationship between locus of control and volunteering is theoretically ambiguous. Economic theory identifies two main motivations behind volunteering behaviour (Myers,

2010; Sauer, 2015): (i) the consumption motive and (ii) the investment motive. The consumption motive refers to the case in which individuals gain personal satisfaction or internal reward as a direct consequence of their voluntary behaviour (Andreoni, 1990). The price of volunteering work, viewed as a consumption good, is the opportunity cost of time that could have been spent on paid work or leisure activities. Individuals with an external locus of control believe their efforts do not make a change, which does not increase volunteer work. However, older adults with an internal locus of control may volunteer more because they think they can influence society and get internal benefits. Alternatively, if a person has an external locus of control and believes their time is unimportant, they may volunteer more. When someone with an internal locus of control believes their time is necessary and they have more important things to do, they reduce their involvement in volunteering.

Moreover, the time cost for older adults reduces with age, so we expect older adults with the consumption motive to increase their volunteering as they age. On the other hand, the investment motive posits that older adults who engage in volunteer work view it as a form of investment and expect future benefits or advantages related to their careers (Menchik, Weisbrod, 1987). If the investment motive dominates consumption, we expect volunteer work to decline because most ageing individuals are retired or jobless. Only 25% of older persons in our sample declared they are employed.

This paper considers volunteering participation (intensive volunteering) and volunteering frequency (extensive volunteering) among the older population in Europe, examining their relationship with locus of control. This relationship is important for several reasons. First, older people constitute a vital segment of the volunteer workforce (Zhu, 2021). Individuals aged 65 years and over contribute more time to volunteering than any other group in Europe (Ehlers et al., 2011). Similarly, older adults in countries like Ireland and the United States also play a substantial role in volunteerism (Tang, 2016; Eibich et al., 2020). Second, volunteering is recognised as one of the avenues through which older adults can remain active in their later lives (Morrow-Howell, 2010). Third, older adults may feel less control of their lives as they age and experience a possible decrease in physical health (Lachman, 1986). This external sense of control is associated with poorer health outcomes (Reknes, 2019). Therefore, volunteering is more important to them than any other age group.

We use data covering 2010-2019 for 12 European countries from five waves of the Survey of Health, Ageing and Retirement in Europe (SHARE). Our empirical results show that an internal locus of control increases volunteering participation among older men and women. On the other hand, women's volunteer frequency has a larger association with control perceptions than that of older men. Our heterogeneity analysis findings show that the impact of locus of control on volunteering participation is positively and statistically significant in all European regions (North, Central, and South). The analysis of volunteering frequency shows a positive and insignificant relationship in all European countries except Southern Europe.

This paper has made two contributions to the literature. First, prior studies have shown a correlation between internal locus of control and engaging in health behaviours and lifestyles. Nevertheless, the relationship between locus of control and volunteering work among older adults remains under-explored (Andor et al., 2022). Second, we estimate distinct effects for Northern, Central, and Southern Europe to account for the cultural and organisational variations across continental Europe. Therefore, this is the first study to provide thorough data on how locus of control affects volunteering across many welfare systems in Europe.

The rest of this paper is structured as follows: section 2 presents the Literature review. Section 3 presents data, and Section 4 describe the empirical approach. Results are presented and discussed in Section 5. Section 6 concludes the paper.

2.2 Literature review

Volunteering is a crucial activity for older adults for several reasons. First, volunteering increases life satisfaction, self-esteem, and feelings of usefulness (Marchesano & Musella, 2020). Second, considering the large number of older people who have retired, volunteering may replace their previous work-related activities (Mettenberger & Kupper, 2019).

Many studies have highlighted the importance of volunteering later in life. Meier and Stutzer (2008) found that participating in volunteer activity might enhance an individual's subjective well-being. Ensuring the older population experiences a sense of purpose and meaning during retirement is particularly critical (Wahrendorf et al., 2016). Volunteering may give older people a fresh feeling of achievement, motivating them to stay involved in their communities (Haski-Leventhal, 2009). Morrow-Howell et al. (2003) discovered a direct correlation between

the level of well-being and the amount of time older individual's volunteer. Cubel et al. (2016) suggest that volunteering may enhance cognitive performance in older persons.

Cultural differences across European countries significantly shape the volunteering landscape for older adults. For instance, in countries like the Netherlands and Sweden, volunteering is widely promoted and seen as a social responsibility. In contrast, in countries like Italy and Spain, volunteering is often tied to religious or family duties. These cultural nuances can influence the rates of older volunteering in different countries (Ehlers et al., 2011). Volunteering for older adults in diverse cultures yields various effects. Older adults enjoy increased access to social support and other services in countries with high volunteering rates, potentially enhancing their health and well-being. Conversely, older adults may feel more isolated and unsupported in countries with low volunteering rates, leading to poorer health and well-being outcomes (Gil-Lacruz et al., 2020).

Several studies using data from the SHARE database analysed the phenomenon of volunteering for elderly adults in various European countries. Erlinghagen and Hank (2006) conducted research using data from the 2004 survey to examine the relationships between socio-demographic characteristics and volunteer rates among older people in 10 countries. Their research revealed elevated levels of engagement in Northern European countries and decreased levels in Mediterranean countries. Additional studies have shown a generally favourable link between engaging in volunteer work and one's perception of their health, overall contentment with life, and self-perceived life expectancy. It finds that there is a negative relationship between volunteering and experiencing symptoms of depression.

Nevertheless, the magnitude of this link exhibited substantial variation among the various nations (Haski-Leventhal, 2009). The study conducted by Morawski et al. (2022) investigated the correlation between volunteering and the quality of life in adults aged 50 and above, using data from the SHARE database. It was discovered that the influence of volunteering on quality of life has a non-linear trend, characterised by an inverted U-shaped curve. The association between volunteering and quality of life is modest in nations with very high or low volunteering rates. Nevertheless, the link exhibits more strength in nations with intermediate levels of volunteering, such as Austria, Italy, and Israel.

Locus of control, a psychological concept established over six decades ago, is vital in influencing individuals' decision-making through their preferences and beliefs. It differentiates between those who believe their actions directly impact outcomes (internal locus of control) and those who attribute results to external factors, such as luck or the influence of powerful others (external locus of control). Caliendo et al. (2024) explore how locus of control affects decision-making by conducting a laboratory experiment using a delegation game. This game examines four key pathways linking locus of control to decision-making: preference for an agency, optimism and confidence concerning the return on effort, and the illusion of control. Their findings suggest that individuals with an internal locus of control are more inclined to prefer retaining agency over their decisions, particularly among women.

Interestingly, the study found no significant evidence that locus of control influences optimism or confidence about returns on effort, nor does it appear to function through an illusion of control. These results illuminate how locus of control shapes decision-making behaviour, especially in uncertain environments, and highlight the importance of understanding these psychological mechanisms when designing incentive structures, contracts, and policies. Furthermore, the study reveals a gendered aspect of locus of control, with women demonstrating a stronger preference for an agency than men, thereby adding a new layer to our understanding of how locus of control operates within decision-making contexts.

The study conducted by Botha and Dahmann (2024) explores the influence of locus of control and self-control on health outcomes, particularly emphasising how these personality traits interact to predict physical and mental health. The research draws on a nationally representative Australian sample, enhancing the findings' generalisability by utilising data from the 2019 wave of the Household, Income and Labour Dynamics in Australia (HILDA) survey. The results indicate that, although locus of control and self-control are distinct constructs, a stronger internal locus of control correlates with higher levels of self-control. Additionally, self-control partially mediates the relationship between locus of control and health outcomes. In contrast, an internal locus of control enhances the positive effects of self-control, especially regarding physical health. These findings underscore the potential of interventions for both traits to improve overall population health.

The study conducted by Bucciol and Trucchi (2021) explores the relationship between locus of control and saving behaviour, placing particular emphasis on the underlying mechanisms at play. By leveraging longitudinal data from the Dutch DNB Household Survey, the research

reveals how psychological traits shape saving decisions on the extensive margin (the decision to save) and the intensive margin (the amount saved). A significant finding is the influence of locus of control—the degree to which individuals attribute life outcomes to their actions (internal) versus external factors such as luck (external)—on saving behaviour. Individuals with an internal locus of control generally save more, primarily motivated by broad goals like financial independence and preparation for unforeseen expenses. A methodological highlight of the study is its use of mediation analysis, which disentangles the direct and indirect effects of locus of control on saving behaviour. It indicates that an internal locus of control influences saving through its effects on motives, while an external locus exerts a direct influence. These findings emphasise the importance of non-cognitive skills, such as self-control, in financial planning and highlight the critical role psychological factors play in shaping economic outcomes.

The study by Heywood et al. (2017) examines the relationship between personality traits—specifically, locus of control and risk tolerance—and the likelihood of undergoing performance appraisals in the workplace. Utilising data from the German Socioeconomic Panel (SOEP), the authors apply econometric methods to analyse individual and workplace characteristics across a diverse sample of employees in Germany. The results indicate that personality traits play a significant role in job appraisal systems, which is crucial for designing and implementing effective performance appraisal systems in the workplace. Notably, individuals with an internal locus of control are more inclined to work in positions that involve performance appraisals, as they view these systems as opportunities to showcase their skills and gain recognition. In contrast, those with an external locus of control are less likely to find themselves in such roles, as they may consider performance appraisals less relevant or beneficial due to their belief that external factors dictate outcomes. Additionally, the results suggest that risk tolerance moderates this relationship; a higher tolerance for risk is associated with a greater likelihood of engaging in jobs subject to performance appraisals.

The study conducted by Cobb-Clark et al. (2015) investigates the relationship between individuals' locus of control and their savings behaviour, specifically focusing on wealth accumulation, savings rates, and portfolio choices. Utilising data from the HILDA Survey, the authors analyse various savings metrics, including wealth accumulation and portfolio allocations, specifically for couple-headed households across different wealth distributions. They find that households with an internal reference person tend to save more overall,

revealing significant disparities in wealth accumulation that favour poorer households. In comparison, higher savings rates benefit wealthier households. Furthermore, these households demonstrate distinct allocation preferences, favouring less liquid assets like pensions over financial instruments.

McGee and McGee (2016) examine the connection between job-seeking behaviour and locus of control, which refers to an individual's belief that they can change the direction of their life. When faced with uncertainty, those with an internal centre of control often set larger reserve pay and exert more effort. The phenomenon doesn't show up when there is a clear relationship between the effort put in and the output. Heckman et al. (2006) conducted research on how locus of control affects health-related behaviours, with a particular emphasis on drug and smoking use in the United States of America. The study found that people's locus of control significantly affects their dangerous health behaviours. This result supports the theory that a person's sense of control is a major factor in determining the decisions they make about their health. Moreover, Cobb-Clark et al. (2012) examine the connection between internal locus of control and health-promoting habits, such as eating a balanced diet and getting regular exercise, using data from Australia. This research highlights the relationship between people's perceived control over their lives and their propensity to make better judgements, which has important implications for our comprehension of how locus of control affects decisions related to health.

In the paper closest to our study, Cobb-Clark et al. (2014) examine the correlation between the locus of control of individuals and their decision-making processes concerning healthy lifestyle choices, with a particular emphasis on diet, exercise, and other behaviours associated with health in Australia. The study estimates the pathways that connect locus of control and health behaviours by employing data from the Household, Income, and Labour Dynamics in Australia (HILDA) Survey. According to the findings, an internal locus of control is associated with a greater propensity to adopt healthier behaviours, including regular exercise and a well-balanced diet. The study investigates the subtle ways in which locus of control influences health behaviour, such as the belief that men with an internal locus of control will experience higher health returns and that women with an internal locus of control will be more satisfied with their healthy practices.

Milte et al. (2015) investigate the impact of health locus of control on physical function, quality of life, and depression in older adults in South Australia. The study specifically focuses on a sample of 230 older adults after hospital admission, a population with unique health needs. It employs hierarchical multiple regression analysis to show that an internal locus of control over health is associated with better quality of life and physical function in older adults.

Kesavayuth et al. (2020) examine the relationship between healthcare utilisation, health, and locus of control. The study utilises longitudinal data obtained from the Household Income and Labour Dynamics in Australia (HILDA) Survey to analyse how individuals perceive their control, health outcomes, and utilisation of healthcare services. The results emphasise that people with an internal locus of control report improved mental and physical health independently and lower reliance on medical care, including preventative and curative measures.

The study conducted by Salamanca et al. (2020) examines the relationship between internal locus of control and equity investment in hazardous assets. The study seeks to comprehend how particular characteristics influence investment behaviour by using the DNB Household Survey. The analysis investigates the likelihood of equity ownership and the proportion of equity in portfolios. In contrast to established hypotheses, the research demonstrates that the correlation endures even when multiple variables, such as risk aversion and financial expertise, are accounted for. Additionally, the study reveals that equity investment is more significantly influenced by locus of control in the case of investors lacking financial literacy. The study offers intricate observations regarding the influence of personality traits, specifically internal locus of control, on investment choices.

In a similar study to our research, Andor et al. (2022) explore the correlation between prosocial behaviour, such as altruism, and personality characteristics, including locus of control. Their analysis of various datasets from Germany and the United States uncovers a significant correlation. This correlation has profound implications, suggesting that an individual's internal locus of control plays a crucial role in their propensity for prosocial behaviour, prompting further reflection on the nature of human altruism.

In the study of Botha and Dahmann (2023) about the locus of control and self-control, we aim to examine how these two personality traits interact and their influence on physical and mental health. The study significantly contributes to the relatively under-explored relationship

between locus of control and self-control. they employ data from the Household, Income and Labour Dynamics in Australia (HILDA) survey. their findings reveal that an internal locus of control is linked with higher levels of self-control. Self-control is crucial in the relationship between locus of control and health outcomes. Additionally, an internal locus of control supports the positive effect of self-control on health outcomes.

A study by Clark and Zhu (2024) investigates the causal impact of retirement on locus of control in Australia using data from the household, income, and labour dynamics in Australia (HILDA). The study examines whether retirement, as a significant life transition, alters the internal locus of control. Using fixed effects instrumental variable estimations, this study shows that retirement increases the internal locus of control beliefs. It also positively affects health and well-being. The study also found that locus of control is more elastic at retirement than socio-emotional skills of the Big Five personality traits, risk and time preferences, and trust. These findings have practical implications for retirement planning and management, making the research highly relevant and applicable.

In the study of Caliendo et al. (2024) about the role of locus of control in economic decision-making, the focus is on individuals who perceive their actions as the primary drivers of their life outcomes (i.e., those with an internal locus of control). The study utilises a lab-based delegation game that requires participants to make effort-related choices impacting their financial rewards. It allows for a detailed investigation of the locus of control effect in a controlled environment. Results indicate that a strong internal locus of control correlates with a sense of performance agency; participants who felt capable of influencing outcomes were more inclined to maintain control over decisions affecting their rewards. However, no connections were found between locus of control and either optimism or confidence regarding the returns on their efforts or with the illusion of control—contrary to findings from observational studies that previously identified these beliefs as significant. These results challenge us to rethink the influence of locus of control in economic decision-making.

The influence of locus of control on engagement in volunteering, particularly among the older, is an underexplored area of academic interest. Individuals who believe in their ability to influence life events and have an internal locus of control may be more likely to participate in various activities (Cobb-Clark et al., 2012). Additionally, people with internal locus of control implement plans that benefit them personally. This may be because they believe they can

alter their circumstances to benefit them (Fanghella et al., 2023). On the other hand, the external locus of control negatively affects well-being (Yin, 2022). Studies show that locus of control influences health-related behaviour (Cobb-Clark et al., 2012; Kesavayuth, 2020;), religious behaviour (Lles-Caven et al., 2020), self-control (Botha & Dahmann, 2023) and entrepreneurial intention (Arkorful & Hilton, 2021). Locus of control has been extensively studied within the field of economics, resulting in valuable insights across several disciplines (Fanghella et al., 2023; Bucciol & Trucchi, 2021; Gong & Zhu, 2019; Lee & McKinnish, 2019; Schnitzlein & Stephani, 2016; Caliendo et al., 2015; Abay et al., 2017; Piatek & Pinger, 2016).

This paper contributes to the existing literature in several ways. First, studies find a positive relationship between high internal locus of control and health-related behaviour such as diet and exercise (Cobb-Clark et al., 2014; Kesavayuth et al., 2020; Andor et al., 2022) and health-related shocks (Schurer, 2017). We add to this literature by looking at the role of locus of control and volunteering work. No prior study looks at the influence of locus of control on volunteering work among older adults. Second, we estimate separate effects for Northern, Central and Southern Europe to account for cultural and organisational differences within continental Europe. Thus, this is the first paper to provide comprehensive evidence on the effect of locus of control on volunteering across several European countries' welfare regimes.

2.3 Data

The present paper uses data from the Survey of Health, Ageing, and Retirement in Europe (SHARE), which examines several facts about ageing and well-being in Europe (Börsch-Supan et al., 2013). It spans 28 European countries and Israel across eight waves for individuals aged 50 and older. The first wave was conducted in 2004-2005, and the latest in 2019-2020. The SHARE dataset is panel data, which means most participants were observed multiple times. It offers broad and varied insights into the lives and circumstances of older individuals. The dataset comprises a compilation of data about health, economic circumstances, social networks, and other essential aspects of ageing. In this paper, we use Waves 4 (2010), 5 (2013), 6 (2015), 7 (2017), and 8 (2019) to analyse the relationship between locus of control and volunteering participation and volunteering frequency among adults aged 50 and over in 12 European countries (Austria, Germany, Sweden, Spain, Italy, France, Denmark, Switzerland,

Belgium, Czech Republic, Slovenia, and Estonia). We exclude other countries due to missing data.

2.3.1 Variables

This paper uses the locus of control index, created by Becchetti and Bellucci (2021), to measure the degree to which people view themselves as having control over their life circumstances. The index is calculated based on questions assessing feelings of control over different parts of their lives. Respondents are asked to rate their agreement with 11 statements. Each of the 11 statements is rated on a Likert scale from 1 to 5, where 1 = Strongly Disagree and 5 = Strongly Agree. The first five statements assess external locus of control, including: (1) 'Age prevents you from doing things you would like to do,' (2) 'What happens to you is out of your control,' (3) 'Feel left out of things,' (4) 'Family responsibilities prevent you from doing what you want to do,' and (5) 'Shortage of money stops you from doing the things you want to do,'. The last six statements assess internal locus of control, including: (6) 'You can do the things that you want to do,'. (7) 'Look forward to each day,' (8) 'Look back on life with a sense of happiness,' (9) 'Feel full of energy these days,' (10) 'Life is full of opportunities,' and (11) 'Future looks good for you. The locus of control Index was computed by aggregating the scores obtained from participants' replies to five questions about external control, then subtracting this sum from the total scores obtained from six items related to internal control. Subsequently, a fixed numerical value of 30 is included in the previous calculation, yielding an index that ranges from 11 to 44. A stronger internal locus of control orientation, which signifies a better sense of human agency and power over life events, is reflected by higher index scores. The addition of 30 ensures that the index falls within a specific, interpretable range, facilitating clearer analysis and comparison of the data. This adjustment helps to highlight variations in personal agency and control over life events, making the results more meaningful and easier to understand.

Locus of Control Index: LoC = (Internal Control Scores - External Control Scores) + 30

We use two dependent variables to reflect volunteering. First, volunteering participation is defined as answering the question, "Which of the activities listed on this card have you done in the last twelve months?" If the answer is "done voluntary or charity work, " the variable takes a value of 1 and 0 otherwise. The same identification of formal volunteering was used

hy Haski-Leventhal (2009), Hank and Erlinghagen (2010), and Wahrendorf et al. (2016). Second, volunteering frequency was elicited through participant responses to the question, 'How often have you engaged in voluntary or charity work in the last 12 months?' Participants were prompted to indicate their frequency of participation using a 4-point Likert scale as follows: 1 "less often", 2 "almost every month", 3 "almost every week", 4 "almost every day". We make volunteering frequency dummy variables to increase variation and avoid scale bias problems. Participants who answered 3 'almost every week' and 4 'almost every day' take the value of 1 (volunteering frequency), while participants who answered 1 "less often" and 2 "almost every month" take the value of 0. We do not consider informal volunteering, such as providing unpaid help to a friend, neighbour, or family member. Different questions in SHARE cover these types of activities. A detailed discussion of the challenges associated with the measurement of volunteering can be found in Salamon et al. (2017).

Self-assessed health (SAH) is measured using a single item rated on a 5-point Likert scale. In the survey, participants were asked, "Would you say your health is …." using answer categories between "excellent" and "poor" (i.e. excellent =5, very good =4, good = 3, fair =2, poor =1), higher SPH values indicate better-perceived health.

We use a set of control variables to isolate their effects on volunteering work: age, education dummies, male dummies, marital status dummies, employment dummies, logarithm income, household size, number of chronic diseases, body weight, cognitive functions, ADL, IADL, wave dummies, country, and language. The control variables are elucidated in Appendix A.1.

2.3.2 Descriptive statistics

In our final sample, a slightly higher percentage of people in our group are women than men (about 54%). Respondents have a medium level of education, and the average size of a family is 2.2 members. Only 24% of those who answered the study report reported they were in very good or excellent health, and only 11% declared they were in poor health. The majority of the sample reported their health as good or fair.

Table 2.1[1] provides summary statistics for the data at the beginning of the period in wave 4 (2010) and the end of the period in wave 8 (2019). We possess two variables about

[1] Appendix A.1 provides detailed definitions of the variables in this Table.

volunteering. The first variable pertains to whether the participants volunteered in the last twelve months, whereas the other variable measures the frequency of their volunteering.

Table 2.1 Descriptive statistics

	Wave 4 (2010)				Wave 8 (2019)			
	Volunteering participation		Volunteering frequency		Volunteering participation		Volunteering frequency	
	Participate volunteering	Does not participate in volunteering	High-frequency volunteering	Low-frequency volunteering	Participate volunteering	Does not participate in volunteering	High-frequency volunteering	Low-frequency volunteering
Locus of control	35.89	33.30	36.03	35.74	36.79	34.29	36.95	36.59
	(4.98)	(6.01)	(4.98)	(4.97)	(4.53)	(5.59)	(4.46)	(4.59)
Age	64.13	66.22	64.99	63.28	69.20	71.51	69.67	71.82
	(8.64)	(10.21)	(8.33)	(8.85)	(7.87)	(9.24)	(7.66)	(9.41)
Education:								
Low education	0.23	0.39	0.23	0.22	0.17	0.31	0.18	0.17
	(0.42)	(0.18)	(0.42)	(0.42)	(0.38)	(0.46)	(0.38)	(0.38)
Medium education	0.42	0.38	0.41	0.43	0.42	0.42	0.41	0.44
	(0.49)	(0.48)	(0.49)	(0.9)	(0.49)	(0.49)	(0.49)	(0.49)
High education	0.34	0.178	0.34	0.34	0.39	0.22	0.40	0.37
	(0.47)	(0.38)	(0.47)	(0.47)	(0.48)	(0.42)	(0.49)	(0.48)
Marital status:								
Married, living with a spouse	0.71	0.69	0.71	0.73	0.70	0.67	0.69	0.71
	(0.45)	(0.46)	(0.45)	(0.44)	(0.46)	(0.47)	(0.45)	(0.45)
Register partnered	0.11	0.10	0.11	0.12	0.09	0.11	0.12	0.12
	(0.32)	(0.30)	(0.31)	(0.32)	(0.29)	(0.32)	(0.32)	(0.32)
Not married	0.05	0.06	0.65	0.52	0.06	0.05	0.062	0.065
	(0.23)	(0.24)	(0.25)	(0.22)	(0.24)	(0.23)	(0.24)	(0.25)
Widowed	0.11	0.15	0.12	0.11	0.12	0.16	0.12	0.11
	(0.31)	(0.35)	(33)	(0.31)	(0.32)	(0.36)	(0.33)	(0.31)
Employment:								
Retired	0.55	0.56	0.76	0.67	0.72	0.73	0.61	0.94
	(0.49)	(0.49)	(0.43)	(0.47)	(0.45)	(0.44)	(0.49)	(0.50)
Employed	0.31	0.27	0.24	0.38	0.20	0.16	0.15	0.25
	(0.46)	(0.44)	(43)	(0.48)	(0.40)	(0.37)	(0.36)	(0.43)
Unemployed	0.31	0.27	0.15	0.13	0.08	0.10	0.09	0.08
	(0.46)	(0.44)	(0.36)	(0.33)	(0.27)	(0.31)	(0.28)	(0.27)
Household size	2.15	2.14	2.09	2.22	1.93	1.94	1.88	1.98

	(0.97)	(0.98)	(0.95)	(0.99)	(0.77)	(0.85)	(0.72)	(0.82)
Number of chronic diseases	1.51	1.75	1.51	1.51	1.67	1.97	1.66	1.68
	(1.42)	(1.55)	(1.41)	(1.43)	(1.47)	(1.63)	(1.46)	(1.48)
Body weight:								
Underweight	0.03	0.05	0.10	0.008	0.01	0.02	0.03	0.03
	(0.17)	(0.21)	(0.10)	(0.09)	(0.09)	(0.13)	(0.16)	(0.17)
Healthy weight	0.39	0.34	0.04	0.01	0.01	0.01	0.40	0.38
	(0.49)	(0.47)	(0.06)	(0.07)	(0.07)	(0.07)	(0.49)	(0.48)
Overweight	0.39	0.39	0.01	0.01	0.01	0.01	0.39	0.39
	(0.49)	(0.49)	(0.07)	(0.08)	(0.8)	(0.8)	(0.49)	(0.49)
Obese	0.18	0.22	0.98	0.97	0.98	0.97	0.17	0.19
	(0.38)	(0.42)	(0.14)	(0.14)	(0.14)	(0.14)	(0.38)	(0.39)
Cognitive functions:								
Fluency	22.37	14.09	23.74	23.94	23.84	20.77	22.12	22.62
	(6.78)	(7.98)	(6.59)	(6.91)	(6.74)	(7.41)	(6.75)	(6.80)
Memory	10.42	8.78	10.68	10.83	10.75	9.16	10.40	10.44
	(3.37)	(3.37)	(3.24)	(3.28)	(3.26)	(3.73)	(3.34)	(3.41)
Numeracy	4.43	3.90	4.49	4.50	4.49	4.02	4.41	4.45
	(1.12)	(1.63)	(1.02)	(1.01)	(1.01)	(1.52)	(1.13)	(1.11)
Observations	7,614	40,001	3,779	3,834	5,033	22,082	2,666	2,367

Notes: Data from SHARE covers the years 2010 to 2019. Standard errors clustered at the individual level appear in parentheses.

The results indicate a slight rise in the proportion of older individuals participating in volunteering work and the frequency of their engagement between 2010 and 2019. The mean locus of control score across waves is around 35 on average. That is a moderate level of control over one's life. We can see a slight fluctuation between waves, suggesting a consistent sense of control over time. According to age, we can see an increase in the age of volunteers over time, from 64.13 years in wave 4 to 71.51 years in wave 8. Regarding education levels, there are fluctuations in low, medium, and high education levels between waves. However, there has been a decrease in the participation level of older adults with low education levels over time. On the other hand, there is an increase in participation in volunteer work for older adults with higher education.

However, European countries are different in terms of culture, with different customs, norms, and social expectations between Northern, Central, and Southern European countries. Table

2 gives information about the difference in locus of control, participation, and frequency of volunteering for older adults on average during the study period.

Table 2.2 Descriptive statistics for regional groups

Region	Volunteering participation		Volunteering frequency	
	Participate volunteering	Does not participate in volunteering	High-frequency volunteering	Low-frequency volunteering
Locus of control:				
North European	36.87	34.71	36.95	36.78
	(4.60)	(5.60)	(4.62)	(4.61)
Central European	36.51	34.37	36.73	36.29
	(4.80)	(5.60)	(4.70)	(4.80)
South European	35.09	32.57	35.36	34.82
	(5.10)	(5.90)	(5.15)	(5.03)

Note: Northern European countries (Sweden, Denmark, and Estonia), Central European countries (Austria, Germany, Switzerland, Belgium, Czech Republic, and Slovenia). Southern European countries (Spain, Italy, and France). Data from SHARE Waves 2010, 2013, 2015, 2017 and 2019. Standard errors clustered at the individual level appear in parentheses.

As shown in Table 2.2, the locus of control is lower in Southern European countries than in Central and Northern Europe. In Southern Europe, most countries have collectivist cultures (Hofstede, 2001). Customs like social culture, traditional values and group priority reduce the perception of a person's control over his life events. Older adults who declared that they are participating in volunteering have more locus of control on average than those who reported that they are not participating across all regions, where more significant differences can be shown in the South. This is because, in the South, most countries are collectivist cultures (Hofstede, 2001). Family ties and group values are more critical than individual values, which means people with a sense of control want to put effort into serving their communities by volunteering. The same scenario can be shown in terms of volunteering frequency. However, there is a smaller gap between older adults who declare that they frequently engage in volunteering and those who declare that they do not frequently engage in volunteering work.

2.4 Empirical approach

We use the following model to examine the relationship between locus of control and Volunteer Work:

$$Vol_{it} = \beta_0 + \beta_1 LoC_{it} + \beta_2 X_{it} + \mu_i + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad Eq.1$$

Vol_{it} refers to volunteer participation and volunteering frequency among older adults of individual I at time t. LoC_{it} denotes internal locus of control, representing an individual's belief in control over life circumstances. The introduction of μ_i resolves problems resulting from a correlation between locus of control and unobserved individual heterogeneity. X_{it} donates control variables. ε_{it} represents unobserved factors and random variability that affect volunteering participation and frequency but are not explicitly captured in the model.

2.5 Results

2.5.1 Main regression results

Table 3 shows the findings obtained from the ordinary least squared (OLS) and fixed effects (FE) estimates of Equation 1. To facilitate interpretation, the locus of control (LoC) is standardised to have a mean of zero and a standard deviation of one. In panel A, the dependent variable is the volunteering participant. In panel B, the dependent variable is volunteering frequency.

Table 2.3 The impact of Locus of control on volunteering participation and volunteering frequency

Panel A: Volunteering participation	Ordinary least squares (OLS)	Fixed effect (FE)
Locus of control	0.037*** (0.001)	0.013*** (0.002)
Age	-0.001*** (0.001)	-0.003 (0.003)
Ln-income	0.017** (0.001)	-0.002 (0.001)
Education:		
Low education	-0.107*** (0.007)	-0.078 (0.666)
Medium education	0.036*** (0.007)	-0.005 (0.039)
High education	0.105 *** (0.007)	-0.002 (0.032)
Employment:		
Retired	0.07*** (0.003)	0.063*** (0.006)
Unemployed	-0.058 (0.004)	0.046*** (0.007)
Marital status:		
Married living with spouse	-0.003 (0.005)	0.35*** (0.076)
Never married	0.003 (0.005)	0.186 (0.155)
Widowed	0.002 (0.004)	-0.042 (0.019)

Household size	-0.004***	0.003***
	(0.002)	(0.015)
Number of chronic diseases	0.003***	0.003***
	(0.001)	(0.005)
ALDA	0.001	-0.001
	(0.002)	(0.003)
IADLA	-0.007	-0.013**
	(0.004)	(0.005)
Body weight:		
Healthy weight	0.013*	0.066
	(0.007)	(0.041)
Overweight	0.007	0.094**
	(0.007)	(0.041)
Obese	-0.003	-0.122**
	(0.008)	(0.042)
Cognitive functions:		
Fluency	0.003***	0.003**
	(0.002)	(0.001)
Memory	0.006***	0.003
	(0.004)	(0.002)
Numeracy	0.006***	0.002
	(0.001)	(0.006)
Observations	103,975	82,486
Individuals		29,693
Overall R-squared	0.069	0.005
Panel B: volunteering frequency		
Locus of control	0.024***	0.031***
	(0.005)	(0.009)
Age	-0.001	-0.011
	(0.006)	(0.014)
Ln-income	0.006*	-0.006
	(0.003)	(0.005)
Education:		
Low education	0.002	1.013*
	(0.035)	(0.535)
Medium education	-0.003	0.956*
	(0.032)	(0.550)
High education	0.023	0.881
	(0.016)	(0.554)
Marital status:		
Married living with spouse	-0.299**	0.13
	(0.015)	(0.127)
Registered partnership	-0.032**	0.08
	(0.016)	(0.127)
Widows	-0.012	0.21
	(0.016)	(0.132)
Household size	-0.013**	-0.02
	(0.005)	(0.014)
Number of chronic diseases	-0.005**	-0.015***
	(0.005)	(0.005)
ADL	-0.005	0.033**
	(0.009)	(0.014)

IADL	0.009 (0.022)	-0.029 (0.414)
Body weight:		
Under weight	-0.017 (0.281)	0.008 (0.041)
Healthy weight	0.011 (0.011)	0.014 (0.021)
Overweight	0.006 (0.011)	0.019 (0.022)
Cognitive functions:		
Fluency	-0.002*** (0.006)	0.001 (0.001)
Memory	0.001 (0.001)	0.002 (0.002)
Numeracy	-0.009* (0.004)	0.009 (0.006)
Observations	18,893	11,246
Individuals		4,403
Overall R-squared	0.029	0.012

Note: Control variables for all regressions: age, education dummies, marital status dummies, employment dummies, logarithm income, household size, number of chronic diseases, body weight, cognitive functions, ADL, ADLI, Wave dummies, country, language. Standard errors clustered at the individual level appear in parentheses.
*** p<0.01, ** p<0.05, and *p<0.1

Table 2.3 shows the results from the OLS and FE estimations. In the OLS model, increasing internal locus of control by one standard deviation is associated with a 3.4 percentage point increase in voluntary participation. whereas in the FE model, it leads to a 1.3 percentage point increase. That means older adults with an internal locus of control tend to participate in volunteering compared to older adults with an external locus of control. Similarly, for volunteering frequency, the OLS approach indicates that increasing the locus of control by one standard deviation increases volunteering frequency by 2.4 percentage points. The estimate is 3 percentage points when using the FE approach. This means older adults with a high sense of control tend to volunteer more than those with a low sense of control. These results are aligned with a study by Son and Wilson (2017), which used panel data from the National Survey of Midwives in the United States. Their study indicates that individuals with an internal locus of control are more likely to volunteer. Overall, we present evidence of the positive impact of locus of control on both volunteering participation and volunteering frequency.

2.5.2 Gender difference

We investigate the influence of locus of control on volunteering participation and frequency among older males and females. We use the FE model to examine and evaluate this relationship. Table 2.4 results indicate that relationship.

Table 2.4 The impact of locus of control on volunteering work based on gender

	Volunteering participation		Volunteering frequency	
	Male	Female	Male	Female
Locus of control	0.009***	0.015***	0.022	0.035***
	(0.003)	(0.0026)	(0.014)	(0.013)
Observations	33,375	49,111	5,000	6,246
Individuals	12,200	17,493	1,952	2,451
Overall R-squared	0.0051	0.0072	0.0162	0.0149

Notes: Control variables for all regressions: age, education dummies, marital status dummies, employment dummies, logarithm income, household size, number of chronic diseases, body weight, cognitive functions, ADL, ADLI, Wave dummies, country, language. Standard errors clustered at the individual level appear in parentheses.
*** p<0.01, ** p<0.05, and *p<0.1

Table 2.4 shows the results of volunteering participation. It shows evidence that locus of control has a positive and statistically significant impact on volunteering participation for both older men and women. Participation in volunteer work may be equal between older men and women due to social programs in European countries that do not differentiate between genders. However, results show that older women with an internal locus of control tend to volunteer more frequently than older women with an external locus of control. On the other hand, this relationship is insignificant for older men with an internal and external locus of control. Older women with an internal locus of control tend to volunteer more frequently than older men with an internal locus of control for several reasons. First, older women have more robust social networks and family ties than older men (Cohn-Schwartz & Schmitz, 2024), which increases the chance of volunteering frequency. Second, older men's volunteering frequency is driven by external factors rather than their personal beliefs (Wilson, 2000). Third, older women are more likely than older men to think that helping is an important action that fits their beliefs and gives them a feeling of purpose. (Einolf et al. 2011).

2.5.3 Heterogeneity

Cultural differences play an important role in shaping volunteering behaviours. Cultural values, norms, and social behaviour affect older adults' opportunities for engagement in volunteering participation and frequency. Table 2.5 shows the impact of locus of control on volunteering participation and volunteering frequency by regions in Europe.

Table 2.5 The impact of locus of control in volunteering work according to region (FE regression)

	Volunteering Participation			Volunteering frequency		
	North	Central	South	North	Central	South
Locus of Control	0.015***	0.013***	0.009***	0.014	0.015	0.058***
	(0.003)	(0.003)	(0.003)	(0.011)	(0.015)	(0.017)
Observations	51,511	39,291	31,075	8,427	6,206	2,819
Individuals	18,221	14,245	11,472	3,272	2,434	1,131
Overall R-squared	0.006	0.006	0.006	0.013	0.013	0.021

Note: countries of Northern Europe in our sample are (**Denmark, Sweden and Estonia**). Central Europe (**Austria, Germany, Switzerland, Belgium, Czech Republic and Slovenia**). Southern Europe (**Italy, Spain and France).** Note: Control variables for all regression: age, education dummies, marital status dummies, employment dummies, logarithm income, household size, number of chronic diseases, body weight, cognitive functions, ADL, ADLI, Wave dummies, country, language. Standard errors clustered at the individual level appear in parentheses. *** p<0.01, ** p<0.05, and *p<0.1

Internal locus of control positively relates to volunteering participation and is statistically significant across all regions. This means internal control increases the opportunities for engagement in volunteering work in all regions. However, concerning volunteering frequency, the locus of control is positive but not statistically significant in all regions except the South. This means that older adults in the Southern countries of Europe who have an internal locus of control are much more likely to volunteer frequently. This relationship is insignificant in Northern and Central Europe due to solid social safety and more established volunteering cultures, where institutional support might mitigate the influence of personal control perceptions. This suggests that although older adults in Northern and Central Europe have an internal locus of control, this does not influence their volunteering frequency.

On the other hand, older adults in Southern Europe have lower volunteering rates and locus of control, where the relationship between locus of control and likelihood to volunteer becomes significant. Older adults in Southern Europe have more family obligations and group responsibilities, meaning when they feel a sense of control, they tend to put their efforts into serving their communities through volunteering frequency (Hofstede, 2001). On the other hand, in Northern and Central European countries, older adults tend to put more effort into serving themselves rather than focusing on their communities, even though they have more sense of control than those in the South.

Moreover, Southern countries, as prevalent as Mediterranean cultures, typically promote personal agency via social involvement, which may explain why locus of control significantly affects volunteering frequency in this area (Triandis, 1995). In contrast, Northern and Central

Europe have more individualistic societies where volunteering activities may be driven more by institutional and structural elements than psychological attributes (Assmann & Ehrl, 2021). In these regions, there are more formal and governmental events for volunteering opportunities that do not depend on a sense of control. Hence, locus of control has no significant impact on volunteering frequency. Therefore, older adults participate in volunteer work since it is a formal event organised by the government. However, because of the individualistic culture prevalent in those regions, which means individuals place their interests above their societies and groups, older adults in Northern and Central European societies with a sense of control do not care to put their effort into serving their communities by volunteering frequency compared to those in Southern Europe.

2.5.4 Robustness checks

So far, the main results suggest that locus of control positively affects volunteering participation and frequency. This section explores the sensitivity of our results to changes in the econometrics specification. We aim to ensure that our results are stable, reliable, and generalisable across various methodological approaches. This helps us gain a better understanding of the strength and consistency of the relationship between locus of control and volunteering behaviours, ensuring that our findings are not influenced by factors specific to any single model.

2.5.4.1 An alternative measure of volunteering frequency

Section 2.4 employed a binary variable for volunteering frequency. In this section, we use an alternative measure of volunteering frequency, specifically 4-scale volunteering frequency of 1 (less often), 2 (almost every month), 3 (almost every week), and 4 (almost every day). This scale is more illustrative of volunteering frequency. We apply Ordinary Least Squares (OLS), Fixed Effects (FE), and Ordinal Logit Regression models; the results are shown in Table 6.

Table 2.6 Using different measurements of volunteering

Volunteering Frequency	Ordinary Least Squares	Fixed effect	Ordinal Logit Regression
Locus of Control	0.058***	0.066***	0.112***
	(0.009)	(0.017)	(0.171)
Observations	18,893	11,246	18,895

Overall R-squared	0.028	0.016	0.0115

Notes: Control variables for all regressions: age, education dummies, marital status dummies, employment dummies, logarithm income, household size, number of chronic diseases, body weight, cognitive functions, ADL, ADLI, Wave dummies, country, language. Standard errors clustered at the individual level appear in parentheses
*** p<0.01, ** p<0.05, and *p<0.1

Table 2.6 shows that the ordinary least squares, fixed effect and ordinal logit regression approaches. The results show a positive and significant relationship between the locus of control and volunteering frequency. In the FE model, increasing the internal locus of control by one standard deviation increases volunteering work frequency by 6.6 percentage points. The ordinal logit regression results showing that a one-unit increase in the locus of control score increases the log odds of being in a higher category of volunteering frequency by 0.112. These results are consistent with our results in Table 2.3.

2.5.4.2 Focusing on older people in retirement

The literature highlighted the importance of retirement on locus of control (Clark & Zhu, 2023). However, our main regressions did not specifically isolate the effect of retirement. In this sensitivity analysis, we exclude the employed and self-employed older adults from the regressions. We check if there is any effect of retirement. Results reported in Table 2.7 are similar to those presented in Table 3. We continue to find a positive impact of locus of control on volunteering participation and frequency.

Table 2.7 Using the retirement older adults for FE regressions

	Volunteering Participation	Volunteering frequency
Locus of Control	0.013***	0.029***
	(0.002)	(0.009)
Observations	82,486	11,246
Individuals	29,693	4,403
Overall R-squared	0.005	0.012

Notes: Control variables for all regressions: age, education dummies, marital status dummies, employment dummies, the logarithm of income, household size, number of chronic diseases, body weight, cognitive functions, ADL, ADLI, Wave dummies, country, language. Standard errors clustered at the individual level appear in parentheses.
*** p<0.01, ** p<0.05, and *p<0.1

2.5.4.3 Logit model

We estimate logit fixed effect model regression models to check the accuracy of our regression. Our dependent variables are dummies (volunteering participation and

volunteering frequency). We include the same control variables that we used in the main regressions. The results reported in Table 2.8 are similar to those presented in Table 2.3. We continue to observe that locus of control positively influences volunteering participation and frequency.

Table 2.8 Using logit model with fixed effect

	Volunteering participation	Volunteering frequency
Locus of control	0.185 ***	0.207 ***
	(0.028)	(0.066)
Observations	19,081	4,354
Prob > Chi2	0.000	0.000

Note: Control variables for all regressions: age, education dummies, marital status dummies, employment dummies, logarithm income, household size, number of chronic diseases, body weight, cognitive functions, ADL, ADLI, Wave dummies, country, language. Standard errors clustered at the individual level appear in parentheses.
*** p<0.01, ** p<0.05, and *p<0.1

2.5.5 Mechanisms Linking Locus of Control to Volunteering and Health Outcomes

To examine the potential mechanisms that could drive the association between locus of control and volunteering work. We rely on the same strategy and estimate FE models. For this part of the analysis, we explore the relationship between Locus of Control and other health outcomes such as physical health, cognitive functions, and mental health.

The regression analysis for physical health indicates that the coefficient for locus of control is positive and statistically significant. Suggests that older adults with internal locus of control tend to report better physical health. Older adults with better health are more likely to engage in volunteer work and volunteering frequency. Hence, enhancing physical health may serve as a mechanism through which a higher sense of control leads to volunteering participation and volunteering frequency.

The cognitive function variable is measured by using tests that assess abilities related to memory, numerical skills, and verbal fluency. Results in column 2 suggest that older adults with an internal sense of control have better cognitive functions. Volunteering requires mental tasks such as planning and organising. Older adults who have better cognitive function engage in volunteering work and volunteer more frequently than those with poor cognitive functions.

Therefore, better cognitive functions because of a high sense of control lead to increased volunteering participation and frequency.

The results show that a higher internal locus of control level increases the Euro-D scale, which decreases the Depression level. The results align with previous studies such as those of Khumalo and Platter (2019). The relationship between locus of control and mental health may increase volunteering participation and frequency. A higher internal locus of control decreases depression symptoms, which makes older adults more social, and they like to engage with others and sustain engagement in volunteering.

Table 2.9 presents the mediating role of volunteering work in the relationship between different health outcomes. The fixed effect estimation shows that locus of control positively impacts physical health. The coefficient of locus of control decreases a bit when we control with volunteering participation. It declines from 0.172 to 0.159 when we control it with volunteering frequency. Volunteering frequency significantly affects the relationship between locus of control and physical health. Similarly, cognitive functions and mental health coefficients are positive and statistically significant. When we control volunteering frequency, coefficients also decline, which sheds light on the role of volunteering frequency in those relationships.

Table 2.9 The mediating role of volunteering in the relationship between locus of control and life satisfaction, mental health, cognitive functions and physical health (fixed effects estimates)

	Physical health			Cognitive functions			Mental health		
	Without volunteering	With volunteering Participation	With Volunteering frequency	Without volunteering	With volunteering Participation	With Volunteering frequency	Without volunteering	With volunteering Participation	With Volunteering frequency
Locus of control	0.172***	0.171***	0.159***	0.832***	0.826*** (0.038)	0.543***	0.519***	0.519***	0.384***
	(0.005)	(0.004)	(0.016)	(0.039)		(0.12)	(0.031)	(0.009	(0.023)
Observation	82,508	82,485	11,246	82,509	82,486	11,246	81,718	81,695	11,173
Individuals	29,699	29,693	4,403	29,699	29,693	4,403	29,478	29,472	4,375
R-squared	0.073	0.073	0.064	0.023	0.024	0.016	0.077	0.076	0.052

Note: Control variables for all regressions: age, education dummies, marital status dummies, employment dummies, logarithm income, household size, number of chronic diseases, body weight, cognitive functions, ADL, ADLI, Wave dummies, country, language. In the cognitive function model, we excluded cognitive function from control variables. Standard errors clustered at the individual level appear in parentheses.

2.6 Conclusion

This paper investigates the impact of locus of control on volunteering work among older adults, using data from the Survey of Health, Ageing, and Retirement in Europe (SHARE) for 12 European countries. We consider both volunteering participation and volunteering frequency. We use Ordinary least squares (OLS) and fixed effect (FE) models. Our results show a positive and statistically significant impact of internal locus of control on volunteering participation and frequency. We show evidence that there are no gender differences in this relationship for volunteering participation. However, we show evidence that the correlation between internal control and volunteering frequency is stronger for older women than for older men. Our heterogeneity regional analysis shows that volunteering participation is positive and statistically significant in all European regions (North, Central, and South). Volunteering frequency shows a positive but not statistically significant relationship in Northern and Central Europe, while the relationship is positive and statistically significant in Southern Europe. These results highlight the cultural differences between European cultures and give evidence about how cultural norms impact the psychological behaviour of older adults. Our sensitivity analysis results show similar results to those of our main regressions.

This paper makes two major contributions to the literature. First, previous studies have shown a positive relationship between internal locus of control and better health behaviour and

lifestyle. However, the relationship between locus of control and volunteering work for older adults remains unexplored. We contribute to the literature by examining the impact of locus of control on volunteering work. Second, our paper examines the non-cognitive traits (locus of control) linked to volunteering work by considering the cultural differences across European regions (North, Central, South).

2.6.1 Limitations

This chapter presents two primary limitations. First, the self-report measure for locus of control may be subject to biases. Individual responses could be influenced by mood, emotions, or situational factors at the time of the interview, potentially leading to measurement errors that affect the reliability of the results. This highlights the pressing need for more accurate assessments of locus of control, a crucial area for future research. Second, our analysis is limited to 12 European countries in the SHARE dataset, specifically Austria, Germany, Sweden, Spain, Italy, France, Denmark, Switzerland, Belgium, Czech Republic, Slovenia, and Estonia. We utilise data from Waves 4 (2010), 5 (2013), 6 (2015), 7 (2017), and 8 (2019). It is worth noting that locus of control statements is absent in Waves 1, 2, and 3, leading to their exclusion from our analysis. Additionally, several countries were excluded due to missing data in specific waves: the Netherlands does not appear in Waves 6 and 7; Greece is missing in Waves 4 and 5; Israel is not present in Waves 3 and 4; Ireland appears only in Waves 2 and 3; Luxembourg is absent in Wave 4; Hungary does not appear in Waves 5 and 6; Portugal is missing in Wave 5; and Croatia is not present in Waves 4 and 5. Other countries not included due to missing data are Lithuania, Bulgaria, Cyprus, Finland, Latvia, Malta, Romania, and Slovakia.

2.6.2 Implications

This chapter emphasises the significance of locus of control, which refers to a person's belief in their ability to influence life outcomes and shape healthy behaviour (e.g. volunteering). Policymakers should consider implementing interventions that enhance personal agency and self-efficacy among ageing populations. For instance, programs focused on health education, financial literacy, and empowerment in decision-making could strengthen older adults' sense of control over their lives. This, in turn, could lead to improved health outcomes, greater

engagement in preventive health behaviours, and increased psychological resilience. Moreover, the results indicate that improving the locus of control may lead to greater participation of older adults in social and community activities. Developing community-centred programs could promote social interactions and involvement, giving older individuals chances to make decisions and assert control over their activities. Initiatives like volunteer opportunities, intergenerational programs, or mentorship roles have been proven to greatly improve life satisfaction and mental well-being among older adults, providing a positive and hopeful perspective for the future.

Public policy plays a vital role in creating an environment that supports active ageing and social engagement. By studying volunteering behaviour among older adults, policymakers can gain insights into the factors that motivate and sustain such activities, which can inform the design of targeted interventions. Understanding these behaviours is important because volunteering has been linked to numerous benefits, including improved physical and mental health, enhanced social connections, and a greater sense of purpose. Policies that encourage and facilitate volunteering can help mitigate the negative effects of social isolation and loneliness, which are prevalent issues among the elderly. Furthermore, promoting volunteering can harness the valuable skills and experiences of older adults, contributing to community development and intergenerational solidarity. Therefore, integrating findings from research on volunteering behaviour into public policy can lead to more effective strategies for fostering active ageing and enhancing the overall well-being of older adults.

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2.8 Appendices

Appendix A.1 Descriptive of variables

Variable	Description
Locus of control	The participants were asked 11 statements, five of them are external locus of control and 6 of them are internal locus of control. We Subtract external ones from internal ones plus 30.
Volunteering Participation	The participants in the survey were asked "which of the activities listed on this card have you done in the last twelve months?" if the answer is "done voluntary or charity work, " the variable takes value 1 and 0 otherwise.
Volunteering frequency	The participants in the survey were asked "How often have you engaged in voluntary or charity work in the last 12 months" ranging from 1 'less often to 4 "almost every day'. We Make it dummy variable. It takes 1 if the participant has high volunteering frequency and 0 otherwise.
Age	The participant's age at the time of the interviews. We take the participants who have 50 years and old.
Male	Dummy variable if the participant is male variable take value of 1 and 0 otherwise.
Education	ISCED (International Standard Classification of Education) levels: zero level of education meaning no education or unfinished first level of education. First level (primary education or first stage basic education), second level (lower secondary or second stage of basic education), third level (upper secondary education), fourth level (post-secondary non-tertiary education), fifth level (first stage of tertiary education) and sixth level (second stage of tertiary education).
Employment	Categorical variable representing employment status as Retired, Employed or self-employed, Unemployed, permanently disabled, Homemaker, or Other
Income	Annual household income after taxes and social insurance contributions. We use the natural logarithm (Ln income)..
Marital status	Participants were asked about their marital status: It takes value 1 if the participant is married or living with spouse, 2 if they have registered partnership, 3 if they never married and 4 if widowed. We separated the answers for 4 dummies variables.
Number of chronic diseases	The number of the following chronic diseases: heart attack, high blood pressure or hypertension, high blood cholesterol, a stroke or cerebral vascular disease, diabetes or high blood sugar, chronic lung disease, cancer or malignant tumor, stomach or duodenal ulcer, peptic ulcer, Parkinson disease, cataracts, hip fracture or femoral fracture
Household size	The participant was asked about the total number of households, excluding himself/herself. The answer is within the range of 0 to 12.

ALD	The Activities of Daily Living Index measures the level of difficulty experienced by the respondent, ranging from 0 to 5. The duties included by it include dressing, bathing, or showering, eating, cutting up food, going across a room, and getting in or out of bed.
IALD	Instrumental Activities of Daily Living (IADLs) The index go from 0 to 3 and correspond to increasing levels of difficulty for the responder. The actions included include making phone calls, administering prescriptions, and handling financial matters.
Cognitive Functions	Cognitive function is operationalised by means of memory, numeracy and verbal fluency. 1. Memory, as measured by the 10-word recall test: Participants were read ten words, and they were then asked to recall them at two time points. 2. Verbal fluency is a measure of executive function: participants were asked to report all the animals they could think of in 60s. 3. Numeracy is also a measure of executive function: participant was asked to subtract 7, starting at 100. The starting question was: "Now let's try some subtraction of numbers. One hundred minus 7 equals what?". After the respondent's answer, he or she was asked "And 7 from that?" four consecutive times. Answers were coded as correct (1) or incorrect (0).
Underweight	Underweight if BMI index <18.50. if underweight take 1 otherwise takes 0
Healthy weight	Healthy weight if BMI index between 18.5 and 25. if healthy weight takes 1 otherwise takes 0
Overweight	Overweight if NMI index between 25 and 30. if overweight takes 1 otherwise takes 0
Obese	Obese if BMI index >30. if obese take one otherwise takes 0
Country	The countries use in our sample are Austria, Germany, Sweden, Spain, Italy, France, Denmark, Switzerland, Belgium, Czech Republic, Slovenia and Estonia.
Language	German, Dutch, Swedish, Italian, French, Flemish, Slovenian, Estonian, Russian, Spanish, Catalan.
Wave	The rounds of interviews: Wave 4 in 2010, Wave 5 in 2013 wave 6 in 2015, Wave 7 in 2017 wave 8 in 2019.

Notes: those definitions from SHARE dataset

Appendix A.2 Descriptive statistics for countries

	Volunteering participation		**Frequency volunteering**	
	Participate volunteering	Does not participate volunteering	High frequency volunteering	Low frequency volunteering
Locus of control:				
Austria	37.93 (4.38)	35.83 (5.5)	38.19 (4.2)	37.72 (4.5)
Germany	36.76 (4.38)	35.02 (5.4)	36.88 (4.3)	36.61 (4.4)
Sweden	36.47 (4.17)	35.60 (4.8)	36.42 (4.2)	36.48 (4.1)
Spain	35.08 (5.22)	32.52 (5.9)	35.09 (5.2)	35.06 (5.2)
Italy	33.41 (5.1)	30.61 (5.9)	33.43 (5.1)	33.38 (5.0)
France	35.98 (4.78)	33.99 (5.6)	36.27 (4.8)	35.56 (4.8)
Denmark	38.04 (3.9)	37.04 (4.5)	38.03 (4.0)	38.04 (3.8)

Switzerland	37.85 (3.9)	36.72 (4.7)	37.96 (3.9)	37.73 (4.0)
Belgium	35.51 (4.9)	33.99 (5.7)	35.66 (5.0)	35.31 (4.9)
Czech Republic	33.09 (4.9)	31.70 (5.3)	32.89 (5.2)	33.17 (4.8)
Slovenia	36.87 (4.7)	34.89 (4.7)	37.42 (4.6)	36.44 (4.6)
Estonia	35.18 (5.2)	31.82 (5.9)	34.58 (5.5)	34.87 (5.6)

Notes: source from SHARE dataset

Appendix A.3 System GMM estimation results for locus of control and volunteering participations

Variable	**Coefficient**
lagged dependent variable	0.136***
	(0.013)
Locus of control	0.003
	(0.003)
Observations	63,537
Individuals	36,410

Diagnostic tests:

	Statistic	**P-value**
Arellano-Bond test for AR (1)	-18.09	0 .000
Arellano-Bond test for AR (2)	2 .91	0.004
Sargan test	57 .25	0.00
Hansen test	36 .60	.0013
Difference-in-Hansen test	5 .23	0.632

Notes: Control variables for all regressions: age, education dummies, marital status dummies, employment dummies, logarithm income, household size, number of chronic diseases, body weight, cognitive functions, ADL, ADLI, Wave dummies, country, language. Standard errors clustered at the individual level appear in parentheses.
*** p<0.01, ** p<0.05, and *p<0.1

Appendix A.3 System GMM estimation results for locus of control and volunteering frequency

Variable	**Coefficient**
lagged dependent variable	0.143***
	(0.034)
Locus of control	0.022
	(0.016)
Observations	7,583
Individuals	5,031

Diagnostic tests:

	Statistic	**P-value**

Arellano-Bond test for AR (1)	-7.32	0.000
Arellano-Bond test for AR (2)	-0.96	0.339
Sargan test	32.17	0.042
Hansen test	31.10	0.054
Difference-in-Hansen test	2.63	0.917

Chapter 3: Emotional Closeness and Life Expectancy: Cross-country evidence from Europe

3.1 Abstract

This paper uses panel data from the Survey of Health, Ageing and Retirement for Europe (SHARE) to examine the empirical link between emotional closeness and life expectancy, using. We use wave 4 (2010), wave 6 (2015) and wave 8 (2019) for 14 European countries. We use a fixed effects (FE) approach in this paper. We employ network satisfaction as an instrumental variable to identify the causal impact. We use a fixed effects instrumental variable (FE-IV). We find a positive and significant effect of emotional closeness on life expectancy for older people. We find that emotional closeness has a strong and positive impact of on life expectancy for older women, while there is no such evidence for men. Our study delves into cultural differences between European regions. We use Hofstede's cultural theory (Hofstede, 1984). We classify the countries into two groups according to cultural differences: collectivism and individualism. Women in European collectivist cultures form that relationship, underscoring the cultural context's impact on health outcomes in those societies, while women in individualistic cultures do not. Those results highlight the cultural norms regarding health benefits.

Keywords: Emotional closeness, Life expectancy, SHA

3.2 Introduction

As the proportion of the ageing population continues to increase, our view of old age has changed from one of decline and disengagement (Boudiny and Mortelmans, 2011). In Europe, people are living longer, and families are getting smaller, which increases isolation, highlighting the importance of social networks affecting the health and well-being of older adults. Notably, this influence extends across gender, socioeconomic status, and welfare measures, highlighting the universal need for strong social connections for older adults (Olofsson et al., 2018). Social and economic changes in Europe need increasing attention to older individuals' well-being and the possibility of keeping their active and engaged lifetime. This perspective includes examining physical, mental, and social health factors (Arezzo and Giudici, 2017). The shifting landscape emphasises the significance of emotional closeness in older individuals' well-being, encouraging a collective commitment to supportive and stimulating situations.

Life expectancy is the average number of years a person is expected to live (Da Costa, 2023). It is a vital measure that provides valuable insights into a society's overall well-being and socioeconomic advancement (Miles, 2023; Kulinskaya et al., 2020). Life expectancy is a key indicator of social well-being, with a robust body of literature exploring the intricate relationship between health outcomes and socio-economic factors (Cutler et al., 2006; Preston & Ho, 2009). It is a pivotal metric, encapsulating healthcare access, disease prevalence, lifestyle choices, and the influence of social determinants of health (Cutler et al., 2006). This understanding empowers policymakers to allocate resources effectively and tailor interventions to diverse population needs (Marmot et al., 2012). In the last several centuries, there have been notable advancements in life expectancy (Pascariu et al., 2018). it has shown a constant increase in all countries over the last century. This upward trend may be attributed to a range of variables, including advancements in living and working circumstances, enhanced access to maternity and preventative healthcare, and higher education (Turan, 2020). Prior research has highlighted that social determinant of health influence life expectancy, such as income (Deaton, 2003), education (Soares, 2006) and social networks (Bhatia, 2023).

The social networks of older people are seen to offer their main members a variety of support that contributes considerably to their health and happiness (Litwin, 2010; Rafnsson et al., 2015). Goldman and Cornwell (2018) observed that the longevity of these partnerships is impacted by consistent communication and strong emotional connections. Emotional closeness plays a crucial role in fostering profound connections, shaping interpersonal dynamics, and shaping the expression of desires and requirements (Keltner & Haidt, 1999). Significantly, the potential consequences of these relationships characterised by emotional depth extend beyond simple personal connections; they possess the capacity to impact health-related behaviours, improve psychological welfare, and foster a deep sense of empowerment and safety (Umberson and Montez, 2010; Griffiths et al., 2015). Emotional closeness, characterised by robust social connections and nurturing interactions, has significant implications for individuals' well-being and longevity throughout their senior years (Lang & Carstensen, 1994). Research has shown that those who possess robust social ties are at a decreased risk of experiencing stress, depression, reduced immune system functioning, and chronic ailments such as heart disease and diabetes (Holt-Lunstad et al., 2015; Uchino, 2006; House et al., 1988). Maintaining these crucial social connections is important since they have been shown to have a positive impact on life expectancy (Yang et al., 2016).

In the later stages of life, strong emotional closeness becomes a powerful factor that positively influences health trajectories, impacting vital aspects such as life expectancy (Mirowsky & Ross, 2007). As explained by Umberson and Montez (2010), establishing emotional support can promote the adoption of healthier lifestyles among elderly adults. This emotional closeness, characterised by the nurturing connections of attachment and comfort, becomes a cornerstone for well-being. Providing emotional support within these relationships goes beyond mere companionship. It helps people feel a sense of control and empowerment, fostering active engagement in behaviours that actively contribute to health promotion (Pender and Barbara, 2006). This diverse nature of emotional closeness highlights its importance in shaping the emotional landscape and the physical well-being of individuals navigating the later stages of life.

This paper examines the causal effect of emotional closeness on life expectancy in 14 European countries. We exploit rich survey data from the Survey of Health, Ageing and Retirement in

Europe (SHARE). The survey provides representative information on the emotional closeness and life expectancy of individuals at a later age across European countries. We use wave 4 (2010), wave 6 (2015) and wave 8 (2019) for 14 European countries. To address the endogeneity problem, we instrument the emotional closeness by network satisfaction. The results provide evidence that emotional closeness positively impacts life expectancy. Our estimations show that emotional closeness affects the life expectancy of women but not men. Moreover, conforming to the nation regarding cultural differences matters; our results suggest that emotional closeness affects the life expectancy of older women in collectivist European countries. In contrast, it does not have a similar effect in individualistic ones.

Existing research in economics has diligently explored the impact of social networks on diverse dimensions, such as healthcare demand, healthcare utilisation, life satisfaction, and subjective well-being (Lei et al., 2015; Rosenquist and Lehrer, 2014; De Neve and Oswald, 2012; Oswald and Powdthavee, 2008; Frijters et al., 2004; Deri, 2005; Lleras-Muney, 2005). However, emotional closeness has received relatively limited attention within this extensive body of research. The link between emotional closeness and life expectancy is a topic typically examined by psychology (Bahatai et al., 2023; Gil-Clavel et al., 2020; Asante and Karikari, 2021; Freak-poli et al., 2021; Danielsbacka et al., 2015; Umberson and Montez, 2010; Holt-Lunstad et al., 2010; Mirowsky and Ross, 2007; Berkman and Syme, 1979). Against this background, our study follows a trend in economics to expand its scope of inquiry to topics traditionally addressed by other scientific disciplines. Extending economics into other social sciences with bigger and more representative datasets or statistically more sophisticated explanatory factors is pointless if it doesn't produce new theoretical insights. Economic thought must include atypical themes to explore atypical themes (Lazear 2000) successfully. We use an informal theoretical background discussion to incorporate the psychological problem into the analytical framework of economics and tie it to health economics to guide our empirical investigation.

We make a distinctive contribution to the literature in several ways. (i). Unlike many previous studies, our research delves into this often-underexplored dimension of social networks by delving into the essential role of emotional closeness. Studies in health economics have paid little attention to the emotional as a determinant of health outcomes. Our study suggests that

considering emotional closeness may lead to a development in health economics. (ii). Our study stands out for its unique perspective on the older population, recognising their distinct needs and the crucial role of emotional closeness in their lives. Our focus on older people is important. Firstly, there has been a significant increase in the population of older individuals, particularly in developed countries (World Population Prospects, 2019). Second, the increasing ageing population has significant implications for healthcare, pensions, and social services, requiring thorough investigation (Bloom et al., 2011). Thirdly, emotional closeness is paramount for the well-being of older adults, particularly when compared to other age groups (Charles& Carstensen, 2010). (ii). We present a rigorous analysis of the effects of emotional closeness on life expectancy over a long follow-up period in a harmonised multi-country framework and produce novel findings on the heterogeneous effect of emotional closeness across country groups.

The rest of the paper is organised as follows. Section 3.2 provides a literature review discussion. Section 3.3 describes the methodology. Section 3.4 presents the empirical results. Section 3.5 discusses robustness checks, and Section 6 sets out the conclusion.

3.3 Literature review

Life expectancy is the average number of years a person is expected to live (Kim et al., 2019). it serves as a critical measure for predicting health outcomes, encompassing mortality rates and prospects for longevity (Becchetti et al., 2023). It is a vital indicator of population health, influenced by healthcare, living conditions, nutrition, and public health initiatives (Garrido-Vergara and Sepúlveda-Rodríguez, 2023). Additionally, it profoundly impacts retirement planning, pension systems, and economic well-being in ageing populations (Bloom et al., 2003). Policymakers rely on life expectancy for efficient healthcare resource allocation (Wise, 2004). However, the rising life expectancy strains healthcare systems, necessitating resource allocation to address evolving elderly healthcare needs while maintaining accessibility and efficacy (Zweifel et al., 1999). The examination of life expectancy in the economics literature frequently occurs within the framework of human capital, labour market dynamics, and pension systems (Turan, 2020). The life expectancy calculation often occurs at birth, offering an approximation of the

average lifespan that a baby is expected to experience, given the prevailing mortality circumstances.

Nevertheless, this metric may also be calculated for other age groups, such as individuals aged 65 or 75, which is relevant to ageing societies (Department of Data and Analytics, 2020). life expectancy is a statistical construct and does not serve as a prognosticator for the lifetime of any specific person. Instead, it provides a comprehensive outlook on the general mortality trends within a certain group (Miladinov, 2020).

Historically, studies have defined emotional closeness. For example, Davey & Paolucci (1980) defined it as the frequency of contact and the willingness to spend time together. Rubin's (1970) emotional closeness measures the level of intimacy and acceptance experienced within interpersonal relationships. Emotional closeness is the degree and depth of interpersonal ties based on trust, empathy, communication, and shared feelings and experiences (Lee et al., 1990). It is a key family relationship component and is especially important for older people (Duflos et al., 2020). This sense of closeness enables individuals to experience feelings of being understood, supported, and cherished. The concept expands to include collective emotional experiences, reciprocal comprehension, and robust emotional connections (Feeney & Collins, 2001; Laurenceau et al., 1998). As a result, establishing emotional closeness fosters a favourable setting for individuals to engage in open self-revelation and articulating their thoughts and emotions (Berscheid et al., 1989). Emotional closeness can positively influence an individual's overall health and well-being, which, in turn, may contribute to a longer lifespan (Holt-Lunstad et al., 2010).

The significance of emotional closeness becomes notably prominent in later life. Social support, which improves older health and well-being, relies on the emotional dimension of living (Umberson & Montez, 2010). The experience of emotional connectivity serves to alleviate sensations of loneliness and isolation, hence acting as a protective factor against negative psychological and health consequences (Hawkley & Cacioppo, 2010; Tomaka et al., 2006). Cornwell et al. (2006) show that older people's social networks fluctuate in size and emotional closeness. It is important to note that closeness in these social networks encourages older people to engage in various activities. Establishing strong and meaningful connections

within one's family and maintaining close emotional bonds can positively impact mental health and overall personal happiness (Fingerman et al., 2013; Lin & Chen, 2018; Taylor et al., 2015). Conversely, having strained relationships and lacking emotional closeness are associated with unhappiness, life dissatisfaction, and depression (Chen & Zhou, 2020).

Studies have shown that emotional closeness affects health outcomes, particularly in ageing. Holt-Lunstad et al. (2010) state that emotional closeness in social relationships improves mental health and cognition functions. In addition, establishing emotional closeness promotes the reciprocal provision of emotional assistance, enhancing mental well-being and psychological fortitude (Cornwell and Waite, 2009). Glass et al. (1997) illuminate older persons' socioeconomic level and social network ties. Their research shows that social networks affect health and well-being. Moreover, Lang and Carstensen (1994) discovered that older adults had fewer close relationships than younger people. Without a nuclear family, emotional closeness is more important in social embeddedness for them. Holt-Lunstad et al. (2015) examine how social isolation and loneliness affect older adults' mortality. This research reinforces the role of emotional relationships in life expectancy.

The investigation of the relationship between emotional closeness and life expectancy is the subject of numerous scientific studies. An investigation by Ozbay et al. (2017) establishes a correlation between health outcomes, including life expectancy, and social support factors, including emotional support. Social support is associated with decreased stress levels, improved mental well-being, a higher likelihood of adhering to medical treatments, and a strengthening of immune system functioning (Berkman et al., 2000). In addition, having meaningful relationships with others has been linked to a longer life expectancy, better health, and higher quality of life (Holt-Lunstad et al., 2010). Providing emotional and instrumental support often enhances the management of diseases and adherence to medical regimens, reducing the need for extensive medical treatments and decreasing healthcare expenses, which positively affects life expectancy (Cohen et al., 2003).

The Influence of cultural norms and values on emotional attachments and their impact on life expectancy is substantial. According to Hofstede's (1980) study, European nations demonstrate

diverse levels of individuality and collectivism. Countries with a pronounced collectivist orientation, such as those in Southern Europe, emphasise the importance of strong familial ties and intergenerational relationships. These cultural values contribute to the development of robust emotional support networks, which in turn have been shown to have a favourable impact on health outcomes and life expectancy (Triandis et al., 1988). Cultural differences significantly impact the establishment of emotional closeness among older individuals. Lee (2021) offers significant insight into the correlation between social isolation and subjective well-being among older individuals across diverse European areas. The data presented unveils significant cultural and regional disparities in well-being and social exclusion. Nordic countries exhibit greater well-being and lower exclusion rates, while Central and Eastern European nations demonstrate contrasting patterns. This research highlights the significant impact that financial resources and access to essential services have on the life satisfaction, happiness, and overall health of older individuals. The results are relevant in comprehending the influence of socio-economic determinants and geographical disparities on the health and lifespan of elderly individuals. Moreover, income inequality within a country significantly impacts people's ability to access essential emotional support networks. The research by Wilkinson and Pickett (2006) offers vital insights into a notable correlation, wherein countries characterised by lower income disparities tend to have more social welfare provisions and foster a heightened sense of community.

In their study of close emotional relationships in late life, Lang and Carstensen (1994) illuminate how older adults actively manage their social networks to emphasise emotional quality rather than quantity. The research involving 156 participants aged 70-104 indicates that while social networks typically contract with age, the number of emotionally significant relationships remains stable. This finding challenges the common belief that social withdrawal in later life indicates dysfunction; instead, it may reflect a strategic choice. The study builds on socioemotional selectivity theory (SST), which posits that older adults shift their social priorities from seeking new information and diverse connections to engaging in emotionally fulfilling interactions. As individuals come to perceive their future as limited, they increasingly invest in relationships that offer emotional satisfaction. The study also incorporates the social convoy model, suggesting that individuals navigate life within a core group of emotionally close companions. In situations where

family members are absent, the number of these intimate relationships becomes a more significant predictor of social well-being.

A study by Jiang and Jiang (2021) provides a detailed examination of the relationships between elder mistreatment, emotional closeness, loneliness, and life satisfaction among older adults in China. Utilising data from a substantial sample of 8,717 participants in the 2018 China Longitudinal Ageing Social Survey, the authors aim to deliver a comprehensive understanding of how both emotional and physical mistreatment impact life satisfaction. The findings indicate a significant decrease in life satisfaction attributable to emotional mistreatment, primarily due to its detrimental effect on emotional closeness with children and its correlation with increased feelings of loneliness. Notably, physical mistreatment did not demonstrate a significant mediating effect through emotional closeness, highlighting the distinct ways in which different forms of mistreatment can influence psychological outcomes. The study contextualises elder mistreatment within the stress process model, identifying it as a stressor that depletes personal resources and negatively affects overall well-being. This aligns with existing evidence linking elder mistreatment to adverse outcomes such as anxiety, depression, and diminished life satisfaction. The authors emphasise the role of cultural norms in shaping these dynamics, particularly the influence of traditional Confucian values, which can amplify the perceived severity of mistreatment in Chinese society. They also advocate for more nuanced research that differentiates between various forms of mistreatment and their unique pathways of influence on psychological well-being.

Binder et al. (2012) examined the emotional closeness, support, and maintenance behaviours of core and significant ties within personal communities. The research reveals an inverse relationship between the number of core ties—those closest to an individual—and the emotional closeness of these ties; as the number of core ties increases, the emotional closeness to each tie diminishes. In contrast, significant ties, which are essential but less close, demonstrate distinct patterns in friendship maintenance behaviours and social support, indicating that they act as a buffer against social loneliness. The study also highlights the impact of these ties on loneliness. Specifically, social loneliness was negatively associated with the number of significant ties, suggesting that having more can reduce feelings of social loneliness.

Conversely, emotional loneliness was positively correlated with the number of core ties, implying that an increase in such ties might elevate emotional loneliness due to the lower levels of intimacy characteristic of larger networks. This indicates a complex dynamic in which the number of ties in a person's network can influence emotional well-being differently. For example, while core ties may contribute to increased emotional loneliness, significant ties may help mitigate social loneliness. The study underscores the idea that while a greater number of ties can provide additional social support, it may also necessitate more effort in maintenance, leading to potential trade-offs in intimacy and emotional closeness.

Effective communication is crucial in preventing the deterioration of social relationships over time. A study by Roberts and Dunbar (2010) explored how factors such as social network size, emotional closeness, and the nature of the relationship (kinship versus friendship) influence communication patterns. The study of 251 women found that individuals with larger kinship networks maintained longer periods of contact with family and friends. Conversely, those who experienced higher emotional closeness within their networks tended to have shorter intervals between communications. Notably, the impact of emotional closeness was more pronounced in kinship relationships than friendships. This indicates that sustaining kin relationships is less demanding regarding communication frequency than nurturing friendships. The research underscores the dynamic nature of social relationships, emphasising the need for active maintenance to avoid deterioration, with frequent communication playing an essential role. Additionally, while earlier studies have primarily examined communication patterns in close relationships, this research broadens the lens by investigating a more extensive range of connections within an individual's social network, encompassing inner and outer layers, each with varying degrees of emotional intensity and significance. The outer layer, often composed of "weak ties," offers access to diverse information and experiences but also necessitates maintenance to avert emotional detachment.

The meta-analytic review conducted by Holt-Lunstad et al. (2010) aimed to assess the impact of social relationships on mortality risk comprehensively. Drawing on 148 studies with 308,849 participants, the study revealed a 50% increased likelihood of survival for individuals with stronger social relationships. The analysis considered various participant and study

characteristics, such as age, gender, initial health status, cause of death, and follow-up period. The findings indicated consistent results across these factors. Notably, the type of social measurement evaluated demonstrated variations in association strength, with complex measures of social integration showing the strongest correlation.

A study conducted by Bhatia et al. (2023) aimed to investigate the influence of social networks and social support on life expectancy and disability in older adults, using data from the Cardiovascular Health Study (CHS) that followed over 5,700 adults aged 65 and older for 25 years. The study assessed participants' social network and social support scores, with social network scores reflecting the size and quality of social connections and social support scores measuring interpersonal support. The analysis method involved using linear regression to adjust for socio-demographics and comorbidity. The key findings revealed that higher social network scores were significantly associated with increased and disability-free life expectancy, with a 1-standard deviation increase in the social network score corresponding to an additional 0.40 years of life. Notably, this effect remained significant even among participants aged 75 and older, and frailty adjustments did not attenuate it. In contrast, the social support scale did not exhibit significant associations with years of life or disability-free years after accounting for social network scores.

This paper makes two contributions to literature. First, unlike prior economics studies that focused on general social networks, this study examines emotional closeness for older adults. Previous studies have examined social networks and health consequences for ageing Europeans (Fawaz and Mira, 2023; Fiorillo, 2020; Ostrovsky-Berman and Litwin, 2019). The distinct contribution of emotional closeness on health outcomes for older adults has been relatively unexplored within the economic framework. We estimate the causal impact of emotional closeness on life expectancy. Our findings suggest that considering emotional closeness may improve health economics. Second, we examine the cultural differences in this relationship by using a survey of health, ageing and retirement in Europe (SHARE), exploiting the exogenous variation in emotional closeness indicated by network satisfaction. The utilisation of the SHARE dataset adds robustness to the study. We propose thoroughly examining this relationship over a lengthy follow-up period in a harmonised multi-country framework. We obtain fresh results on the diverse influence of emotional closeness across country groups.

3.4 Data

This paper uses the data from the Survey on Health, Ageing and Retirement in Europe (SHARE), a longitudinal survey of people aged 50 and older (Börsch-Supan et al., 2013). Since 2004, more than 140,000 people in 28 European countries and Israel have participated in this cross-national panel survey, which gives information on their health, socioeconomic situation, and social and familial networks (Paiva et al., 2021). The analysis utilises data from Waves 4 (2010), 6 (2015), and 8 (2019) since the survey questions about emotional closeness were not included in the first three waves and Wave 7. Our sample includes 14 European countries (Germany, Austria, Sweden, Denmark, France, Spain, Portugal, Italy, Belgium, Switzerland, Czech Republic, Poland, Slovenia and Estonia). We exclude other countries because they have missing data.

3.4.1 Variables

Emotional Closeness refers to the self-report level of support and connectedness experienced by older individuals within their social relationships, including family, friends, and social networks. In the survey, the participants were asked “How close do you feel to “social network members”?” the answer could be: 1-not very close. 2-somewhatclose. 3-very close. 4-extremely close. To increase the variation of the observations, we use the mean variable of emotional closeness.

Our dependent variable is life expectancy, which refers to the average number of years an individual expects to live. It was measured by asking, “What are the chances that you will live to the age ‘X’ or more?” Participants were asked about their likelihood of reaching a certain age or beyond ‘X’. This specific age ‘X’ was derived from the respondents’ ages, calculated by subtracting their birth year and month from the interview year and month. The assignment of ‘X’ followed a clear pattern: If under 65, ‘X’ was set at 75. For those aged 65-69, ‘X’ was 80. Ages 70-74 corresponded to ‘X’ being 85. Ages 75-79 resulted in ‘X’ being 90. Ages 80-84 were associated with ‘X’ set at 95. Ages 85-94 led to ‘X’ being 100. Ages 95-99 resulted in ‘X’ being 105. Ages 100-104 corresponded to ‘X’ being 110. Ages 105 and above had ‘X’ set at 120. The life expectancy variable is a percentage from 0 to 100. Figure 3.1 shows the life expectancy in our sample. We can see that there are 6,338 of our samples, and their expectation to reach the age that is the

target of their age group is 0. We also noticed that there are 17,375 older adults, and 100% will reach their target age. The highest expectation is 50%, where 21,974 older adults declared that. To account for potential confounding factors, several control variables will be included in the analysis: age, income[2], male dummy, education dummies[3], marital status dummies, household size, Body weight dummies[4], ADL[5], IADL[6], sports activity, grip strength, number of chronic diseases, chronic diseases dummies[7], cognitive functions[8] and self-assessed health[9], language, countries, wave dummies.

3.4.2 Descriptive statistics

Table 3.1 presents the summary statistics of our analysis sample. About 46% of observations come from men, while 54% from women.

Table 3.1 Descriptive statistics

	All	Male	Female
Life expectancy	61.76 (30.46)	61.54 (30.54)	61.93 (30.35)
Age	67.78 (10.05)	67.76 (9.73)	67.8 (10.29)
Marital status:			
Married, living with spouse	0.69	0.78	0.62
Registered partnership	0.10	0.09	0.11
Not married	0.05	0.06	0.05
Widowed	0.15	0.06	0.21
Education:			
Low education	0.35	0.32	0.38
Medium Education	0.39	0.41	0.38
High Education	0.22	0.24	0.20
Employment:			
Retired	0.61	0.67	0.57
Employed	0.24	0.26	0.23

[2] We take the natural logarithm after adding one to the income variable to handle the zero income responses correctly in log form.
[3] For the education variable, we use the International Standard Classification of Education (ISCE) and make it 4 dummy variables (see Appendix A.1).
[4] Body weight is calculated by computing the body mass index (BMI) (see Appendix A.1)
[5] Activities of Daily Living
[6] Instrumental Activities of Daily Living
[7] We use the highest effect diseases on life expectancy (see Appendix A.1).
[8] We use three indicators of cognitive functions: fluency, memory and numeracy (see Appendix A.1)
[9] Self-assess health is self-reported about general health (see Appendix A.1)

Unemployed	0.14	0.07	0.19
Number of Chronic Diseases	1.8 (1.59)	1.7 (1.54)	1.8 (1.63)
Self-assessed health	1.7 (1.06)	1.8 (1.07)	1.7 (1.05)
Family size	2.4 (1.33)	2.53 (1.31)	2.31 (1.33)
Cognitive Functions			
Fluency	20.39 (7.51)	20.41 (7.37)	20.37 (7.61)
Memory	9.1 (3.77)	8.8 (3.59)	9.4 (3.87)
Numeracy	4.0 (3.87)	4.1 (1.44)	3.9 (1.59)
Observations	220,588	102,084	118,504

Note: Standard errors clustered at the individual level appear in parentheses

Table 3.1 also shows that the individuals in our sample are, on average, in their early 60s during the survey periods. Concerning the family, most observations, 69%, come from married respondents. The average household size is slightly above 2.

Table 3.2 Emotional closeness and life expectancy in Europe

country	Emotional closeness			Life expectancy		
	All	Male	Female	All	Male	Female
Italy	3.52	3.51	3.53	65.53%	66.71%	64.58%
Spain	3.64	3.62	3.66	65.71%	67.21%	64.46%
Portugal	3.57	3.54	3.59	62.31%	64.35%	60.70%
Czech Republic	3.71	3.69	3.72	50.23%	49.37%	50.81%
Slovenia	3.47	3.46	3.48	63.01%	63.79%	62.44%
France	3.47	3.44	3.50	60.30%	60.59%	60.08%
Germany	3.39	3.39	3.39	62.27%	60.95%	63.43%
Sweden	3.43	3.43	3.43	62.65%	60.73%	64.28%
Estonia	3.37	3.33	3.40	55.12%	52.32%	56.83%
Austria	3.87	3.87	3.88	65.61%	64.93%	66.07%
Switzerland	3.35	3.34	3.35	66.84%	66.31%	67.30%
Denmark	3.73	3.71	3.75	75.91%	73.97%	77.57%
Belgium	3.55	3.53	3.57	61.86%	61.64%	62.04%
Poland	3.44	3.41	3.45	55.81%	55.86%	55.77%

Source: SHARE dataset

Table 3.2 displays descriptive information on emotional closeness and life expectancy in 14 European countries. The Czech Republic has the greatest average emotional closeness score of 3.71 out of 4, while Switzerland has the lowest score at 3.35. Denmark has the greatest life expectancy among both genders, averaging 75.91%. It scores 77.57% life expectancy for females, while for males, it is 73.97%. Ultimately, there seems to be a consistent correlation between increased life expectancy and heightened emotional closeness. Figure 3.1 presents the mean emotional closeness of 14 European countries from the SHARE dataset. The map uses a colour gradient to represent different levels of emotional closeness, with darker shades indicating

higher means and lighter shades indicating lower means. The key on the right side of the map shows the range of emotional closeness (mean) values

Figure 3.1 The means of emotional closeness in European countries

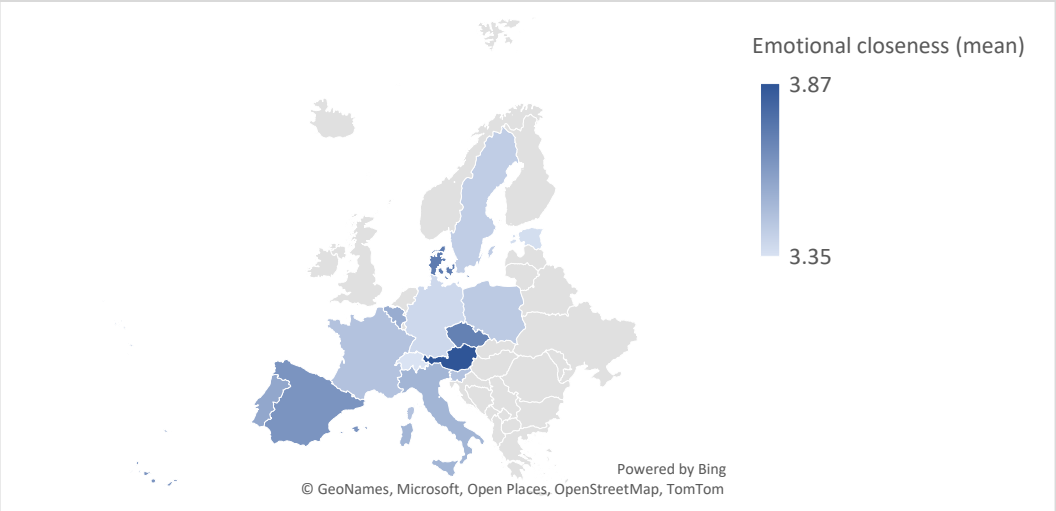

Fig.3.1 shows the mean emotional closeness of European countries. The sample is from 14 European countries from the SHARE dataset

3.4.3 Empirical study

To study the relationship between emotional closeness and life expectancy, we consider the following model:

$$LE_{it} = \beta_0 + \beta_1 EC_{it} + \beta_2 C_{it} + \mu_i + \varepsilon_{it}$$

LE_{it} refers to self-expected life duration among older adults of individual i at time t. EC_{it} donates Emotional closeness and represents the closeness for social network members. C_{it} donates control variables. ε_{it} represents unobserved factors and random variabilities that affect life expectancy but are not explicitly captured in the model.

The endogeneity problem arises because emotional closeness EC_{it} may be correlated with unobserved individual heterogeneity μ_i or the error term ε_{it}. This correlation can lead to biased and inconsistent estimates of the parameter β, which measures the effect of emotional closeness on life expectancy. Specifically, unobserved factors such as personality traits, mental health

status, or life events that are not captured by the control variables C_{it} might influence both emotional closeness and life expectancy. For instance, an individual's inherent optimism could simultaneously enhance their emotional closeness with social network members and positively affect their self-expected life duration. If these unobserved factors are not accounted for, the estimated relationship between emotional closeness and life expectancy will be confounded, leading to endogeneity bias. To address this issue, we employ the fixed effects instrumental variable (FE-IV) approach, using network satisfaction NS_{it} as an instrument for emotional closeness. This method helps isolate the variation in emotional closeness that is exogenous, thereby providing a more accurate estimate of its causal effect on life expectancy. The validity of this approach hinges on the assumption that network satisfaction is correlated with emotional closeness but not directly with the error term in the life expectancy equation, ensuring that the instrument is both relevant and valid. The following equations illustrate the estimation:

$$EC_{it} = \beta_0 + \beta_1 NS_{it} + \beta_2 C_{it} + \nu_i + \varepsilon_{it}$$

$$LE_{it} = \beta_0 + \beta_1 \widehat{EC_{it}} + \beta_2 C_{it} + \mu_i + \varepsilon_{it}$$

In eq. (2), network satisfaction (NS_{it}) is the instrumental variable for Emotional closeness (EC_{it}), ν_i is the individual fixed effect. In eq. (3), $\widehat{EC_{it}}$ is the predicted Emotional Closeness derived from the first-stage FE estimation of eq. (2). Since $\widehat{EC_{it}}$ is predicted using NS_{it} and C_{it}, it is uncorrelated to unobserved confounders absorbed in ε_{it}. Therefore, in the second stage, a FE panel estimation of eq. (3) can produce the estimation of β that uncovers the causal effects of emotional closeness on life expectancy. We adjust standard errors for clustering at the individual level to account for heteroskedasticity and arbitrary serial correlations across the waves of the SHARE Survey.

The basic assumptions of instrumental variables are relevance and exclusion. A stable instrument for emotional closeness is crucial to the success of the FE-IV method. The instrumental variable we use is network satisfaction for social networks, which we believe is uncorrelated with life expectancy.

Our assumption is supported by the instrumental variable test, which shows that the instrumental variable is working well. We anticipate that network satisfaction will be associated with emotional closeness meaningfully. A social network that meets the fundamental psychological requirements of emotional support for older adults (Perez et al., 2022) fosters emotional closeness with families and friends. Those satisfied with their social network may communicate more frequently with members, fostering emotional closeness. Furthermore, older persons who are happy with their social network generally have a feeling of belonging within that network (Chen et al., 2022).

On the other hand, dissatisfaction with their social network may reduce their emotional closeness (Hammig, 2019). Moreover, Older adults who report a high level of network satisfaction are more likely to experience a sense of emotional closeness. Studies have shown that high network satisfaction correlates with stronger relationships (Holt-Lunstad et al., 2010), which is the main component of emotional closeness.

3.5 Results

3.5.1 Main results

Previous studies have emphasised the significance of social relationships and emotional well-being in determining health outcomes, including life expectancy (Rueseda-Salazar et al., 2021; Hot-Lunstad et al., 2010; Umberson and Montez, 2010). Table 3 reports results for fixed effect (FE) and instrumented fixed effect (FE-IV) estimations. The fixed effect results show evidence that emotional closeness positively impacts European life expectancy. Emotional closeness increases life expectancy by around 0.48 percentage points, which is statistically significant.

The causal effect of emotional closeness on life expectancy can be defined using the two-stage FE-IV approach. The coefficient of network satisfaction (Instrumental variable) is statistically significant at 1%. The results show a positive causal effect of emotional closeness on life expectancy, which is significant at 10%, as shown in Table 3.3.

Table 3.3 Emotional Closeness and Life Expectancy (FE + FE-IV estimates)

Outcome variable: Life expectancy	Fixed effect	Fixed Effect with IV
Emotional closeness	0.414 *** (0.206)	1.352* (0.801)
Age	0.469 (0.447)	0.344 (0.457)
Ln-Income	0.134 (0.189)	0.115 (0.189)
Education:		
Low education	11.526 (12.438)	-17.628 (11.062)
Medium education	-5.809 (6.191)	-15.162 (11.920)
High education	-3.827 (5.038)	-11.782 (12.448)
Marital status:		
Married/living with spouse	-3.827 (4.325)	-3.599 (4.332)
Registered partnership	-1.317 (4.456)	-0.941 (4.468)
Widowed	-5.286 (4.459)	-5.080 (4.468)
Employment:		
Retired	2.692 (0.683)	2.668*** (0.685)
Unemployed	1.818 (0.884)	1.787*** (0.887)
Self-assessed health	2.469*** (0.264)	2.437 *** (0.265)
Household size	-0.504 (0.404)	-0.480 (0.405)
Body weight:		
Underweight	-3.799*** (1.397)	-3.694*** (1.399)
Healthy weight	-0.455 (0.684)	-0.473 (0.685)
Overweight	-0.410 (0.623)	-0.414 (0.624)
ADL	-1.057 ** (0.395)	-1.026*** (0.396)
IALD	0.979 (0.821)	0.988 (0.824)
Sport activity	0.611 *** (0.160)	0.615*** (0.159)

Grip strength	0.078 **	0.075*
	(0.039)	(0.399)
Number of chronic diseases	0.126	0.126
	(0.214)	(0.214)
Cognitive function:		
Fluency	0.171***	0.170***
	(0.038)	(0.039)
Memory	0.487***	0.488***
	(0.074)	(0.05)
Numeracy	0.189	0.169
	(0.193)	(0.190)
Number of observations	29,273	29,245
Number of individuals	13,474	13,463
First stage (network satisfaction)		0.201***
		(0.006)
F-statistics for instrumental variable		1127.587

Note: control variables: Age, income, male dummy, education dummies, marital status dummies, wave dummies, household size, weight dummies, activity of daily living, instrumental activity of daily living, sport activity, grip strength, number of chronic diseases, chronic diseases dummies, cognitive functions and self-assessed health. Standard errors clustered at the individual level appear in parentheses.
*** p<0.01, ** p<0.05, and *p<0.1

The second column of Table 3.3 presents the fixed effects FE estimation results. They show that emotional closeness positively impacts life expectancy. However, as we mentioned above, we have an endogeneity problem. The third column of Table 3.3 shows the results of the FE-IV estimation. The first-stage results show that the instrumental variable network satisfaction is a significant predictor of older people's emotional closeness. Second-stage results show a positive and statistically significant impact of emotional closeness on life expectancy. Emotional closeness increases life expectancy by 1.35. Among control variables, retirement has the highest positive effect, while being underweight has the highest negative effect according to our estimation. When it comes to chronic diseases, heart attack, cancer, and diabetes are the strongest diseases that negatively impact life expectancy. Although diagnosed diseases may not exactly capture respondents' actual health condition, including self-assessed health should account for the omitted variable bias on their health conditions. Self-assessed health increases life expectancy by 2.43.

The strong statistical evidence highlights the reliability of network satisfaction in separating the external factors affecting emotional closeness, enabling a more reliable estimation of its causal

effect on European life expectancy. The F-statistics value is 1127.587. They are confirming the instrument's significance in addressing possible endogeneity problems. Moreover, results on Table 3.4 shows that the impact of network satisfaction on life expectancy is insignificant, supporting the inclusion restriction of the instrumental variable.

Table 3.4 Network Satisfaction and Life Expectancy (FE estimate)

Dependent variable (life expectancy)	Fixed effect
Network satisfaction	0.158
	(0.168)
Observations	52,844
Individuals	37,402
Overall R-squared	0.059

Note: Standard errors clustered at the individual level appear in parentheses.

Table 3.4 presents the results of a fixed effects (FE) estimation examining the relationship between network satisfaction and life expectancy. The coefficient for network satisfaction is 0.158 with a standard error of 0.168, indicating that the impact of network satisfaction on life expectancy is statistically insignificant. This result supports the inclusion restriction of the instrumental variable, suggesting that network satisfaction is not directly related to life expectancy except through its effect on emotional closeness.

3.5.2 Gender differences

To estimate gender differences, we ran eq.1 and eq.2 by gender, and the results are shown in Table 4. The first part of Table 2 reports results for fixed effect estimation for each gender. It shows a strong and statistically significant positive relationship between emotional closeness and life expectancy among females, while it is negative and insignificant for males.

Table 3.5 Emotional closeness and life expectancy (FE and FE-IV estimate) according to gender

Panel A: Fixed effects results		Males		Females
Emotional closeness		-0.142		0.089***
		(0.316)		(0.27)
Observations		11,197		18,078
Individuals		5,215		8,260
Overall R-squared		0.0607		0.0536
Panel B: FE-IV results	Males		Females	
	First stage	Second stage	First stage	Second stage
Emotional closeness		-0.305		2.755***
		(1.20)		(1.068)
Network satisfaction	0.0209***		0.196***	
	(0.009)		(0.007)	
F-statistics	442.98		688.292	
Observations	11,183		18,064	
Individuals	5,209		8,255	
Overall R-squared	0.0882		0.0981	

Note: control variables: Age, income, male dummy, education dummies, marital status dummies, wave dummies, household size, weight dummies, activity of daily living, instrumental activity of daily living, sport activity, grip strength, number of chronic diseases, chronic diseases dummies, cognitive functions and self-assessed health. Standard errors clustered at the individual level appear in parentheses.

*** p<0.01, ** p<0.05, and *p<0.1

The second part of Table 3.4 shows the causal effect estimation for eq. (2) of the relationship between emotional closeness and life expectancy by gender. Results show an insignificant relationship for males in the second stage, confirming the finding of eq. (1). In contrast, results that examine females show that positive and significant relationship. This is consistent with the Convoy model, which describes social networks in terms of function (emotional closeness) and claims that the function and structure of social networks are influenced by social structural characteristics such as gender (Antonucci et al., 2014). Similar findings between the FE and FE-IV support the idea that females' emotions impact their health outcomes more than males. Consistent studies show that females have more emotional support in social networks than men (Stevens and Tilburg, 2011; Cornwell et al., 2008). At the same time, women are more involved in intense support and care for others (Cohn-Schwartz and Schmitz, 2024). This is because women have more emotionally expressive communication. Women tend to have more inclusive and emotional relationships, resulting in more profound emotional connections and improved health results than males (Bedrov et al., 2022; Cohn-Schwartz and Naegele, 2023). In addition, women often exhibit elevated levels of emotional intelligence, enabling them to better manage interpersonal relationships contributing to an increased life expectancy (Zomer, 2012). Moreover, the harmony of love (Oxytocin) is more active in women, which can influence their

behaviour differently from men (Carter, 2022). The fixed effect in the first stage illustrates that the instrumental variable is strong.

3.5.3 Heterogeneity

Previous research on social networks and life expectancy has reached differing results on the amount and direction of the influence. Different study designs might explain some of the variations across studies. Researchers employed varied sample selection procedures and countries. Countries in Europe have different cultures, which might affect the relationships between older people. In the next section, we perform a heterogeneity test for different cultures between European countries to determine those differences. In our study, we use Hofstede's cultural theory (Hofstede, 1984), which divides countries into two groups: collectivist and individualist. Collectivism is a culture or guiding philosophy that encourages people to prioritise the interests of their in-groups, most notably family, above their self-interest and would rather blend in with close social networks (Taniguchi and Kaufman, 2022). Collectivism means family ties are often highly valued. Individuals in collectivist cultures often prioritise fulfilling their familial commitments (De Cristofaro and Pellengrini, 2022).

On the other hand, individualism implies a stronger focus on personal liberty and independence. The family ties may have a less rigid framework. Individualistic culture is when individuals place their interests above those of the larger social group to which they belong by origin. They prioritise self-expression and place independence above group objectives (Hofstede, 2010). In this study, we group countries into two regions: Collectivism (Spain, Italy, France, Portugal, Slovenia, Czech Republic and Poland) and Individualism: (Austria, Germany, Sweden, Denmark, Switzerland, Belgium, Estonia). Figure 3.3 presents a map of those countries. In South and Eastern Europe, cultures lean toward collectivism, whereas Northern Europe generally adheres to individualism.

Figure 3.2 Cultural Orientation in Europe

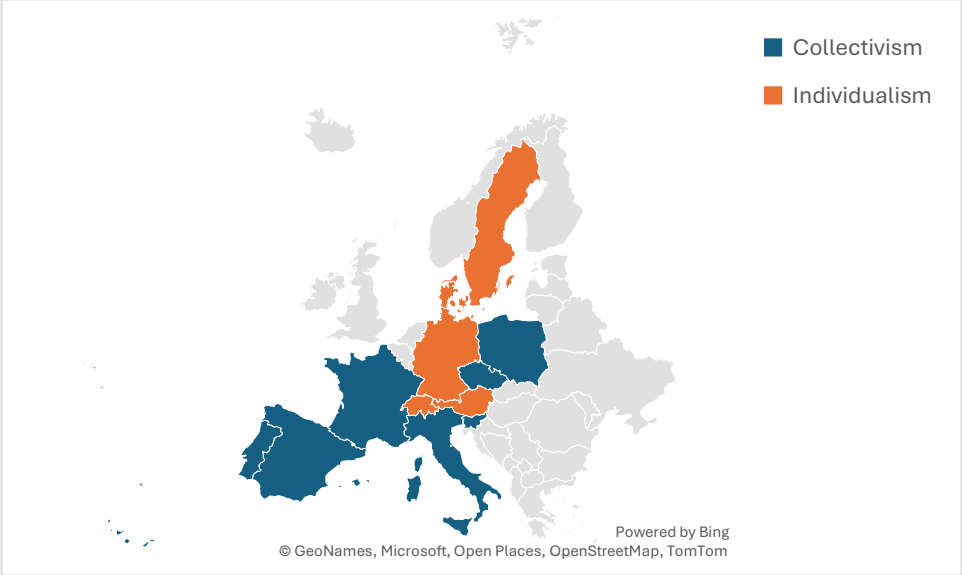

Fig.2 The sample is 14 European countries from the SHARE dataset. We excluded other European countries in SHARE because of missing data.

Prior research lacks clarity about France's societal orientation, with some asserting it as collectivist and others characterising it as individualistic. In our study, we classify it as a collectivist country for many reasons: firstly, France follows an egalitarian welfare state model that is founded on the ideas of equality, fraternity, and solidarity. It has implemented a comprehensive social security system (Nadal, 2005). Moreover, French culture highly values friendship, brotherhood, and social cohesiveness. In addition, France is in the Mediterranean Sea and has a significant population of immigrants, particularly from Africa, where most African countries are considered collectivist societies.

Culture plays a vital role in older people's social lives. For older Europeans, two studies use the SHARE dataset to find differences between collectivism and individualism. Okely et al. (2018) investigate the relationship between well-being and longevity and whether this relationship is consistent across individualistic and collectivistic cultures. It found a stronger relationship between well-being and self-rated health or cardiovascular mortality in more individualistic countries. This suggests that these relationships differ across different cultures. In addition, Beller and Wangner (2020) investigate whether the impact of loneliness on health is moderated by individualism. It found that this impact was moderated by individualism.

Countries with collectivist cultures tend to show more emotional closeness than those with individualistic cultures. In collectivist societies, such as in southern Europe, there exists a strong history of family care and profound reverence for the older (Taniguchi et al., 2022). The older population in collectivist societies typically show heightened feelings and gets assistance from close family members, neighbours and their local community. In contrast, in individualistic cultures such as Nordic countries, older people may experience social isolation and loneliness although enjoying a sense of independence and self-dependence. In these cultures, older people rely on government support systems such as retirement communities and social security instead of emotional and caregiving assistance from family and social networks (Okely et al., 2018).

To investigate this, we estimate eq. (1) and eq. (2) Table 5 presents fixed effects (FE) and fixed effect IV (FE-IV) results to see the impact of cultural differences on the relationship between emotional closeness and life expectancy. The estimation of eq. (1) results indicates that countries with individualistic cultures exhibit a significant and positive correlation between emotional closeness and life expectancy. On the other hand, countries with collectivist cultures also demonstrate a positive relationship, but less significant. This is consistent with the study of (Beller and Wangner, 2020), which found that living in an individualistic culture in Europe decreases the adverse effect of loneliness for an ageing population. In collectivistic communities, the lack of family relationships was more strongly associated with feelings of loneliness than individualistic ones. In contrast, in countries prioritising individualism, the lack of social connections with friends and the absence of a trusted confident were more strongly associated loneliness than civilisations prioritising collectivism (Lykes and Kemmelmeier, 2014). However, as we mentioned above, we have an endogeneity problem, and the FE estimates are not causal and may be biased by confounding time-varying unobservable or reverse causality. We use fixed effect IV for cultural differences. The results confirm our hypothesis that the relationship between emotional closeness and life expectancy for older adults in collectivist cultures is positive and statistically insignificant. In contrast, although the results for countries with individualist cultures are positive, they are statistically insignificant. This means that gender may make the biggest difference between those cultures.

Table 3.6 Emotional closeness and life expectancy (FE estimates and FE-IV) for gender and culture

Panel A: Fixed effect results				
	Individualism		Collectivism	
	Males	Females	Males	Females
Emotional closeness	-0.112 (0.387)	1.023** (0.351)	-0.008 (0.531)	0.605 (0.433)
Observations	7,357	11,437	3,840	6,641
Individuals	3,433	5,210	1,782	3,050
Overall R-squared	0.0776	0.0617	0.0672	0.0538
Panel B: FE-IV results				
Individualism				
	Males		Females	
	First Stage	Second Stage	First Stage	Second Stage
Emotional closeness		-0.169(1.614)		2.412 (1.470)
Network satisfaction	0.192*** (0.012)		0.177*** (0.009)	
F-statistics	238.021		371.030	
Observations	7,346		11,426	
Individuals	3,428		5,206	
Overall R-squared	0.085		0.118	
Collectivism				
	Males		Females	
	First Stage	Second Stage	First Stage	Second Stage
Emotional closeness		-0.55 (1.768)		3.054** (1.51)
Network satisfaction	0.243*** (0.017)		0.232 (0.012)	
F-statistics	199.083		321.694	
Observations	3,837		6,638	
Individuals	1,781		3,049	
Overall R-squared	0.118		0.1044	

Note: control variables: Age, income, male dummy, education dummies, marital status dummies, wave dummies, household size, weight dummies, activity of daily living, instrumental activity of daily living, sport activity, grip strength, number of chronic diseases, chronic diseases dummies, cognitive functions and self-assessed health. The countries with collectivist cultures (Spain, Italy, France, Portugal, Slovenia, Czech Republic and Poland). Countries with individualistic cultures (Austria, Germany, Sweden, Denmark, Switzerland, Belgium, Estonia). Standard errors clustered at the individual level appear in parentheses.

*** p<0.01, ** p<0.05, and *p<0.1

The fixed effect is that the result of Table 3-5 shows that females in both societies are positive. However, in individualistic European societies are significant, and collectivist European societies are insignificant. We use a fixed effect instrumental variable (FE-IV) to address the causal effect, and the results show that emotional closeness positively affects life expectancy in females. However, it is insignificant in individualistic European societies and statistically significant in collectivist European societies. Those findings highlight the differences between cultural norms

for females. In individualistic European societies, where females have a strong focus on autonomy, self-sufficiency and independence, the influence of emotional closeness may be diminished due to the reliance on human action and self-reliance (Hofstede, 1980). However, it is important to note that variables such as healthcare services and lifestyle choices may significantly influence life expectancy more than emotional closeness for females.

In contrast, for females in collectivist European societies where community and social connection are priorities, there is a common expectation for older women to assume nurturing responsibilities within their families and communities, cultivating deep emotional closeness with their loved ones. Furthermore, in cultures that prioritise the well-being of the group more than personal achievement, there is a stronger focus on the significance of maintaining strong, close relationships and communal ties, especially for women. This may be attributed to the emphasis on family and social relationships in these cultures (Hofstede, 2011), resulting in improved mental health and eventually leading to increased life expectancy.

3.5.4 Robustness checks

Thus far, the main results suggest that emotional closeness significantly and positively impacts life expectancy in Europe. This subsection explores the sensitivity of our results. As explained above, we use network satisfaction as an instrumental variable. We examine how sensitive our results are to changes in the econometrics specification. All estimates from eq. (1) and eq. (2) are comparable to the results in Table 3.3.

3.5.4.1 Exclude low-income countries

Studies show that income plays an important role in social networks for an ageing population and other groups (Feng et al., 2020). Here, we check the sensitivity analysis by dropping the countries whose income per capita is less than 40,000 per year (Poland, Portugal, Czech Republic, Slovenia and Estonia). Results are shown in Table 3.6. The results are qualitatively the same as the main results in Table 3.3.

Table 3.7 The impact of emotional closeness on life expectancy in high income European countries

	First Stage	Second Stage
Emotional closeness		1.445
		(1.435)
Social network	0.205***	
	(0.007)	
F-statistic	295.914	
Observations	5,835	
Individuals	2,718	
Overall R-squared	0.0524	

	Panel A: Male		Panel B: Female	
	First stage	Second stage	First stage	Second stage
Emotional closeness		-0.397		3.279**
		(1.285)		(1.398)
Network satisfaction	0.225*** (0.012)		0.1898***	
			(0.009)	
F-statistics	356.734		357.948	
Observations	8,397		10,866	
Individuals	3,939		5,059	
Overall R-squared	0.0831		0.0671	

Note: control variables**:** Age, income, male dummy, education dummies, marital status dummies, wave dummies, household size, weight dummies, activity of daily living, instrumental activity of daily living, sport activity, grip strength, number of chronic diseases, chronic diseases dummies, cognitive functions and self-assessed health. Standard errors clustered at the individual level appear in parentheses.

*** p<0.01, ** p<0.05, and *p<0.1

3.5.4.2 Alternative definitions of emotional closeness

In this section, we use other different measurements of emotional closeness. As mentioned above, in the main regression, we use the mean variable of emotional closeness. We use emotional closeness as a 4-point scale from 1 to 4 to check sensitivity. Results are shown in Table 3.7. The estimated outcomes closely approach the baseline estimations in Tables 3.3 and 3.4.

Table 3.8 The impact of emotional closeness on life expectancy by using alternative measurement of emotional closeness

	First Stage	Second Stage
Emotional closeness		0.480**
		(1.027)
Social network	0.157***	
	(0.006)	
F-statistic	615.526	
Observations `	29,358	
Individuals	13,464	
Overall R-squared	0.0631	

	Males		Females	
	First stage	Second stage	First stage	Second stage
Emotional closeness		-0.405 (1.598)		3.46*** (1.346)
Network satisfaction	0.1577*** (0.010)		0.156*** (0.007)	
F-statistics	237.97		382.201	
Observations	11,183		18,064	
Individuals	5,209		8,255	
Overall R-squared	0.0565		0.07	

Note: Note: control variables: Age, income, male dummy, education dummies, marital status dummies, wave dummies, household size, weight dummies, activity of daily living, instrumental activity of daily living, sport activity, grip strength, number of chronic diseases, chronic diseases dummies, cognitive functions and self-assessed health. Standard errors clustered at the individual level appear in parentheses.
*** p<0.01, ** p<0.05, and *p<0.1

3.5.5 Potential mechanism

In this section, we explore the relationship between emotional closeness and other health outcomes such as physical health, mental health, and cognitive functions. For physical health, we use Self-assessed health (SAH) as an indicator of physical health. Emotional closeness significantly impacts physical health by reducing stress levels and promoting better cardiovascular function. Studies have shown that strong emotional closeness can lower cortisol levels, a stress hormone that, when elevated, can lead to various health issues such as hypertension and weakened immune response (Navaneetham & Kanth, 2022). Additionally, emotional support from close relationships has been linked to improved heart health and reduced risk of chronic diseases (Liu, 2025). These findings suggest that the positive effects of emotional closeness on physical health are substantial, contributing to increased life expectancy.

For mental health, we use the Euro-D scale as an indicator. Emotional closeness plays a crucial role in enhancing mental health by providing a sense of support and belonging. Strong emotional bonds can significantly reduce feelings of loneliness and isolation, which are major risk factors for mental health issues such as depression and anxiety. Research has shown that individuals with close emotional connections experience lower levels of stress and higher levels of happiness and life satisfaction (Piao et al., 2024). Furthermore, emotional closeness can improve resilience, helping individuals better cope with life's challenges and reducing the likelihood of developing

mental health disorders (Li et al., 2025). These positive effects on mental health underscore the importance of emotional closeness in promoting life expectancy.

Finally, according to cognitive functions, we use memory, fluency and numeracy as indicators. Strong emotional bonds encourage social interactions, which are crucial for maintaining cognitive health. Research has shown that individuals with close emotional connections are less likely to experience cognitive impairments such as dementia and Alzheimer's disease (Aldrawsheh et al., 2024). Emotional support from family and friends can enhance cognitive resilience, helping individuals better cope with cognitive challenges and maintain their mental faculties longer (Pruitt et al., 2025). These findings highlight the importance of emotional closeness in preserving cognitive functions and promoting overall brain health.

Table 3.9 Potential Mechanism

	Physical health	Mental health	Cognitive function
Emotional closeness (Second Stage)	0.177*** (0.036)	0.309*** (0.060)	7.809** (3.418)
Network Satisfaction (First Stage)	0.114*** (0.003)	0.186*** (0.006)	0.011*** (0.003)
F-Statistic	1571.867	810.874	1123.142
Observations	40,350	24,579	30,028
Individuals	17,877	10,832	13,414
Overall R-squared	0.634	0.015	0.048

Note: Note: control variables: Age, income, male dummy, education dummies, marital status dummies, wave dummies, household size, weight dummies, activity of daily living, instrumental activity of daily living, sport activity, grip strength, number of chronic diseases, chronic diseases dummies, cognitive functions and self-assessed health. In the cognitive function model, we excluded cognitive function from control variables. Standard errors clustered at the individual level appear in parentheses.

*** p<0.01, ** p<0.05, and *p<0.1

Table 3.9 shows the results of potential mechanism. First, we use physical health as a dependent variable. Self-assessed health (SAH) refers to an individual's subjective assessment of their health state, and it serves as a valuable tool for monitoring one's health (Bardage et al., 2005). It enables a comprehensive evaluation of the individual's overall health and its link to life expectancy and mortality prediction (Maniscalco et al., 2020). Older adults who feel emotionally close to friends, family and others tend to feel happier, contented and more satisfied in their lives, which gives them a more positive outlook and optimism about their health status. Self-assessed health (SAH) is measured using a single item rated on a 5-point Likert scale. In survey, participants were asked,

“Would you say your health is ….” using answer categories between “excellent” and “poor” (i.e. excellent =5, very good =4, good = 3, fair =2, poor =1), higher SAH values indicate a better general health. The results for this regression are shown in column 1 of Table 3.8. The estimated outcomes closely approach the baseline estimations in Tables 3.2 and 3.3, which means a strong positive relationship between emotional closeness and physical health.

Second, we use mental health as a dependent variable. Studies show that older adults’ emotional closeness as a part of social networks positively impacts subjective well-being (Litwin and Levinsky, 2023), quality of life (Peleg and Litwin, 2019) and mental health (Litwin and Levinsky, 2022). We test the impact of emotional closeness on mental health using the Euro-D scale. The scale contains 12-item depression, and if the older adult has a high scale, that means he is less depressed. Results shown in column 3 of Table 3.8 indicate that a high level of emotional closeness decreases depression, showing evidence that emotional closeness increases the sense of belonging and reduces the feelings of isolation. Moreover, emotional closeness opens the connection between older adults and people close to them, making them share emotions and how they feel. Gilman et al. (2017) find that depression impact negatively on life expectancy. Our results closely align with the baseline estimates shown in Tables 3.2 and 3.3. We find that emotional closeness is linked to lower levels of depression, which means it impacts positively on life expectancy.

Third, we use cognitive functions as a dependent variable. The cognitive functions variable is measured using tests that assess abilities related to memory, numerals and fluency. Studies show that social networks are associated with better cognitive functions for older adults (Dodds et al., 2024). We find that emotional closeness positively impacts cognitive function. Cognitive functions enable older adults to make profound health, financial, and lifestyle decisions. It also gives a sense of control, which makes older adults optimistic and fosters high life expectancy. On the other hand, declining cognitive functions can lead to feelings of being of control and uncertain about the future, which negatively impact life expectancy.

3.6 Conclusion

Population ageing is a prevalent issue in European countries. As people age, certain variables that might impact life expectancy become more significant. This paper investigates the causal impact of emotional closeness on life expectancy among older adults, using data from the Survey of Health, Ageing, and Retirement for Europe (SHARE) for 14 European countries. We address the endogeneity problem of emotional closeness exploring the variation in network satisfaction. Our analysis shows that emotional closeness has a positive and significant impact on life expectancy. Notably, our study reveals a gender-specific pattern. We show that emotional closeness increases life expectancy for women, while there is no such impact for men—finally, our results shed light on the influence of cultural contexts. We provide information showing that emotional closeness among women in countries with collectivist cultures significantly and positively affects life expectancy.

On the other hand, women in countries that have individualist cultures do not experience such impact. Future investigations are necessary to examine the processes that explain the observed relationships and to create specific approaches that use emotional closeness to improve the health and lifespan of older adults in various cultural contexts. These findings not only add to the growing subject of social determinants of health and emphasise the significance of interpersonal ties in determining peoples' beliefs and expectations about their life expectancy.

This paper makes two major contributions to the literature on the intersection of social relationships and health outcomes. First, it differs from previous economics studies that mostly investigated social networks since it specifically investigates emotional closeness among older adults. The impact of emotional closeness on health outcomes for older persons has not been thoroughly examined from an economic perspective. Secondly, we use a comprehensive and globally sourced dataset. The dataset used in this study comprises the replies of older individuals from 14 European countries, as provided by the SHARE dataset. In a harmonised multi-country framework, we present a rigorous analysis of the causal impact of emotional closeness on life expectancy between 2010 and 2019. We obtain novel findings on the heterogeneous effect of emotional closeness across country groups.

The increase in life expectancy among older adults may lead to several economic consequences, such as a surge in the need for healthcare services, increased pressure on social security benefits, and the need for pension reform. Understanding the significance of emotional closeness in collectivist cultures for women motivates politicians to develop new initiatives and regulations that promote the financial welfare of older individuals in these communities. The results of our study provide a connection between the fields of sociology, psychology, and public health, emphasising the multidisciplinary character of research on ageing and health. Our work highlights the significance of social ties in impacting health outcomes, hence advocating for interdisciplinary cooperation to create holistic strategies for promoting healthy ageing. In addition to life expectancy, emotional closeness has significant effects on the general well-being of older individuals. Robust social ties have been correlated with enhanced subjective well-being, reduced rates of depression, and elevated levels of life satisfaction.

Moreover, the gendered nature of the relationship between emotional closeness and life expectancy warrants attention. A female's life expectancy is more affected by emotional closeness than a male's. This gender difference shows the unique sociocultural dynamic that shapes health outcomes for older adults.

3.6.1 Implications

The Findings of this chapter hold a crucial implication for understanding the role of emotional closeness and social networks in the quality of life and well-being of older adults. Policymakers can promote active ageing programs that aim to decrease social isolation and help older people to engage more in relationships with others, especially in countries with high levels of isolation among older adults. Moreover, by comprehending this link and recognising the importance of social connections in physical and mental well-being, healthcare services can be inspired to integrate social assessments into their routine evaluations of older adults. This approach could involve incorporating social support systems and interventions to preserve or enhance emotional bonds. Maintaining or strengthening these connections can act as a powerful preventive measure for health, potentially alleviating the strain on healthcare systems by reducing risks associated with isolation, such as depression and other mental health challenges.

3.6.2 Limitations

This chapter focuses on 14 European countries from the SHARE dataset (e.g. Germany, Austria, Sweden, Denmark, France, Spain, Portugal, Italy, Belgium, Switzerland, Czech Republic, Poland, Slovenia and Estonia). It has two limitations. First, it is crucial to understand that our independent main variable, emotional closeness, is a part of the social network model, which is only present in 3 Waves of the SHARE dataset: Wave 4, Wave 6, and Wave 8. This model plays a significant role in our analysis. Therefore, we have excluded other waves from our research. Second, we excluded any country that does not appear in those three waves. The Netherlands does not appear in Wave 6. Greece and Israel do not appear in Wave 4. Ireland does not appear in Wave 4, Wave 6 and Wave 8. Luxembourg does not appear in Wave 4. Hungary does not appear in Wave 6. Croatia does not appear in Wave 4. Lithuania and Bulgaria do not appear in Wave 4 and Wave 6.

These limitations suggest a degree of data restriction, which diminishes the ability to generalise our findings to all European countries. Nevertheless, they highlight the need for further investigation. Upcoming research should aim to include additional datasets or different sources to achieve a wider representation of European regions. This will enable a more thorough examination of how emotional closeness and social networks impact well-being among the ageing population, which is a vital area of inquiry in our discipline.

3.7 References

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3.8 Appendix

Appendix A.1: Descriptions of variables

Variable	Description
Age	The participant's age at the time of the interviews 50 years old and old.
Income	Annual household income after taxes and social insurance contributions. We use the natural logarithm (Ln income)..
Education status	ISCED (International Standard Classification of Education) levels: Zero level of education meaning no education or unfinished first level of education. The first level (primary education or first stage basic education), the second level (lower secondary or second stage of basic education), third level (upper secondary education), fourth level (post-secondary non-tertiary education), fifth level (first stage of tertiary education), sixth level (second stage of tertiary education).
Male	Dummy variable if the participant male =1, otherwise=0
Marital status	Participants were asked about their marital status: 1 if they married, living with spouse. 2 if they have registered partnership. 3 if they never married, 4 if widowed. We separated the answers for 4 dummies variables.
employment	Categorical variable representing employment status as Retired, Employed or self-employed, Unemployed, permanently disabled, Homemaker, or Other
mortality	Dummy variable = 1 if the respondent dies in the next wave, 0 otherwise.
Number of Chronic Diseases	The number of the following chronic diseases: heart attack, high blood pressure or hypertension, high blood cholesterol, a stroke or cerebral vascular disease, diabetes or high blood sugar, chronic lung disease, cancer or malignant tumor, stomach or duodenal ulcer, peptic ulcer, Parkinson disease, cataracts, hip fracture or femoral fracture.
Diabetes	Dummy variable if the participant has diabetes=1, otherwise=0
Heart attack	Dummy variable if the participant has heart attack =1, otherwise=0
High pressure	Dummy variable if the participant has high pressure=1, otherwise=0
Stroke	Dummy variable if the participant has stroke=1, otherwise=0
Luge	Dummy variable if the participant has luge=1, otherwise=0
Cancer	Dummy variable if the participant has cancer=1, otherwise=0
Parkinson	Dummy variable if the participant has Parkinson=1, otherwise=0
Maxgrip	Maximum of grip strength measure which increases with increasing grip strength. A proxy from 1 to 99.
Country	The countries that the surveys were realised: Austria, Germany, Sweden, Spain, Italy, France, Denmark, Switzerland, Belgium, Czech Republic, Poland, Portugal, Slovenia, Estonia.
Wave	The rounds of interviews: Wave 4 in 2010, Wave 6 in 2015, Wave 8 in 2019
Cognitive function	Cognitive function is operationalised by means of memory, numeracy, and verbal fluency. 1. Memory, as measured by the 10-word recall test: Participants were read ten words, and they were then asked to recall them at two time points. 2. Verbal fluency is a measure of executive function: participants were asked to report all the animals they could think of in 60s. 3. Numeracy is also a measure of executive function: participant was asked to subtract 7, starting at 100. The starting question was: "Now let's try some subtraction of numbers. One hundred minus 7 equals what?". After the respondent's answer, he or she was asked "And 7 from that?" four consecutive times. Answers were coded as correct (1) or incorrect (0).

ALDA	The Activities of Daily Living Index measures the level of difficulty experienced by the respondent, ranging from 0 to 5. The duties included by it include dressing, bathing, or showering, eating, cutting up food, going across a room, and getting in or out of bed.
IALDA	Instrumental Activities of Daily Living (IADLs) The index go from 0 to 3 and correspond to increasing levels of difficulty for the responder. The actions included include making phone calls, taking medication, and handling financial matters.
Household size	The participant was asked about the total number of households, excluding himself/herself. The answer is within the range of 0 to 12.
Sport activity	Frequency of sport activities done by the respondent. Defined in a decreasing manner: 1. More than once a week, 2. Once a week, 3. One to 3 times a month 4. Hardly ever or never
Underweight	Underweight if BMI index <18.50. if underweight take 1 otherwise takes 0
Healthy weight	Healthy weight if BMI index between 18.5 and 25. if healthy weight takes 1 otherwise takes 0
Overweight	Overweight if NMI index between 25 and 30. if overweight takes 1 otherwise takes 0
Obese	Obese if BMI index >30. if obese take one otherwise takes 0
Wave	The rounds of interviews: Wave 4 in 2010, wave 6 in 2015, wave 8 in 2019.

Note: Definitions according to SHARE dataset

Chapter 4: Retirement and Changes in Instrumental Activities of Daily Living: Cross-Country Evidence from Europe

Abstract

This paper examines the causal effect of retirement on Instrumental Activities of Daily Living (IADLs) using cross-country panel data from the Survey of Health, Ageing and Retirement for Europe (SHARE). We use the fixed effects instrumental variable (FE-IV) approach, which employs normal state pension age eligibility as the instrumental variable. We find that retirement increases difficulties in IADLs. The relationship is primarily driven by older individuals in central Europe and Mediterranean countries. We also examine the impact of retirement duration on IADLs. Our findings indicate that spending more time in retirement exacerbates difficulties in IADLs, especially for older men and those in Central Europe and Mediterranean countries.

Key Words: Retirement; IADLs; Europe; Fixed effects.

4.1 Introduction

Population ageing presents significant challenges for countries worldwide. As people live longer, the increasing prevalence of age-related functional declines threatens the ability of older adults to carry out Instrumental Activities of Daily Living (IADLs). These activities, such as managing finances, preparing hot meals, shopping for groceries, making phone calls and taking medications, are crucial for independent living. The gradual decline in IADLs among older adults may lead to a reduced quality of life and increased dependency. As a result, the concern has evolved to include the promotion of healthy ageing to preserve a high quality of life and independence (WHO, 2020). This is particularly true in Europe, where the aged population is growing fast. In 2021, 215 million were 60 and older, with estimates suggesting this figure will be over 300 million in 2050 (WHO, 2024).

Activities of daily living (ADLs) are crucial self-care activities necessary to maintain older adults' physical needs, including eating, dressing, and personal hygiene. Instrumental Activities of Daily Living (IADLs)[10] are essential for maintaining older adults living independently in a community (Storeng et al., 2018). In Europe, around 30% of older adults face difficulties in at least one of the IADLs (SHARE, 2020). IADLs measure more difficult tasks compared to ADLs.

Retirement is considered a significant transition in people's lives. Its effect on health is ambiguous. The transition into retirement signifies a momentous life event that embodies the culmination of one's working years and the commencement of a new phase in life (Odone et al., 2021). This transition involves a change in everyday habits and a significant restructuring of financial, social, and psychological aspects. Some channels imply that retirement harms health. From an economic perspective, if we look at health as an investment good (Grossman, 1972), retirement reduces investment in health as health would no longer affect wages in the labour market. In addition, retirement can also worsen mental health and increase social isolation, which negatively impacts overall health and well-being.

[10] Francesca et al., (2011) defines IADLs as "include help with housework, meals, shopping and transportation. They can also be referred to as "domestic care or home help"

In contrast, several channels imply a positive relationship between retirement and health. Investment in health may increase as retired individuals have a lower marginal value of time, making health less costly. Moreover, retirement increases leisure, which may positively impact mental health and improve well-being (Gorry et al., 2018). Retirement can also cause a change in IADLs through several channels. When people retire, they have more leisure time and less income. More leisure time increases healthy behaviour such as self-care, exercises, reduced stress, and sleeping well, positively impacting IADLs. However, increased leisure time may also increase unhealthy habits such as social isolation, smoking, and drinking. Decreasing income may decrease investment in healthy behaviour, such as going to the gym and buying healthy food. On the other hand, a decrease in income may also decrease unhealthy behaviours such as smoking and drinking (Xue et al., 2020). Therefore, the impact of retirement on IADLs is unclear.

This paper examines the impact of retirement on IADLs in 9 European countries using the Survey of Health, Ageing and Retirement in Europe (SHARE) covering the period 2004-2019. To identify the causal impact, we exploit the recent reforms of the state pensions in European countries, which have significantly changed the financial incentive for older people to retire. Specifically, we employ the fixed effects instrumental variable (FE-IV) approach. Specifically, our instrumental variable is based on eligible ages for normal retirement, which varies across countries, genders, birth cohorts and over time.

Our results show that the transition to retirement increases IADLs, particularly for older women. In Europe, there are different welfare systems. Therefore, cultural differences matter. Our heterogeneity analysis divides countries into three regions: Nordic (Sweden, Denmark), Central Europe (Austria, Germany, Switzerland, Belgium) and Mediterranean (France, Italy, Spain). Our heterogeneity analysis results find evidence of cultural differences in this relationship across European regions in this relationship. For Nordic countries, the relationship is negative and significant. By contrast, it is positive and significant for other regions. We also investigate the impact of retirement duration on IADLs. We use the duration of age eligibility for the state pension as an instrumental variable. Our results show that time spent in retirement worsens IADLs, particularly for older men. Furthermore, our regional analysis indicates that the effect of

retirement duration varies across different regions. In Nordic countries, retirement duration does not impact IADLs, whereas in other regions, it exacerbates them.

This paper contributes to the literature in two ways. Firstly, previous studies have examined the impact of retirement on various health outcomes, including mental health (Gorry et al., 2018; Rose, 2020; Atalay and Barrett, 2022; Garrousta and Perdix, 2022), physical health (Godard, 2016; Rose, 2020), and cognitive functions (Atalay et al. 2019; Rose, 2020). However, there is no prior study linking retirement with IADL difficulties. We examine the hypothesis that retirement has a causal impact on IADLs using data from the Survey of Health, Ageing and Retirement in Europe (SHARE), which adds European evidence to this literature. IADLs provide a unique and practical perspective on an individual's functional capacity and overall quality of life after retirement. Unlike typical health indicators, IADLs offer valuable insights into an individual's abilities to perform essential daily tasks, creating a clear picture of their independence and well-being. Second, we highlight the differences between European regions in estimated retirement effects and the prevalence of IADLs. Few studies focus on this relationship, with regional differences in focus.

This paper is structured as follows: Section 2 presents the literature review. Section 3 discusses eligibility rules for receiving state pensions in Europe. Section 4 outlines the methodology. Section 5 presents results and section 6 concludes the paper.

4.2 Literature review

Retirement is a big transition in an individual's life. It impacts nearly all aspects of well-being, such as mental health, physical health, and cognitive functions. Retirement is well-studied in economics literature. Previews literature has extensively discussed the impact of retirement on health outcomes. This literature indicates that the impact is ambiguous. Some papers have identified a positive effect (Charles, 2004; Coe Lindeboom, 2008; De Grip et al., 2012; Insler, 2014; Eibich; Godard, 2016; Gorry et al., 2018; Garrousta and Perdix, 2022), and others show a negative (Dave et al. 2008; Kuhn et al. 2010), or non-significant effect (Heraes et al. 2013; Heller-Sahgren, 2017). For example, Gorry et al. (2018) investigate the impact of retirement on physical and mental health, as well as life satisfaction. They utilise data from the Health and Retirement Study

(HRS) covering 1992-2014. To address endogeneity, they instrument for retirement using social security eligibility, employer-sponsored pensions and coverage by the social security earnings test. They use the two-stage least squares method and find strong evidence that retirement improves physical and mental health, as well as life satisfaction. Additionally, Bloemen et al. (2017) explore the impact of retirement on mortality using Dutch register data for the period 2000-2010. They use the eligibility age for retirement benefits as an instrumental variable. They find that early retirement decreases mortality.

Insler (2014) applies instruments based on workers' self-reported probability of continuing to work beyond 62 and 65, using data from the HRS. His findings suggest that retirees positively affect a health index that combines objective and subjective health metrics. Furthermore, he finds that retirees often smoke less and engage in more activities that promote their health.

Behncke (2012) investigates the impact of retirement on health outcomes. He used the first three waves of the English Longitudinal Study of Ageing (ELSA). He uses non-parametric matching and instrumental variable (IV) methods to address the endogeneity problem. He finds evidence that retirement increases the risk of being diagnosed with cardiovascular disease and cancer.

Mazzonna and Peracchi (2012) investigate the relationship between ageing, cognitive functions and retirement. Using the Survey of Health, Ageing and Retirement (SHARE), they employ a difference-in-difference (DID) approach. To address potential endogeneity, they employ an instrumental variable strategy. They use early and normal ages of eligibility for a public old-age pension as instrumental variables. They find that retirement is linked to a decline in cognitive functions because of the reduction in mental and social connections that people make at work. They suggest that a decline in cognitive function may increase dependency on other people.

In the paper closest to our study, Rose (2020) examines the impact of retirement on health in England using multiple datasets, such as census records, inpatient records, comprehensive surveys, and mortality records. He uses well-being, cognitive abilities, and mortality as dependent variables. He demonstrates that retirement significantly enhances individuals' self-reported health and reduces the proportion of people reporting poor health and the likelihood of reporting persistent health issues.

The study by Yemiscigil et al. (2021) investigates the impact of retirement on an individual's sense of purpose in life, particularly examining whether retirement triggers an existential crisis or provides an opportunity for a renewed sense of purpose. Previous research has suggested a negative association between retirement and purpose, indicating that it may lead to feelings of aimlessness. However, this study re-evaluates these findings through a quasi-experimental approach involving a panel of 8,113 nationally representative American adults. The authors employed an instrumental-variable analysis to account for Social Security retirement incentives in the United States, creating variations in retirement eligibility independent of other factors, such as illness or bereavement, that might influence one's sense of purpose. The results revealed that, contrary to earlier research, retirement was associated with a significant increase in purpose in life. This effect was particularly pronounced among individuals from lower socioeconomic backgrounds who had retired from unsatisfying jobs. The findings suggest that retirement may allow some individuals to rediscover or experience a renewed sense of purpose, especially those in challenging work situations.

Additionally, the paper distinguishes between the short-term and long-term effects of retirement on purpose, emphasising that the positive effects tend to strengthen over time. The study also explores the underlying factors influencing these outcomes, including the roles of financial, social, and psychological resources and the impacts of work stress and work identification. These insights indicate that retirement can be a positive transition, presenting new opportunities for individuals, particularly those dissatisfied with their work roles, and encouraging and inspiring them.

The study conducted by Feng et al. (2020) investigates the causal impact of retirement on Body Mass Index (BMI) and weight, focusing on urban China, where mandatory retirement policies shape retirement behaviour. The authors highlight that retirement leads to an increase in BMI and weight, especially among men, with this effect being more pronounced among individuals with lower levels of education. They examine potential health behaviour channels such as increased alcohol consumption, changes in eating habits, and reduced physical activity that may contribute to these weight gains observed in retired men. Notably, the study finds that retirement does not significantly influence BMI or weight in women. Utilising data from the China Health and Retirement Longitudinal Study (CHARLS) spanning 2011, 2013, and 2015, the researchers apply a

fuzzy discontinuity design to identify exogenous shocks to retirement behaviour. This research adds to the expanding body of literature on the health implications of retirement, specifically focusing on weight and BMI as indicators of potential health risks within the context of an ageing population in middle-income countries. Additionally, it contributes to the ongoing discussion concerning the ramifications of raising the retirement age and its possible health outcomes in developing economies. The findings suggest that while retirement may have adverse health effects, particularly for certain sub-populations, these effects are not uniformly experienced across the board.

The study conducted by Atalay et al. (2019) explores the causal impact of retirement on cognitive performance among elderly Australians, utilising data from the Household, Income and Labour Dynamics in Australia (HILDA) survey. It takes advantage of exogenous variations in retirement resulting from changes in social security eligibility rules and assesses cognitive functioning at two intervals, specifically in 2012 and 2016. The findings reveal that retirement has a modest negative effect on cognitive abilities. Men exhibit a more pronounced decline than women, particularly in word reading and working memory. In contrast, no significant decrease in working memory or processing speed is observed among women. The study further investigates the underlying mechanisms contributing to these cognitive effects. It reveals that women tend to increase their involvement in mental and household activities post-retirement, which may help account for their more consistent cognitive performance.

A study conducted by Zhang et al. (2018) examines the causal impact of retirement on healthcare utilisation in China. Utilising a fuzzy regression discontinuity design focused on statutory retirement ages, the research reveals that retirement leads to increased healthcare utilisation, contrasting with findings observed in developed countries. This heightened utilisation is attributed to a decline in health and reduced opportunity costs of time following retirement. While the authors investigate income as a potential mechanism, they conclude that it does not primarily drive the effect. Furthermore, among individuals with low education levels, there is a greater likelihood of receiving recommended inpatient care despite having the available time. The study emphasises the urgent need for affordable medical care for retirees with lower socioeconomic status, especially in a country like China, where high co-payments can be a barrier.

These findings contribute valuable insights to the literature by offering evidence from a developing country and highlighting how institutional factors, such as low employment protection and high co-payments, can significantly affect healthcare utilisation among retirees.

The study conducted by Gorry and Gorry (2018) investigates the impact of retirement on health, life satisfaction, and healthcare utilisation by utilising data from the Health and Retirement Study (HRS). The authors employ instrumental variables based on age-related eligibility for Social Security benefits, employer-sponsored pensions, and the Social Security earnings test to address the endogeneity of retirement decisions. The findings indicate that retirement leads to physical and mental health improvements, accompanied by immediate enhancements in life satisfaction and a reduction in depression. However, it is crucial to recognise that improvements in self-reported health and functional limitations typically become noticeable four or more years after retirement. This highlights that health is a stock variable that evolves. This insight encourages individuals to remain patient and optimistic about the long-term health benefits associated with retirement.

Additionally, the study finds that healthcare utilisation does not significantly increase following retirement. Hospitalisations and prescription drug use decreased. This suggests that the health benefits of retirement are not primarily driven by increased medical spending, indicating that the fiscal externalities of retirement on healthcare expenditures can be advantageous.

The study conducted by Celidoni et al. (2017) investigates the long-term effects of retirement on cognitive decline, utilising data from the Survey of Health, Ageing, and Retirement in Europe (SHARE). It introduces an innovative measure of cognitive decline based on recall memory tests from longitudinal surveys, which strongly indicate dementia onset. The authors analyse the relationship between retirement and cognitive decline while controlling for age, education, and other potential confounders. Their findings indicate that retirement initially benefits cognitive function, particularly for those who retire early; however, it can have detrimental effects for those retiring at the statutory eligibility age in the long run. The research also highlights critical distinctions between early and late retirees, with the latter group showing a more rapid decline in cognitive abilities. This suggests that retirement at the statutory age may hasten cognitive

decline, while early retirement offers a protective effect. The study contributes to the existing literature by leveraging panel data from various European countries and identifying how different retirement ages influence cognitive outcomes, emphasising the importance of considering retirement timing in public health and policy initiatives.

The study conducted by Philipp Hessel (2016) offers a significant examination of the relationship between retirement and health among European men and women. Utilising a longitudinal dataset spanning twelve Western European countries from 2009 to 2012 and applying an instrumental variables (IV) approach to mitigate reverse causality, the study challenges the prevalent assumption that retirement adversely impacts health. Instead, it demonstrates that retirement can improve self-reported health, reduce activity limitations, and decrease chronic conditions. Notably, this positive effect is observed among both low- and high-educated individuals, suggesting that the health benefits of retirement are not confined to specific educational backgrounds. By employing statutory retirement ages as instruments, the research effectively isolates the causal impact of retirement on health, circumventing biases that often arise in traditional regression models. Additionally, the study provides distinct results for men and women, addressing the gender-specific effects frequently overlooked in previous research. In conclusion, the findings indicate that contrary to common assumptions, retirement may confer protective health benefits, positively influencing individuals across diverse educational levels and genders. These implications are essential and warrant consideration in future research and policy formulation.

Godard (2016) examines the causal impact of retirement on Body Mass Index (BMI), as well as the likelihood of being overweight or obese, among individuals aged 50 to 69. Utilising data from the 2004, 2006, and 2010–2011 waves of the Survey of Health, Ageing and Retirement in Europe (SHARE), the study employs an instrumental variable approach to address potential endogeneity issues related to retirement, including reverse causality and unobserved confounders. The findings reveal that retirement, particularly when prompted by discontinuous incentives in early retirement schemes, results in a notable increase in obesity rates, with a 12-percentage point rise in the probability of obesity among men within two to four years post-retirement. This effect is

non-linear and predominantly affects men who retire from physically demanding jobs and who are already at risk for obesity. Conversely, no significant effects were observed among women.

The study by Eibich (2015) explores the impact of retirement on health, with a specific emphasis on the mechanisms influencing these effects. Utilising a robust Regression Discontinuity Design (RDD), the research takes advantage of financial incentives within the German pension system to assess the causal relationship between retirement and health outcomes, including self-reported health, mental well-being, and healthcare utilisation. The findings indicate that retirement improves both subjective and mental health while reducing the frequency of outpatient care. Key mechanisms identified in the study include alleviating work-related stress and strain, which mitigates health burdens, increased sleep duration, and heightened physical activity, as retirees participate more in exercises and household tasks such as gardening and repairs. Furthermore, the study investigates variations in these effects, revealing that retirees from more demanding occupations experience the most pronounced health benefits. This research underscores the significant role of health behaviours and changes in time use as mediators of the health advantages of retirement, illustrating that retirement can produce positive health outcomes, particularly for individuals who previously endured high levels of occupational stress.

In another related paper, Zhu and Onur (2023) investigate the causal impact of retirement on informal caregiving. They use data from the Household, Income and Labor Dynamics in Australia (HILDA) survey. To identify the causal impact, they use age eligibility for the Age Pension as the instrumental variable for retirement. They find that retirement (status and duration) does not affect co-resident or extra-resident informal care provided by older people.

Using SHARE data, Coe and Zamarro (2011) analyse the impact of retirement on self-reported health measures and a composite health index across multiple European countries. They discovered that retirement decreases the likelihood of reporting poor self-rated health and enhances subjective health as measured by a composite index. In addition, Mazzonna and Peracchi (2017) examine the causal impact of retirement on health and cognitive abilities. They argue that previous literature failed to detect the potential heterogeneity using the Survey of Health, Ageing and Retirement for Europe (SHARE). They find that for people working in more

physically demanding jobs, retirement has an immediate beneficial effect on both a health index of self-reported measures and cognition. Retirement negatively affects health and cognition for the rest of the workforce

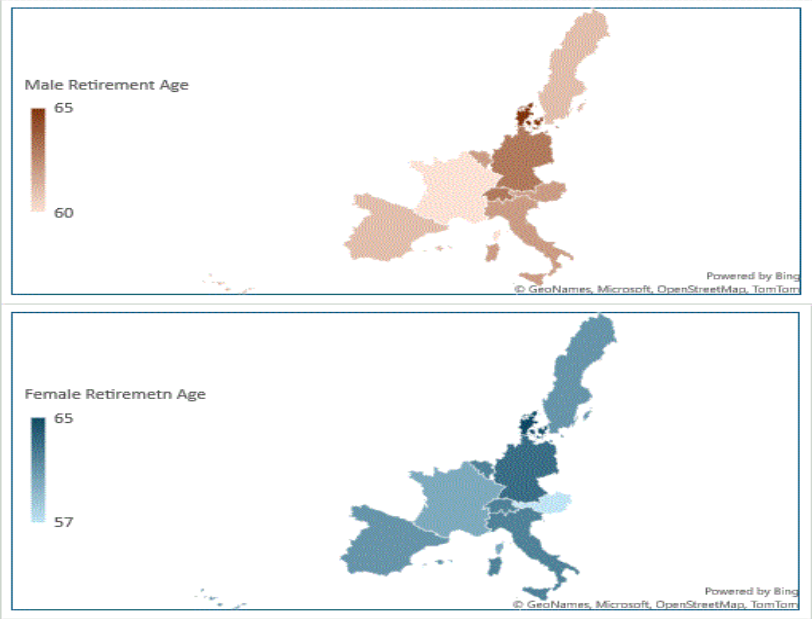
To the best of our knowledge, no prior research has investigated the specific effect of retirement on IADLs. We emphasise the variation in estimated retirement impacts and the prevalence of IADLs across European regions. Few studies examine the relationship between retirement and health, specifically focusing on regional disparities.

4.3 Normal state pension eligibility age in Europe

In Europe, the age eligibility for retirement varies across countries depending on factors such as gender, birth cohort, years of contributions and some country-specific policies. Gender plays a significant role in the pension of European states. Figure 4.1 shows the difference between males and females for normal age state pension in Europe in 2019. Historically, women retired earlier than men since women took more caregiving responsibilities. However, in recent years, most European countries have started to equalise retirement age between genders[11]. For example, Italy's state pension in 2004 was 65 for men and 60 for women. By 2019, this has increased to 67 for both men and women (OECD, 2019). Figure one shows the difference in normal age retirement between genders in 9 European countries[12] in 2019.

[11] For more details see Appendix A.2.
[12] We use the countries in our sample: Austria, Germany, Sweden, Spain, Italy, France, Denmark, Switzerland, Belgium

Figure 4.1 Normal Retirement Age in Europe in 2019



Source: Data from Pensions at a Glance 2019, OECD website

Some countries focus on contribution when it comes to state pensions. For example, the German statutory pension system is structured around the principle of contribution equivalence. Individual pension-related contributions directly correlate with the resulting pension entitlement. In 2007, an important reform was introduced to gradually raise the statutory pension age from 65 to 67 by 2031. This change aims to ensure the long-term sustainability of retirement benefits and reflect individuals' increasing life expectancy and healthier lifestyles (Fiche, 2020). Some other European countries are trying to enhance their state pension systems. The increase age-eligibility for retirement to address the demographic change and increase in life expectancy. For instance, the retirement age in Spain has changed to address demographic challenges and sustain the pension system. Historically, the retirement age was 65 for both men and women, but it is gradually increasing to 67 by 2027 for those with fewer than 38.5 years of contributions (OECD, 2021). Early retirement options with reduced benefits and incentives for working beyond the statutory retirement age are also available. These changes aim to align the retirement age with increasing life expectancy and address the financial strains of an ageing population (European Commission, 2020). These reforms create exogenous variations in the financial incentives for retirement, allowing us to identify the causal impact of retirement on IADLs. By incorporating

these variations, we ensure that our instrumental variable accurately captures the differences in pension age policies across the studied countries.

In this study, the state pension age[13] variable is defined based on the legislated normal retirement age, which is the age at which individuals are eligible to receive full retirement benefits without any reduction. This variable is crucial for our analysis as it varies across countries, genders, birth cohorts, and over time, reflecting the diverse pension age policies in different European countries. We follow the approach used by Mazzonna and Peracchi (2017), who also utilised the Survey of Health, Ageing and Retirement in Europe (SHARE) data and made similar assumptions. This age varies across different countries and over time, providing a source of exogenous variation that is crucial for addressing endogeneity issues in retirement studies. Specifically, we use an eligibility indicator, a binary variable that indicates whether an individual is eligible for normal retirement based on their age and the legislated normal retirement age. This variable is considered exogenous as it is determined by national legislation and not influenced by individual characteristics. By leveraging the variation in normal retirement ages across different European countries, we can robustly identify the causal effects of retirement on IADLs. The variation in the age of pension eligibility, as shown in Appendix A.2, is both cross-country and time-based. Cross-country variation is evident as different countries have different eligibility ages for both males and females. Time variation is also present, particularly in countries where the eligibility age increased over the years. This demonstrates that the variation in the IV is due to both cross-country differences and changes over time.

4.4 Data

This paper utilises data from the Survey of Health, Ageing, and Retirement in Europe (SHARE), a comprehensive dataset focusing on various aspects of ageing and well-being in Europe (Börsch-Supan et al., 2013). The SHARE dataset is a well-rounded and inclusive multidisciplinary dataset encompassing many European countries. The SHARE dataset consists of panel data, indicating that most participants were observed multiple times. It spans 28 European countries and Israel across 7 waves. The first wave was conducted in 2004-2005, and the latest in 2019-2020. It

[13] See Appendix A.2 for the state pension age for the European countries included in our study

provides a wide range of perspectives on the experiences and situations of older adults. The database contains a comprehensive collection of information on health, economic conditions, social networks, and other important aspects of ageing.

To determine the causal relationship between retirement and IADLs, we use 7 Waves of the SHARE dataset covering 2004-2019. We exclude Wave 3 due to missing data for IADLs for this wave. We conducted our analysis of 9 European countries (Austria, Germany, Sweden, Spain, Italy, France, Denmark, Switzerland, Belgium). We also exclude other countries due to missing data for IADLs.

4.4.1 Variables

IADLs indices the respondent's difficulty. The participants were asked, "Please tell me if you have any difficulty with these activities because of physical, mental, emotional or memory problems". They cover the following activities: telephone calls, taking medications, managing money, preparing a hot meal, and shopping for groceries. For each of the five activities, a response indicating a difficulty is coded as 1, and 0 for no difficulty. The total indices score reflects the sum of difficulties across those activities, ranging from 0 (no difficulties) to 5 (difficulties in all activities).

In the literature, there are two definitions of retirement. First, people not participating in the labour force are considered retired. This definition has drawbacks in that homemakers, sick people with disabilities, and the unemployed can be considered retired. Second, self-reported retirement is regarded as a good indicator and has been widely used in economics (Kesavayuth et al., 2018). So, we use self-reported retirement as an indicator of retirement.

We use a set of control variables to isolate their effect on IADLs: age, age square, education dummies[14], marital status dummies, logarithm income[15], household size, countries[16] and languages[17].

[14]. For the education variable, we use the International Standard Classification of Education (ISCE) and make it 4 dummy variables (see Appendix A.1).
[15] We take the natural logarithm after adding one to the income variable to handle the zero income responses correctly in log form.
[16] Countries: Austria, Germany, Sweden, Spain, Italy, France, Denmark, Switzerland, Belgium.
[17] Languages: German, Swedish, Spanish, Italian, French, Danish, Flemish, Catalan.

4.4.2 Descriptive statistics

Table 4.1 presents the summary statistics and presents a breakdown of retirement status by gender, providing a comparative view of the distribution of retirees within the sample. A slightly higher percentage of people in our group are women (about 53%). Respondents in our sample have a medium level of education, and the average family size is 2.36 members. Most of our sample reported their health as good or fair. Table 4.1 shows the descriptive statistics for retirement status in both genders.

Table 4.1 Summary statistics

	Male		Female	
	Retired	Not Retired	Retired	Not Retired
IADLs	0.092 (0.288)	0.045 (0.206)	0.114 (0.318)	0.091 (0.288)
Age	72.200 (7.910)	57.220 (5.180)	72.210 (8.180)	61.610 (9.510)
Marital status:				
Married, living with spouse	0.796	0.763	0.569	0.725
Registered partnership	0.067	0.120	0.105	0.102
Not married	0.049	0.097	0.058	0.056
Widowed	0.087	0.018	0.267	0.116
Education:				
No education	0.056	0.031	0.052	0.064
Low education	0.368	0.248	0.409	0.484
Medium education	0.344	0.417	0.333	0.331
High education	0.231	0.304	0.204	0.230
State pension age eligibility [18]	0.966 (0.181)	0.350 (0.477)	0.963 (0.189)	0.481 (0.499)
Household size	2.040 (0.732)	2.499 (1.105)	1.737 (0.708)	2.339 (1.042)
Number of children	2.140 (1.12)	1.970 (1.378)	2.066 (1.390)	2.206 (1.440)
Observations	60,612	85,792	57,767	106,829

Note: Data from SHARE 2004-2019. Standard errors clustered at the individual level appear in parentheses.

Table 4.1 provides an overview of retirement status for men and women. Retired people tend to experience more instrumental difficulties with daily activities than those who are not retired. The average age of retirees is around 72 for both men and women, while non-retired individuals are generally younger, with men averaging around 57 and women around 61. The varying work patterns between men and women influence this age difference. Women often engage in intermittent jobs such as caregiving and childcare, which allow them to postpone their retirement

[18] The data source is from Pensions at a Glance 2019, OECD website

(Evertsson et al. 2016). Retired men are more likely to be married and living with a spouse, while retired women are more likely to be widowed. Additionally, men with higher levels of education tend to retire later. Non-retired individuals typically have more household members compared to retired ones.

4.4.3 Empirical methodology

We use the following model to examine the relationship between retirement and IADLs:

$$IADL_{it} = \beta_0 + \beta_1 Ret_{it} + \beta_2 C_{it} + \mu_i + \varepsilon_{it} \qquad (1)$$

$IADL_{it}$ refers to the IADLs index of individual i at time t. The variable Ret_{it} indicates retirement status, take the value 1 if the individual is retired and 0 otherwise. Control variables[19] are denoted by C_{it}. μ_i represents individual fixed effects, and ε_{it} is the error term.

Determining the causal impact of retirement status (Ret_{it}) on Instrumental Activities of Daily Living (ADL_{it}) is challenging due to the likely endogeneity of retirement. Causality may run in reverse: individuals with IADLs may be more likely to retire than individuals without those difficulties. Moreover, unobserved variables could influence both the decision to retire and IADLs. In addition, the retirement status variable might be subject to measurement error in panel surveys. While the fixed effects estimator helps to calculate the coefficients of interest by eliminating potential bias that arises from time-constant omitted variables, it does not address the other possible sources of endogeneity in retirement: time-varying omitted variables, reverse causality, and measurement error in retirement status.

We use a fixed effect instrumental variable (FI-IV) approach to resolve this concern. To be valid, our instrumental variable must be highly correlated with an individual's retirement decision. However, it must also not relate to IADLs. The following equations illustrate the (FE-IV) estimation:

$$Ret_{it} = \beta_0 + \beta_1 EliAge_{it} + \beta_2 C_{it} + \nu_i + \varepsilon_{it} \qquad (2)$$

$$IADL_{it} = \beta_0 + \beta_1 \widehat{Ret_{it}} + \beta_2 C_{it} + \mu_i + \varepsilon_{it} \qquad (3)$$

[19] See Appendix A.1

In Eq. 2, normal state pension age eligibility $EliAge_{it}$ is the instrument for retirement status Ret_{it} and ν_i is the individual fixed effect. In eq. 3, $\widehat{Ret_{it}}$ is the predicted retirement derived from the first-stage FE estimation of eq. 2. Since $\widehat{Ret_{it}}$ is predicted using $EliAge_{it}$ and C_{it}, it is uncorrelated to unobserved confounders absorbed in ε_{it}. Therefore, in the second stage, an FE estimation of eq. (3) can produce the estimation of β that uncovers the causal effects of retirement on IADLs. We adjust standard errors for clustering at the individual level to account for heteroskedasticity and arbitrary serial correlations across the waves of the SHARE survey.

The instrumental variable approach relies on two assumptions: relevance and exclusion. Selecting a suitable instrument for retirement is paramount for the success of the FE-IV method. Our instrument, normal state pension age eligibility, is uncorrelated with IADLs except via people's retirement behaviour. As demonstrated below, the relevance condition is satisfied, given the strong association between normal state pension age eligibility and retirement.

4.5 Results

4.5.1 The impact of retirement on IADLs

Table 2 shows the results from fixed-effect (FE) and fixed-effects instrumental variable (FE-IV) estimations. We generated dummies for IADLs to minimise measurement error. If the participant experiences difficulties, we assign a value of 1 and 0 otherwise.

Table 4.2 The impact of retirement on IADLS

Outcome variable: IADLs	Fixed effect	Fixed Effect with IV
Retirement	-0.007 **	0.160 ***
	(0.003)	(0.030)
Age	-0.066***	-0.092 ***
	(0.002)	(0.005)
Age-square	0.005**	0.001***
	(0.001)	(0.003)
Ln-Income	0.0012	0.001
	(0.001)	(0.001)
Education level:		
Low Education	-0.009	-0.009
	(0.038)	(0.038)
Medium Education	-0.301	-0.009
	(0.043)	(0.042)
High Education	-0.015	-0.021
	(0.044)	(0.013)

Marital Status:		
Married/living with spouse	-0.023*	-0.026**
	(0.012)	(0.013)
Registered partnership	-0.014	-0.017
	(0.025)	(0.026)
Widowed	-0.003	-0.003
	(0.015)	(0.014)
Household size	0.001	-0.0007
	(0.002)	(0.003)
Number of Children	0.0008	0.002
	(0.002)	(0.002)
Number of Observations	71,571	71,571
Number of individuals	23,958	23,958
First stage (State pension age eligibility)		0.147***
		(0.005)
F-statistic on the excluded instrument		671.086

Note: control variables: age, age square, ln-income, male dummy, education dummies, marital status dummies, wave dummies, household size, number of children. Standard errors clustered at the individual level appear in parentheses.
*** p<0.01, ** p<0.05, and *p<0.1

FE estimates are shown in the second column of Table 2. The results show that there is little negative correlation between retirement and IADLs. However, as mentioned above, we have an endogeneity problem; therefore, we use the two-stage FE-IV approach. Statistical evidence in the third column of Table 2 indicates that state pension age eligibility is a strong instrumental variable. In the first stage, it is evident that the instrumental variable significantly influences retirement decisions. If an older individual reaches the eligible age for a state pension, the probability of retirement increases by 12 percentage points.

Moreover, the F-statistics on the excluded instrument is 671.086, for exceeding the rule-thumb threshold of 10. The second-stage results are shown in the third column in Table 2. The results demonstrate that retirement has a positive and statistically significant effect on difficulties in IADLs. Specifically, the transition to retirement increases the propensity of having IADL difficulties by 16 percentage points.

4.5.2 The impact of retirement duration on IADLs

In section 4.4, retirement was considered a distinct lifestyle change. Results in Table 2 were based on Eq.3, which examined the impact of transitioning from labour force to retirement on IADLs. In this section, however, retirement is treated as an ongoing process of adjustment to reflect a prolonged period outside the labour force (Bonsang et al., 2012; Zhu, 2021; Zhu and Onur, 2023). Adjusting to retirement can be gradual, as it may take time for retirees to adapt to the lifestyle

changes linked with leaving the labour force. IADLs may change after retiring for an extended period. Therefore, IADLs may change as retirees spend more time in retirement.

Within the SHARE dataset, respondents reported the year they exited the labour force. From this, we calculate the retirement duration for each retiree, denoted as $RetDur_{it}$ which is the time between the retiree's reported retirement year and the year of the interview, defined as $RetDur_{it} = Max\{Year_{it} - RetYear_{it}, 0\}$. In addition, we compute the duration of being age eligible for the state pension $EliDur_{it}$ which captures the time since they first became eligible for state pension, i.e., $EliDur_{it} = Max\{Year_{it} - EliYear_{it}, 0\}$. As Table 4.2 shows a strong positive linkage between pension eligibility and retirement behaviour, we anticipate a high degree of correlation between $RetDur_{it}$ and $EliDur_{it}$.

To analyse the relationship between retirement duration and IADLs, we use the following model:

$$Log\ (RetDur_{it} + 1) = Log\ (EliDur_{it} + 1)\theta + \chi_{it}\lambda + \nu_i + \varepsilon_{it} \qquad (4)$$

$$IADL_{it} = Log\ \left(\widehat{RetDur}_{it} + 1\right)\beta + \chi_{it}\lambda + \nu_i + \varepsilon_{it} \qquad (5)$$

eqs. (4) and (5) are estimated via fixed effects instrumental variables (FE-IV). In the first stage, FE estimation of eq. (4), $(EliDur_{it} + 1)$ is the instrument for $Log\ (RetDur_{it} + 1)$. In the second stage, we replace $Log\ (RetDur_{it} + 1)$ with its predictor $\widehat{RetDur}_{it}$ obtained in the first stage and then performed a FE estimation of Eq. 5. The logarithmic transformation duration variables follow that in Bonsang et al. (2012), Zhu (2021) and Zhu and Onur (2023). In Eq 5 the logarithmic retirement duration allows the changes in IADLs for individuals to be nonlinearly related to retirement duration. Table 3 presents the results from both FE and FE-IV estimations of the impact of retirement on IADLs[20].

Table 4.3 The impact of retirement duration on IADLs

Outcome variable: IADLs	Fixed effect	Fixed Effect with IV
Log (retirement duration)	0.002	0.274***
	(0.004)	(0.042)
Age	-0.109***	-0.250***
	(0.005)	(0.021)
Age-square	0.001***	0.002***
	(0.0003)	(0.0412)

[20] If the estimate of β is statistically significant, then the marginal impact of retirement duration on IADLs declines in magnitude as older people spend more time in retirement.

Ln-Income	0.001	0.001
	(0.0017)	(0.0018)
Education level:		
Low education	-0.049	-0.012
	(0.066)	(0.0749)
Medium education	-0.034	-0.018
	(0.412)	(0.045)
High education	-0.020	0.009
	(0.0361)	(0.039)
Marital status:		
Married/living with spouse	0.005	0.005
	(0.036)	(0.049)
Registered partnership	0.035	0.053
	(0.042)	(0.051)
Widowed	0.028	0.032
	(0.042)	(0.049)
Household size	0.009*	0.011*
	(0.005)	(0.004)
Number of children	0.001	-0.002
	(0.005)	(0.004)
Number of observations	36,581	35,368
Number of individuals	13,158	12,735
First stage (log duration of being age eligible for state pension)		0.292***
		(0.016)
F-statistic on the excluded instrument		316.408

Note: control variables: age, age square, ln-income, male dummy, education dummies, marital status dummies, wave dummies, household size, number of children. Standard errors clustered at the individual level appear in parentheses.

*** p<0.01, ** p<0.05, and *p<0.1

The second column of Table 3 reports the results of the FE estimation. Generally, there is no statistically significant association between the time spent in retirement and IADLs.

We next turn our attention to the FE-IV estimations of eqs. (4) and (5). Regarding the first stage results, the instrumental variable, the duration of being age-eligible for State Pension, is a significant predictor of retirement duration. The first-stage F-statistic on the instrumental variable is 316.408. The instrumental we use thus has strong explanatory power in our sample. Specifically, a 10% increase in the pension-eligibility duration is linked to about 2.9% increases when older people are exposed to retirement. The second stage results, shown in the third column of Table 4.3, generally show a story inconsistent with FE estimates displayed in the second column. The estimated effects of retirement duration on IADLs are positive and statistically significant. Increasing time spent in retirement by 10% leads to increases in IADL difficulties by 42.7%. Therefore, we find evidence that older adults' IADLs worsen when the time they spend in retirement becomes longer.

4.5.3 Alternative measures of IADLs and IADLs components

4.5.3.1 An alternative index of IADLs

Section 5.1. employs a binary variable for IADLs. In this section, we use an alternative measure of IADLs, which ranges from 0 to 5, with each point on the scale corresponding to a specific IADL (making phone calls, taking medications, preparing a hot meal, shopping for groceries, and managing money). Results of FE-IV estimations for the impact of retirement and retirement duration on IADLs are shown in Table 4.4.

Table 4.4 The impact of retirement on the IADLs index

Panel: A	**IADL index**	
	First stage	Second stage
Retirement		0.439***
		(0.067)
State pension age eligibility	0.147***	
	(0.005)	
F-statistics	671.086	
Observations	71,571	
Individuals	23,958	
Panel: B	**IADL index**	
	First stage	Second stage
Log (retirement duration)		0.274***
		(0.012)
Log (duration of being age-eligible for state pension)	0.292 ***	
	(0.016)	
F-statistics	316.408	
Observations	35,368	
Individuals	12,735	

Note: control variables: age, age square, ln-income, male dummy, education dummies, marital status dummies, wave dummies, household size, body weight dummies, number of chronic diseases, cognitive functions and self-assessed health. Standard errors clustered at the individual level appear in parentheses.
**** p<0.01, ** p<0.05, and *p<0.1*

Panel A in Table 4.4 shows results about the impact of retirement on the IADL index. Transition to retirement leads to an increase in IADLs of about 0.439 units. These results aligned with our main results in Table 4.2. The instrumental variable is positive and statistically significant. Being eligible for retirement increases the chance of retirement by 14.7%. In addition, the value of F-statistics on the excluded IV is high (671.086). Panel B in Table 4.4 shows results about the impact of retirement duration on the IADL index. We use logarithmic retirement duration, which allows the changes in IADLs for individuals to be nonlinearly related to retirement duration. With a strong first stage, the second stage results show that retirement duration positively impacts the index measuring IADL difficulties.

4.5.3.2 IADLs components

The IADLs index includes difficulties in making phone calls, taking medications, preparing a hot meal, shopping for groceries, and managing money. This section considers each component of the IADLs index separately as a dependent variable. The results are shown in Table 4.5.

Table 4.5 The impact of retirement on each component of IADLs

FE-IV results	IADLs				
Panel: A	Phone calls	Taking Medications	Managing money	Shopping for groceries	Preparing a hot meal
Retirement	0.046***	0.062***	0.092***	0.138***	0.102***
	(0.014)	(0.015)	(0.021)	(0.086)	(0.021)
First stage (State pension age eligibility)	0.147***				
	(0.006)				
F-statistics	671.086				
Observations	71,571				
Individuals	23,69				
Panel: B					
Log (retirement duration)	0.066***	0.064***	0.185***	0.229***	0.183***
	(0.018)	(0.019)	(0.028)	(0.036)	(0.029)
First stage (duration of being age-eligible for state pension)	0.292***				
	(0.017)				
F-statistics	312.277				
Observations	35,568				
Individuals	12,735				

Note: control variables: age, age square, ln-income, male dummy, education dummies, marital status dummies, wave dummies, household size, body weight dummies, number of chronic diseases, cognitive functions and self-assessed health. Standard errors clustered at the individual level appear in parentheses.
*** p<0.01, ** p<0.05, and *p<0.1

Panel A in Table 4.5 illustrates that the transition to retirement significantly increases the difficulties in each component of IADLs. Transition to retirement is associated with 0.046 and 0.062 unit increases in the measure of difficulties in valuing a call phone and taking medications, respectively. Both estimates are statistically significant at the 1% level. In addition, retirement also increases difficulties in managing money, shopping for groceries and preparing a hot meal. The estimates for the last three components are notably greater than those for phone calls and taking medications. This might be because the last three components are more complex and difficult tasks than phone calls and taking medications. Panel B in Table 4.5 shows that more time in retirement also significantly increases difficulties in IADLs, and all estimates are statistically significant at the 1% level.

4.5.4 Heterogeneity analysis

4.5.4.1 By gender

It is crucial to incorporate gender differences, as there are several reasons for examining the differences between men and women that may be connected to their retirement behaviours. By considering these distinctions, we can achieve a better understanding of retirement patterns and formulate more effective retirement policies. It is reasonable to suggest that work and retirement patterns differ between genders. Traditionally, men have assumed the role of primary earners, while women have been more likely to take on caregiving responsibilities within the household. Consequently, women often experience interrupted careers and are more likely than men to work part-time. This leads to lower accumulated pension wealth due to fewer years in the labour market. These factors may further restrict retirement options for women, potentially preventing them from qualifying for or affording an early retirement (Esser & Palme, 2010; Komp, 2018). To examine gender differences, we conducted Eq.3 separately for each gender, and the results are presented in Table 4.6.

Table 4.6 Retirement and IADLs according to gender

FE-IV results				
Panel A: IADLs	Males		Females	
	First stage	Second stage	First stage	Second stage
Retirement		0.151***		0.157***
		(0.047)		(0.039)
State pension age eligibility	0.132***		0.158***	
	(0.008)		(0.007)	
F-statistics	257.108		405.252	
Number of individuals	10,659		13,299	
Number of observations	31,489		40,082	
Log (Retirement duration)		0.351***		0.211***
		(0.064)		(0.055)
Log (duration of being age-eligible for state pension)	0.284***		0.304***	
	(0.024)		(0.022)	
F-statistics	136.701		183.811	
Number of individuals	6,279		6,456	
Number of observations	17,294		18,074	
Panel B: IADL index	Males		Females	

	First stage	Second stage	First stage	Second stage
Retirement		0.427*** (0.104)		0.416*** (0.088)
State pension age eligibility	0.132*** (0.008)		0.159*** (0.007)	
F-statistics	260.109		405.252	
Number of individuals	10,659		13,299	
Number of observations	31,489		40,082	
Log (Retirement duration)		0.994*** (0.152)		0.505*** (0.115)
Log (duration of being age eligible for state pension)	0.284*** (0.024)		0.304***	
F-statistics	136.701		183.811	
Number of individuals	6,279		6,456	
Number of observations	17,294		18,074	

Note: control variables: age, age square, ln-income, male dummy, education dummies, marital status dummies, wave dummies, household size, number of children. Standard errors clustered at the individual level appear in parentheses.
*** p<0.01, ** p<0.05, and *p<0.1

Panel A of Table 4.6 shows gender results for the relationship between retirement and retirement duration from one side and IADLs from the other. The estimates for both males and females are positive and statistically significant. Those results align with Grotting and Lillebo (2019). We find that retirement increases IADLs for men by 0.151 and 0.157 for women. The second section of Panel A shows the gender difference for the impact of retirement duration on IADLs. It shows that retirement duration increases IADLs by 0.351 for men while it is 0.211 for women. To estimate the gender difference in the impact of retirement and retirement duration on the IADL index, we run eqs. (3) and (5) for the IADL index by gender. The results are shown in Panel B in Table 6. First-stage results show that the instrumental variable in both genders is strong and significant. Second-stage results show that for both genders the relationship is positive and statistically significant regarding retirement and retirement duration.

4.5.4.2 By region

Regional differences among European regions are a crucial aspect of our study. These differences are evident in retirement behaviour, which is influenced by culture. Each country's pension system and varying pension age eligibility across countries and regions significantly impact retirement decisions. Notably, the contrast between the comprehensive social security systems of Nordic countries and the more restrictive retirement policies of Central and Southern European

countries underscores the diversity of the topic. In this section, we examine whether there are regional differences in our findings. We divide countries into three regions: Nordic (Sweden, Denmark), Central Europe (Austria, Germany, Switzerland, Belgium) and Mediterranean (France, Italy, Spain). Results are shown in Table 7.

Table 4.7 Retirement and IADLSs according to according to region

Panel A: IADL	Nordic countries		Central Europe		Mediterranean countries	
	First stage	Second stage	First stage	Second stage	First stage	Second stage
Retirement		-0.748* (0.327)		0.146*** (0.039)		0.069** (0.317)
State pension age eligibility	-0.036** (0.11)		0.161*** (0.008)		0.272*** (0.010)	
F-statistics	9.53		359.848		723.044	
Individuals	5,312		10,716		7,930	
Observations	16,702		31,626		23,243	
Log (Retirement duration)		-2.83 (3.910)		0.368*** (0.069)		0.141*** (0.044)
Log (duration of being age-eligible for state pension)	-0.036 (0.049)		0.284*** (0.025)		0.417*** (0.022)	
F-statistics	0.546		128.248		347.323	
Individuals	2,971		5,720		4,044	
Observations	8,406		15,823		11,139	
Panel B: IADL index	Nordic countries		Central Europe		Mediterranean countries	
	First stage	Second stage	First stage	Second stage	First stage	Second stage
Retirement		-1.36* (0.627)		0.339*** (0.081)		0.293*** (0.079)
State pension age eligibility	0.036*** (0.012)		0.161*** (0.008)		0.273*** (0.010)	
F-statistics	9.53		359.848		732.044	
Individuals	5,312		10,716		7,930	
Observations	16,702		31,626		23,243	
Log (Retirement duration)		-5.54 (7.670)		1.041*** (0.153)		0.411*** (0.104)
Log (duration of being age-eligible for state pension)	-0.036 (0.094)		0.284*** (0.025)		0.417** (0.022)	
F-statistics	0.545		128.248		347.323	
Individuals	0,971		6,720		4,044	
Observations	8,406		26,23		11,139	

Note: control variables: age, age square, ln-income, male dummy, education dummies, marital status dummies, wave dummies, household size. Nordic (Sweden, Denmark), Central Europe (Austria, Germany, Switzerland, Belgium) and Mediterranean (France, Italy, Spain). Standard errors clustered at the individual level appear in parentheses.
**** p<0.01, ** p<0.05, and *p<0.1*

There is a negative and significant relationship in Nordic countries, which means retirement increases IADLs. However, it is positive and significant in other regions, meaning retirement increases those difficulties. This might have multiple reasons. Nordic countries have developed pension systems that provide substantial financial and social support for retired people. This includes pension schemes and healthcare programs. In addition, governments in those countries support active age programs such as volunteering and attending clubs (Von Nordheim & Kvist,

2023). Moreover, Nordic countries' cultures are considered individualistic, meaning individuals strongly emphasise independence and self-care (Hofstede, 2011), which may increase functional abilities after retirement. In addition, Nordic countries tend to have healthier lifestyles, diets, and engagement in physical activities, helping to improve those difficulties after retirement (Celidoni and Rebba, 2017).

On the other hand, in Central Europe and Mediterranean countries, governments with strong pension systems are less generous than in Nordic countries. Therefore, the financial pressure that retired people face after retirement could be stressful and potentially worsen their functional abilities (European Commission, 2024). In addition, in Mediterranean countries, cultures are considered collectivist cultures, which means retired people depend on family support (Hofstede, 2011), which does not provide the same level of care as government programs in Nordic countries.

Cultural differences play an important role in shaping IADLs after retirement, as explained in section. We check the effects of cultural differences on the relationship between time spending in retirement and IADLs. The FE-IV results in Table 7 strong F-statistics on the excluded IV in Central Europe and Mediterranean countries conform that validity of the instrumental variable. This ensure that the duration of being eligible for state pension is a strong instrument for retirement duration in those regions. However, F-statistics is low in Nordic countries.

The results also indicate that the impact of retirement duration on IADLs is more obvious in Central Europe and Mediterranean countries, with coefficients of 0.368 and 0.141, respectively. The significance levels are 1% and 10% in Central Europe and Mediterranean countries, respectively. These findings are similar to those in Section 3.3, suggesting a subtle difference in the impact of retirement and retirement duration on IADLs in these regions. In Nordic countries, the impact is negative for retirement and insignificant for retirement duration, indicating that the health benefits for older adults from retirement do not change over time. This could be attributed to well-developed health systems and active ageing programs in these countries that provide continuous support to older adults (Rostgaard et al, 2022). Panel 2 of Table 7 shows that the

regional analysis for the impact of retirement and retirement duration on IADL index. Results show the same results as panel A.

4.5.5 Robustness checks

So far, our main findings indicate that retirement has a significant and positive impact on IADLs across Europe. In the following sections, we will explore the sensitivity of these results, examining how various factors may influence or change these outcomes, as well as assessing the robustness of the observed relationships. This further analysis aims to provide a deeper understanding of how retirement affects IADLs in different contexts.

4.5.5.1 Alternative definitions of retirement

To assess the sensitivity of our results to alternative retirement definitions, we perform two tests. first, we consider homemakers as retired and include them in our estimation sample. Second, we redefine retirement by considering those not in the labour force, instead of the core variable of interest from self-reported retirement. The table 8 presents the FE-IV estimations from these two robustness checks.

Table 4.8 Alternative definitions of retirement (FE-IV estimates)

FE-IV results		IADLs
Panel A	First stage	Second Stage
Retirement		0.182 ***
		(0.408)
State pension age eligibility	0.123***	
	(0.006)	
F-statistics	16.380	
Observations	62,211	
Individuals	22,016	
Panel B:	First Stage	Second Stage
Retirement		0.179***
		(0.042)
State pension age eligibility	0.124***	
	(0.005)	
F-statistics	522.075	
Observations	62,211	
Individuals	22,016	

Note: control variables: age, age square, ln-income, male dummy, education dummies, marital status dummies, wave dummies, household size, number of children. Standard errors clustered at the individual level appear in parentheses.
*** p<0.01, ** p<0.05, and *p<0.1

Table 8 illustrates the two different definitions of retirement. Both coefficients are positive and statistically significant at 1%. Those results are similar to main results presents in Table 2.

4.5.5.2 The range and specification of age

In this section, we examine the impact of age trends. The identification strategy in our analyse relies on instruments related to age. Although we have controlled for age squared in both stages of the FE-IV estimations, this specification may not adequately capture the full age trend. To address this concern, we assess the robustness of our results by including the third order polynomials of age into the model. The results of this test are presents in Table 10.

Table 4.9 The range and specification of age (FE-IV estimates)

FE-IV results		IADLs
	First stage	Second stage
Retirement		0.071*
		(0.038)
State pension age eligibility	0.129**	
	(0.006)	
F-statistics	416.211	
Observations	61,017	
Individuals	21,692	

Note: control variables: age, age square, age cubed, ln-income, male dummy, education dummies, marital status dummies, wave dummies, household size, body weight dummies, number of chronic diseases, cognitive functions and self-assessed health. Standard errors clustered at the individual level appear in parentheses.
*** p<0.01, ** p<0.05, and *p<0.1

The FE-IV results in Table 10 show that the estimates using this age specification are similar to those in Table 2. The precision of the estimates is slightly reduced (as expected).

4.5.6 Conclusion

This paper investigates the causal impact of retirement on IADLs using data from the Survey of Health, Ageing, and Retirement in Europe (SHARE) for 9 European countries. To address the endogeneity problem, we use the fixed effect instrumental variable (FE-IV) approach. Our results show a positive effect of retirement on IADLs, which meaning retirement increases IADLs that negatively affect health. We show evidence that the impact is strong for older women than for older men. Our regional heterogeneity analysis shows that the relationship is negative and significant for Nordic countries, whereas it is positive and significant for Central Europe and

Mediterranean countries. We also examine the causal impact of retirement duration on IADLs. We use duration of being age eligible for state pension as instrumental variable. We find that time older adults spend in retirement worsen IADLs, and adverse impact is larger for older men than older women. Regional heterogeneity analysis shows that retirement duration does not impact IADLs in Nordic countries, while it worsens IADLs in both Central Europe and Mediterranean countries. We find evidence transition to retirement does not affect ADL difficulties, while spending time in retirement worsen them. Our sensitivity analysis results show similar results to those of our main regressions.

This paper makes two contributions to the literature. First, previous studies have shown a positive, negative and insignificant relationship between retirement and various health outcomes, such as physical health, mental health, and cognitive functions. However, we examine the causal impact of retirement on IADLs, which add to literature a unique physical health indicator that measure individual's abilities to perform essential daily tasks. Second, only few studies focus on the relationship between retirement and health related outcomes variables with regional differences. We emphasise the variations between European regions in estimated retirement effects on IADLs.

Retirees potentially face a declining in IADLs, which means they required more medical assistance, visiting doctors and using therapy, all those increase healthcare costs. Economics help quantify those costs and allows individuals to arrange financially better for retirement. As well as it gives a view of health status of retirees for insurance companies. In addition, declining IADLs may shift the responsibilities of the caregiving role. This can reduce household income if caregivers reduce their working hours.

4.5.7 Implications

Understanding how retirement affects Instrumental Activities of Daily Living (IADLs) provides essential guidance for policymakers who are working to create social and retirement policies that enhance health and independence in later life. As discussions around retirement age policies

continue to evolve across Europe, these findings indicate that the timing of retirement can have both direct and indirect effects on functional health.

The results also reveal that the effect of retirement on IADLs varies significantly across regions, with Nordic countries demonstrating a notably weaker association. This suggests that social policies, healthcare systems, and lifestyle factors may mitigate the anticipated decline in functional ability after retirement. Moreover, the magnitude of the effect observed in certain regions, such as Central Europe, is larger than once thought, underscoring the need for targeted interventions to support older adults in these contexts. By highlighting these regional differences and the potential for policy influence, this study emphasizes the importance of tailored strategies to promote healthy aging and maintain independence among retirees.

Policymakers might consider introducing flexible retirement ages, allowing individuals to choose their retirement time based on personal health and job demands. Such flexibility can help address the diverse needs of the population effectively. Furthermore, implementing programs that offer social and physical support to those who have recently retired could help alleviate potential negative impacts on functional health.

Another important consideration is the role of employers in supporting employees who are nearing retirement. By providing gradual retirement options, such as part-time positions or phased transitions, employers can help ease the shift from work to retirement. These strategies minimize the abrupt loss of work-related activities that contribute to mental and physical stimulation, leading to a smoother transition into a retirement lifestyle that promotes functionality and well-being.

Financial planning and support systems are important areas for policy intervention. Ensuring that retirees have access to sufficient financial resources can reduce stress and encourage them to invest more on healthy activities. Policies that promote financial literacy such as saving, investing, and managing money can help them prepare better for retirement. This preparation can mitigate the risk of economic hardship, which may negatively impact their ability to perform instrumental activities of daily living (IADLs).

4.5.8 Limitations

This chapter has limitation primarily to data availability in the SHARE dataset. First, the SHARE dataset. While SHARE provides a comprehensive cross-country comparison among European countries, it has missing data for certain countries during specific waves. which prevents us from including these countries in our analysis.

In this chapter, we focus on 9 European countries: Austria, Germany, Sweden, Spain, Italy, France, Denmark, Switzerland, and Belgium. These countries are present in Waves 1, 2, 4, 5, 6, 7, and 8. It is important to note that IADL difficulties are missing in Wave 3, so we have excluded this wave from our analysis. We also excluded 19 other European countries and Israel from our study for the following reasons: the Netherlands is absent in Waves 6 and 7; Greece does not appear in Waves 4 and 5; Israel is missing in Waves 3 and 4; and the Czech Republic and Poland do not appear in Wave 1. Ireland is present only in Waves 2 and 3, while Luxembourg appears only in Waves 5, 6, 7, and 8. Hungary is included in Waves 4, 7, and 8; Portugal in Waves 4, 6, 7, and 8; Slovenia and Estonia in Waves 4, 5, 6, 7, and 8; Croatia only in Waves 6, 7, and 8; and, finally, Lithuania and Bulgaria are present only in Waves 7 and 8.

The exclusion of certain countries, due to gaps in the dataset, may restrict the applicability of our findings to the broader European context. Nonetheless, this also creates a promising opportunity for future studies to enhance our knowledge. While concentrating on nine countries with consistent data enables a solid longitudinal analysis, these limitations underscore the importance of being cautious when interpreting the wider implications of the research. Future investigations could seek to overcome these challenges by integrating additional data sources or examining different regions to offer a more thorough perspective on IADL difficulties and the ageing experience throughout Europe.

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4.7 Appendices

Appendix A.1 Control variables used in regressions

Variable	Description
Retirement	The participants were asked about if they are retired or still working at the time of interviews. The variable take value 1 if the participant is retired and 0 otherwise.
Age	The participant's age at the time of the interviews. We take the participants who have 50 years and old.
Age squared	We squared the participants age at the time of interviews.
Income	Annual household income after taxes and social insurance contributions. We use the natural logarithm (Ln income).
Education status	ISCED (International Standard Classification of Education) levels: zero level of education meaning no education or unfinished first level of education. First level (primary education or first stage basic education), second level (lower secondary or second stage of basic education), third level (upper secondary education), fourth level (post-secondary non-tertiary education), fifth level (first stage of tertiary education) and sixth level (second stage of tertiary education).
Male	Dummy variable if the participant is male variable take value of 1 and 0 otherwise.
Marital status	Participants were asked about their marital status: It takes value 1 if the participant is married or living with spouse, 2 if they have registered partnership, 3 if they never married and 4 if widowed. We separated the answers for 4 dummies variables.
Household size	The participants were asked about the total number of households, excluding himself/herself. The answer is within the range of 0 to 11.
Number of children	Number of children
Country	The countries that we use in this paper: Austria, Germany, Sweden, Spain, Italy, France, Denmark, Switzerland, Belgium.
Languages	German, Swedish, Spanish, Italian, French, Danish, Flemish, Catalan.
Wave	The rounds of interviews in 8 Waves: From Wave 1 in 2004 to Wave 8 in 2019. Exclude Wave 3

Note: Those definitions according to SHARE dataset

Appendix A.2 Eligible age for normal retirement in 9 European countries

	Wave	Year	Austria (1)	Germany (2)	Sweden (3)	Spain (4)	Italy (5)	France (6)	Denmark (7)	Switzerland (8)	Belgium (9)
Male	1	2004	65.00	65.00	65.00	65.00	65.00	60.00	65.00	65.00	65.00
	2	2006	65.00	65.00	65.00	65.00	65.00	60.00	65.00	65.00	65.00
	4	2010	65.00	65.00	65.00	65.00	65.00	60.00	65.00	65.00	65.00
	5	2013	65.00	65.00	65.00	65.00	66.17	60.00	65.00	65.00	65.00
	6	2015	65.00	65.00	65.00	65.00	66.25	61.1	65.00	65.00	65.00
	7	2017	65.00	65.00	65.00	65.00	66.6	61.6	65.00	65.00	65.00

	8	2019	65.00	65.00	65.00	65.00	67	62.00	65.00	65.00	65.00
female	1	2004	60.00	65.00	65.00	65.00	60.00	60.00	65.00	64.00	65.00
	2	2006	60.00	65.00	65.00	65.00	60.00	60.00	65.00	64.00	65.00
	4	2010	60.00	65.00	65.00	65.00	60.00	60.00	65.00	64.00	65.00
	5	2013	60.00	65.00	65.00	65.00	62.00	60.00	65.00	64.00	65.00
	6	2015	60.00	65.00	65.00	65.00	63.75	61.1	65.00	64.00	65.00
	7	2017	60.00	65.00	65.00	65.00	65.6	61.6	65.00	64.00	65.00
	8	2019	60.00	65.00	65.00	65.00	67	62.00	65.00	64.00	65.00

Note: The data source is from Pensions at a Glance 2019, OECD website

Appendix A.3 Eligible age for early retirement in 9 European countries

	Wave	Year	Austria (1)	Germany (2)	Sweden (3)	Spain (4)	Italy (5)	France (6)	Denmark (7)	Switzerland (8)	Belgium (9)
Male	1	2004	62.00	63.00	61.00	61.00	59.00	59.00	65.00	63.00	60.00
	2	2006	62.00	63.00	61.00	61.00	59.00	59.00	65.00	63.00	60.00
	4	2010	62.00	63.00	61.00	61.00	59.00	59.00	65.00	63.00	60.00
	5	2013	62.00	63.00	61.00	61.00	62.00	59.25	65.00	63.00	60.00
	6	2015	62.00	63.00	61.00	61.00	62.50	60.00	65.00	63.00	60.00
	7	2017	62.00	63.00	61.00	61.00	62.80	56.70	65.00	63.00	62.00
	8	2019	62.00	63.00	61.00	61.00	62.00	60.00	65.00	63.00	62.00
female	1	2004	57.00	60.00	61.00	61.00	59.00	59.00	65.00	62.00	60.00
	2	2006	57.00	60.00	61.00	61.00	59.00	59.00	65.00	62.00	60.00
	4	2010	57.00	60.00	61.00	61.00	59.00	59.00	65.00	62.00	60.00
	5	2013	57.00	63.00	61.00	61.00	62.00	59.25	65.00	62.00	60.00
	6	2015	57.00	63.00	61.00	61.00	62.00	60.00	65.00	62.00	60.00
	7	2017	57.00	63.00	61.00	61.00	61.80	56.70	65.00	62.00	62.00
	8	2019	57.00	63.00	61.00	61.00	62.00	60.00	65.00	62.00	62.00

Note: The data source is from Pensions at a Glance 2019, OECD website

Chapter 5: General Discussion

5.1 Thesis overview

The research presented in this thesis investigated the factors that shape the well-being and behaviour of an ageing population in European countries using the Survey of Health, Ageing and Retirement for Europe (SHARE). Chapter 1 summarises the overall thesis. Chapter 2 (Paper 1) is about the impact of locus of control on volunteering. It investigates the impact of locus of control on volunteering behaviour among older adults in Europe. The research aims to determine the relationship between a sense of control, level of participation, and frequent volunteering. Chapter 3 (paper 2) is about the impact of emotional closeness on life expectancy. Studies how emotional connections impact the life expectancy of older adults in Europe by exploring the link between social networks and longevity for ageing. Chapter 4 (Paper 3) is about the impact of retirement on Instrumental Activities of Daily Living. It examines retirement's effects on older adults' ability to perform Instrumental Activities of Daily Living (IADLs), such as phone calls, taking medication, preparing a hot meal, shopping for groceries, and managing money.

5.2 Summary of findings

We present exciting findings from each paper, which examine the effects of psychological, social, and life transition factors on health outcomes. Each paper offers valuable insights into various aspects affecting healthy ageing outcomes using data from the SHARE dataset.

Paper 1 finds that the locus of control significantly impacts participation and frequent volunteering. We observed no gender differences in volunteering participation but found that older women are more likely to volunteer frequently than older men. Additionally, our analysis shows that volunteering participation is statistically significant in all European regions, while frequent volunteering is statistically significant only in Southern Europe.

Paper 2 indicates that emotional closeness positively and significantly impacts life expectancy. We find that emotional closeness increases life expectancy for women, while there is no such impact for men. Additionally, results shed light on the influence of cultural contexts. Women in countries with collectivist cultures experience a significant and positive effect on life expectancy due to emotional closeness, unlike women in countries with individualist cultures.

Paper 3 findings indicate that retirement has a positive effect on IADLs, leading to increased health problems. We also found no gender differences in this relationship. Additionally, our analysis shows that the impact of retirement on IADLs varies across different European regions. It is negative and significant for Nordic countries, while positive and significant for Central Europe and Mediterranean countries.

These findings provide understanding of the various factors that influence healthy ageing. They emphasise the complex relationship between psychological, social, and life transition factors, demonstrating how these elements work together to shape health outcomes and overall well-being among older adults in different European regions. The results highlight that psychological factor, such as a sense of control over one's life, social factors like emotional closeness, and life transitions, such as retirement, significantly impact the maintenance of health and independence in later life. These findings highlight the importance of creating policies that are specifically tailored to the unique contexts and challenges faced by older populations in different regions of Europe. The impact of psychological, social, and life transition factors on health outcomes and behaviours varies not only between genders but also across cultural and geographic boundaries. Consequently, a uniform approach to ageing policies is inadequate. Policymakers must consider regional diversity and the gender-specific aspects of ageing when developing policies aimed at promoting healthy ageing.

5.3 Significance of the contribution

Chapter two provides a detailed analysis of the influence of locus of control on volunteering among older adults. While earlier studies have primarily focused on general behavioural outcomes related to locus of control, this paper is the first to offer comprehensive data on its impact within diverse European welfare systems. This is significant because it fills a gap in the literature by examining how different welfare policies and societal attitudes towards volunteering across Northern, Central, and Southern Europe affect this relationship. The cultural differences across these regions are crucial in understanding the variations in volunteer behaviour. For instance, the results suggest that even though older adults in Northern and Central Europe have an internal locus of control, this does not influence their volunteering frequency. Older adults in

Southern Europe have more family obligations and group responsibilities, which means that when they feel a sense of control. These regional variations highlight the importance of tailoring policy approaches to the specific cultural and social contexts of different European regions to effectively promote volunteerism among older adults.

Chapter three contributes to the literature by examining the causal effect of emotional closeness on life expectancy, bridging a gap between psychology and health economics. Unlike previous studies that broadly assess social networks, we focus on emotional closeness and demonstrate its positive impact on life expectancy, particularly among older women. Our findings reveal notable regional differences: emotional closeness significantly enhances life expectancy in collectivist European countries but has no such effect in individualistic ones. This suggests that cultural norms and welfare structures shape the health benefits of social bonds. These insights hold important policy implications—while collectivist societies naturally foster close-knit relationships, individualistic countries may need targeted interventions, such as community engagement programs and social support policies, to strengthen emotional connections among older adults and improve their well-being.

This paper examines the causal impact of retirement on IADLs using data from SHARE (2004–2019) and a fixed effects instrumental variable (FE-IV) approach. We find that retirement makes these tasks harder, especially for older women, and the longer someone is retired, the worse the impact, particularly for men. The effects also vary by region: in Nordic countries, where strong support systems help older adults stay active, retirement has little impact. However, in Central and Mediterranean Europe, retirement leads to more difficulties, likely due to weaker social and healthcare support. These findings suggest that policies should be tailored to each region—Nordic countries can focus on maintaining social participation, while Central and Mediterranean countries may need better post-retirement programs and healthcare to help older adults stay independent.

Overall, this thesis makes a significant contribution to the field of ageing by presenting new and valuable evidence regarding the key factors that influence the well-being and behaviour of older adults. By examining the psychological, social, and structural elements that affect ageing, it offers

a deeper understanding of how these factors interact to impact health outcomes, social participation, and independence in later life. The insights gained from this thesis have the potential to inform the development of more effective policies and programs designed to support older populations across Europe.

5.4 Implications

The findings of this thesis have several implications for policymakers, health professionals, and future researchers. Each paper's results illustrate the complexity of ageing populations in Europe, which can inform economic policies to optimise well-being and productivity among older adults. These findings underscore the complexity of ageing and highlight the need for policies that are region-specific and inclusive, taking into account the various cultural, economic, and healthcare landscapes throughout Europe.

Paper 1 presents findings that the locus of control of the older populations is important in shaping social participation and economic contributions. Those findings suggest policies that support older adults can boost their participation and frequency of volunteering. Consequently, government expenditure on social welfare will likely decline, particularly in southern European countries. The locus of control impacts older women who engage in frequent voluntary work, indicating the potential for involving them in the workforce post-retirement. Policies aimed at nurturing and enhancing the sense of control among older adults could have significant impacts. Programs that promote autonomy, self-efficacy, and a sense of purpose may encourage older individuals to stay socially and economically active, for instance, through volunteering. Customized interventions, such as workshops or community-based activities, can help build the confidence and motivation needed for seniors to engage in society after retirement. Encouraging older adults to volunteer can help reduce pressure on government welfare systems. By utilising the skills and experience of older adults in volunteer roles, especially in southern European countries where support systems are often stretched thin, policymakers can save money while improving community support. Organizing structured volunteering programs that involve older individuals in caregiving, education, or mentorship can promote social connections and strengthen bonds between different age groups.

Paper 2 presents results demonstrating the effects of emotional closeness on life expectancy, especially for women in collectivist cultures, emphasising the importance of emotions on life expectancy. Governments can encourage policies that strengthen family connections and community relationships. This would lead to lower healthcare costs and higher economic growth through the postponement of retirement ages due to increased life expectancy. Governments can play a vital and empowering role in fostering emotional closeness by implementing policies and programs that strengthen family ties and community relationships. These measures, such as parental leave, flexible work arrangements, and caregiving support, not only help individuals balance their professional and personal responsibilities but also foster stronger intergenerational bonds. This empowerment is especially relevant in collectivist cultures, where family cohesion is often the foundation of social and emotional well-being. Initiatives at the community level that promote social engagement and support networks are crucial. Governments play a pivotal role in this by investing in creating community centres, organising intergenerational activities, and supporting local organisations that encourage social interactions. Their support empowers and motivates these programs that facilitate regular contact among family members, friends, and neighbours, helping to reduce feelings of isolation and loneliness, which are known to negatively impact health and longevity.

Paper 3 findings show that retirement affects IADL issues across European regions differently. It suggests that governments should tailor retirement plans to address the specific needs of different populations. In Central and Mediterranean countries, retirement has a positive effect on IADL's difficulties, which can negatively impact individual health. Extending working lives in these countries could help maintain economic productivity and lessen the healthcare burden. In Nordic countries, retirement increases IADL difficulties, which can positively affect individual health. In Central and Mediterranean countries, the findings suggest that retirement has a positive effect on IADL difficulties, potentially leading to In Central and Mediterranean countries, research indicates that retirement positively impacts difficulties with IADLs, which may lead to negative health outcomes for retirees. This highlights the need for policies that promote ongoing engagement in meaningful activities after retirement. Extending working lives in these regions could benefit both individual health and economic productivity. Initiatives such as gradual

retirement schemes, flexible part-time work options, and programs that encourage volunteering or active ageing can help retirees remain active, socially connected, and mentally stimulated, thereby alleviating the negative effects on IADLs. The findings from Nordic countries indicate that retirement can lead to increased difficulties with Instrumental Activities of Daily Living (IADL), which, paradoxically, could have a positive impact on individual health. This suggests that policies in these countries should focus on creating environments that strike a balance between promoting independence and providing support. Additionally, implementing programs that encourage skill development, such as workshops or classes specifically designed for retirees, could inspire and motivate them to adapt to life changes and maintain their functional health.

The findings of this thesis provide essential insights that can guide the development of more effective policies for ageing populations across Europe. The research highlights the importance of incorporating psychological, social, and structural factors into policymaking to support the well-being and independence of older adults. By acknowledging the diverse needs of ageing populations in various European regions and considering the differences in culture and welfare systems, policymakers can create tailored strategies that promote active ageing, reduce healthcare costs, and enhance social participation. This thesis adds to the growing body of knowledge on ageing and offers actionable recommendations that enabling them to continue making meaningful contributions to society well into their later life.

5.5 Limitations of the thesis

This thesis employs the survey of health, ageing and retirement in Europe (SHARE). Even though SHARE is a rich dataset for cross-sectional analysis, it has limitations regarding country and wave availability. The Table shows the availability of data for courtiers and waves within SHARE.

Table 5.1 Data Availability by Country and Wave in the SHARE Dataset

County/Wave	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6	Wave 7	Wave 8
Austria	*	*	*	*	*	*	*	*
Germany	*	*	*	*	*	*	*	*
Sweden	*	*	*	*	*	*	*	*

Netherlands	*	*	*	*	*			*
Spain	*	*	*	*	*	*	*	*
Italy	*	*	*	*	*	*	*	*
France	*	*	*	*	*	*	*	*
Denmark	*	*	*	*	*	*	*	*
Greece	*	*	*			*	*	*
Switzerland	*	*	*	*	*	*	*	*
Belgium	*	*	*	*	*	*	*	*
Israel	*	*			*	*	*	*
Czech Republic		*	*	*	*	*	*	*
Poland		*	*	*	*	*	*	*
Ireland		*	*					
Luxembourg					*	*	*	*
Hungary				*			*	*
Portugal				*		*	*	*
Slovenia				*	*	*	*	*
Estonia				*	*	*	*	*
Croatia						*	*	*
Lithuania							*	*
Bulgaria							*	*
Cyprus							*	*
Finland							*	*
Latvia							*	*
Malta							*	*
Romania							*	*
Slovakia							*	*

Source: SHARE dataset

In paper 1, locus of control and volunteering, we analyse data from 12 countries: Austria, Germany, Sweden, Spain, Italy, France, Denmark, Switzerland, Belgium, the Czech Republic, Slovenia, and Estonia. We exclude other countries that do not have data available from Wave 4 (2010) to Wave 8 (2019). Moreover, volunteering is measured as a binary participation outcome and a frequency scale. However, this measurement does not account for the quality or impact of the volunteering, which could vary widely among individuals. The chapter, in its oversight, does

not consider the differences in the types of volunteer activities (e.g., caregiving, tutoring, community organizing) that may require varying levels of commitment, and this variation may have different implications for well-being of older adults.

In paper 2, we examine the relationship between emotional closeness and life expectancy, using data from 14 European countries (Germany, Austria, Sweden, Denmark, France, Spain, Portugal, Italy, Belgium, Switzerland, Czech Republic, Poland, Slovenia and Estonia). Emotional closeness is a key aspect of the social network model. Our analysis is based on the SHARE dataset, which features the social networks model in Wave 4 (2010), Wave 6 (2015), and Wave 8 (2019). As a result, we have excluded countries that do not appear in these waves. Moreover, the paper depends on self-reported data to evaluate emotional closeness, which can be influenced by biases like social desire or recall bias. Respondents might overestimate or underestimate their emotional connections with family and friends, which could affect the accuracy of the results. Furthermore, the survey measures emotional closeness in a somewhat simplified manner, failing to capture the depth, quality, or consistency of relationships that may have a more significant impact on life expectancy. In addition, this paper emphasises the significant impact of emotional closeness on health outcomes. While life expectancy is an important indicator, it does not capture the entire range of health and well-being. Emotional closeness can affect various aspects of health, including mental health, quality of life, which are not addressed in this chapter. To gain a clearer understanding of overall well-being, it is essential to conduct a more comprehensive assessment of health outcomes that takes emotional closeness into account.

In Paper 3, we examine the impact of retirement on IADL difficulties by utilising data from 9 European countries: Austria, Germany, Sweden, Spain, Italy, France, Denmark, Switzerland, and Belgium. Our analysis is based on the SHARE data collected from Wave 1 (2004) to Wave 8 (2019), except for Wave 3 (2008), which does not include IADL difficulties. We exclude any countries that do not appear in these Waves. In addition, the paper does not account the influence of pre-retirement occupations on post-retirement health outcomes, including IADLs. People transition into retirement from various occupations, each with different physical, mental, and emotional needs. The paper does not capture the range of pre-retirement jobs, including physically demanding roles (e.g., construction, manual Labor) versus sedentary positions (e.g., office work,

administrative jobs). This oversight could result in varying health impacts after retirement. For example, individuals coming from physically demanding jobs may face more health challenges post-retirement, which could worsen IADLs. Conversely, those in desk-based roles might not experience such rapid health declines.

Overall thesis limitations, The SHARE dataset is based on self-reported data, which may lead to inaccuracies due to cognitive decline, memory issues, or social desirability biases. This is particularly relevant when older adults are asked about sensitive topics such as health or personal well-being. These biases could affect the accuracy of the results, especially when analysing health-related outcomes or social behaviours that require respondents to accurately recall and report their experiences. In addition, While the thesis employs established measures of well-being and behaviour, there are limitations in how factors like emotional closeness and locus of control are defined and assessed. This may result in an incomplete understanding of these elements. Moreover, this thesis classifies countries into various regions, such as Nordic, Central, and Mediterranean, or categorises them as collectivist versus individualistic cultures. However, this approach may oversimplify the rich cultural and socio-economic diversity present within these regions. The complexities of Europe's landscape extend beyond these broad classifications. Such potential oversimplification could considerably affect the accuracy of conclusions drawn regarding the influence of culture on ageing and well-being.

5.6 Suggestions for future research

This thesis significantly contributes to understanding the factors that shape well-being and behaviour among older adults in Europe. However, it also highlights the need for further exploration in this vital area of research. A critical next step involves expanding the geographical scope of studies beyond Europe to include regions like the Global South and comparative contexts such as Australia and New Zealand. Such a broadened perspective can offer valuable insights into how cultural, economic, and social differences impact the ageing experience across diverse populations. In addition to geographic expansion, the potential for conducting longer longitudinal studies is paramount. These studies would capture the long-term impacts of ageing and retirement, enabling researchers to identify and analyse generational trends. Understanding

these trends can lead to more informed discussions about the evolving needs and challenges ageing populations face.

While this thesis effectively addresses causality concerns by applying instrumental variable approaches in two chapters, future research holds great promise for investigating the underlying mechanisms that drive observed outcomes. Advanced methods such as structural equation modelling can illuminate the complex interactions of various factors influencing well-being, allowing for a more nuanced understanding of ageing. Including broader measures of well-being, encompassing psychological health, social connectivity, and economic security, will further enhance our comprehension of the multifaceted impacts of ageing. By examining these additional dimensions, researchers can create a more holistic view of well-being for older adults, moving beyond merely physical health metrics. Furthermore, exploring specific population subgroups, such as ethnic minorities or individuals with differing socioeconomic statuses, could uncover unique challenges and opportunities these communities face. Recognising the diversity within the ageing population is essential for developing targeted interventions that address the nuanced needs of all individuals.

Another crucial area for future exploration is the role of policy frameworks, retirement systems, and social programs in shaping the experiences of older adults. Delving into how these systems function—or falter—can generate actionable insights for policymakers, helping create supportive environments promoting well-being among ageing populations.

Additionally, with the rapid pace of technological advancements and the ongoing effects of environmental changes, it becomes increasingly important to research how these factors influence ageing and retirement. Studies could examine the implications of digital inclusion on social connectivity for older adults and investigate how climate adaptation strategies impact their living conditions and overall quality of life. Exploring these diverse avenues will deepen our understanding of ageing populations and pave the way for more effective policies and interventions tailored to their evolving needs. As we look ahead, embracing a multifaceted approach that considers various influences on ageing will be essential to fostering a supportive and enriching environment for older adults in our increasingly complex world.

5.6.1 Ethical and social considerations in ageing research

Research on ageing populations inherently involves ethical and social considerations, as it delves into sensitive aspects of individuals' lives, such as health, autonomy, social relationships, and economic stability. This section explores the essential ethical principles and social dimensions that should guide ageing research to uphold its integrity, inclusivity, and relevance.

As individuals age, they often encounter vulnerabilities associated with declining health, cognitive changes, and increasing dependence on others. Researchers must ensure that the autonomy and dignity of older adults are upheld throughout the research process. This involves obtaining informed consent in a manner that participants can fully comprehend, allowing them to withdraw at any time, and presenting findings honouring their humanity rather than reducing them to mere data points. Furthermore, special care must be taken when engaging with individuals who may have diminished capacity to provide informed consent, such as those living with dementia or other cognitive impairments. This essential consideration should never be overlooked.

The sensitivity of data about older adults—such as their health status, social relationships, and financial circumstances—demands a stringent commitment to privacy and confidentiality standards. Researchers hold a vital responsibility in this regard, as they must adhere to regulations like the General Data Protection Regulation (GDPR) in Europe to protect participants' personal information. Anonymisation and secure data storage are crucial practices to prevent the misuse or exposure of sensitive data. Additionally, researchers should communicate transparently how participants' data will be utilised, ensuring that it is used exclusively to further knowledge and enhance societal outcomes.

Ageing populations are highly diverse, encompassing individuals of varying socioeconomic statuses, ethnicities, genders, and cultural backgrounds. The urgency of inclusivity in research cannot be overstated, as it ensures that findings are representative and applicable to all older adults, not just those from privileged or majority groups. For instance, minority ethnic groups may experience ageing differently due to disparities in healthcare access, social support, or cultural attitudes toward ageing. Researchers can uncover unique challenges and develop more equitable interventions by actively including underrepresented populations.

The insights from ageing research can have significant social implications, influencing policies, healthcare practices, and societal attitudes. Researchers are responsible for ensuring their work fosters positive social change, such as enhancing the quality of life for older adults and addressing intergenerational inequalities. Furthermore, researchers must remain vigilant about unintended consequences, such as reinforcing stereotypes or creating disparities in resource access. This awareness is crucial for preparing the audience to engage thoughtfully. Involving stakeholders—including policymakers, older adults, and advocacy groups—in interpreting and applying research findings can help alleviate these risks.

5.6.2 Regional and cultural nuances in ageing

The ageing process is complex and profoundly influenced by various regional and cultural factors shaping individuals' experiences and outcomes. In Europe, for instance, the differences in welfare systems, healthcare infrastructure, and cultural norms result in diverse ageing trajectories. The comprehensive welfare systems and universal healthcare available in Nordic countries often lead to improved ageing outcomes, characterised by higher levels of well-being and independence among older adults. In contrast, Southern European countries, which rely heavily on family-based support systems, tend to experience caregiver burden and limited access to formal care services (Esping-Andersen, 1999).

Cultural norms play a pivotal role in shaping the ageing experience. In many Southern and Eastern European countries, collectivist cultures emphasise family interdependence and support, fostering strong social networks for older adults associated with positive health outcomes. However, these dynamics can sometimes create a reliance on family members, particularly in caregiving roles, which disproportionately impacts women (Triandis, 1995). Conversely, Western and Northern Europe's individualistic cultures prioritise autonomy and self-reliance. While this emphasis on independence can be beneficial, it may also result in increased risks of social isolation among older adults, an issue that warrants attention.

Regional variations in retirement policies highlight the impact of institutional and cultural contexts. For instance, Southern European nations often promote early retirement, which can

increase economic dependency and health-related challenges. In contrast, Northern and Central European countries encourage later retirement and active ageing, reflecting their cultural values of individualism. These policies emphasise the economic and social benefits of prolonged participation in the workforce, underscoring the importance of keeping older adults engaged in society and alleviating healthcare burdens (European Commission, 2020).

Social networks, significantly shaped by regional and cultural differences, play a crucial role in the lives of older adults. In Southern Europe, older individuals frequently thrive within close-knit family networks that offer emotional and practical support. However, this can limit their access to professional care services. In contrast, Northern Europe's focus on formal support systems promotes greater autonomy, although it may lead to less frequent family interactions, potentially impacting emotional well-being (Börsch-Supan et al., 2013).

Future research should delve deeper into regional and cultural differences, particularly through comparative studies involving non-European regions such as Australia, Asia, and Latin America. These investigations will utilise quantitative and qualitative methods, including surveys, interviews, and ethnographic research. Gaining insight into how cultural, economic, and policy frameworks influence the experiences of ageing can help inform global best practices. Additionally, qualitative approaches that capture the lived experiences of older adults will provide valuable insights into their needs and preferences. Addressing these regional and cultural nuances is essential for developing effective policies that enhance the well-being and independence of ageing populations worldwide.

5.7 The economic impact of ageing populations in Europe

The ageing population in Europe is creating urgent challenges for the economy. As more people age, there is an increasing demand for healthcare, pensions, and social services. This shift towards an older population could seriously affect Europe's economy. It may impact workforce participation, healthcare spending, and public policy (Hoorens et al., 2013). As the population aged 65 and older increases, there is a corresponding rise in the demand for long-term care services, which significantly strains national budgets, especially in welfare states with generous social protection systems (OECD, 2024).

One significant economic challenge that is required is the sustainability of pension systems across Europe. The traditional pay-as-you-go pension model faces growing pressure with increasing life expectancies and declining birth rates. Many European countries, especially those in Southern and Eastern Europe, are currently dealing with pension reforms to ensure the financial viability of these systems (ISSA, 2022). The challenge lies in balancing providing adequate retirement income for older adults and ensuring that younger generations are not overburdened while supporting retirees.

The ageing population requires us to rethink how we fund and deliver healthcare. As people live longer, they often face chronic health issues that lead to higher healthcare costs. This increase in expenses affects both the public and private sectors. According to the European Union, healthcare spending may rise by 2.5% of GDP by 2060 due to the ageing population (Williams et al., 2019). Many European countries are looking at new solutions like digital health technologies and preventive care models to manage these costs. These options could improve health outcomes and lower long-term care costs (Yeung et al., 2023).

5.8 Conclusion

The ageing population challenges in Europe become a big issue for individuals, families and governments. This thesis has contributed to the literature by exploring the factors that shape well-being and behaviour of adults 50 and older. Firstly, it examines the impact of locus of control on volunteering. Secondly, it shows the role of emotional closeness on life expectancy. Thirdly, it explores the impact of retirement on IADLs. The thesis utilises cross-national data from the Survey of Health, Ageing and Retirement in Europe (SHARE). We examine the heterogeneity analysis for European regions to find out the regional and cultural differences within the European continent. In the first paper, we divide European countries into North, Central and South. In the second paper, we divide them into collectivist and individualistic culture countries. In the third paper, we divide them into Nordic, Central and Mediterranean countries.

This thesis presents an analysis of the factors that influence the well-being and behaviour of older adults in Europe. It highlights the interaction of psychological traits, social relationships and transition in older adults' lives. The first paper demonstrates that locus of control plays an

important role in promoting social engagement and how it contributes positively to older adults' lives and the community. The second paper shows the impact of emotional closeness as a social network in promoting longevity and well-being. The third paper reveals the varied effects of retirement on IADL's problems across different European regions.

This thesis provides a comprehensive overview of the factors that influence well-being and behaviour in older adults, highlighting the interaction between psychological, social, and structural elements. By examining how individual characteristics, social networks, and life transitions affect the ageing process, this research enhances our understanding of the complexities associated with healthy ageing in Europe. The findings indicate that well-being in later life is not determined by a single factor; rather, it is shaped by a variety of interrelated aspects that differ across cultural and regional contexts. This perspective is essential for developing effective policies and programs aimed at improving the quality of life for older adults. Moreover, it emphasises the importance of promoting independence, strengthening social support networks, and tailoring retirement policies to address the diverse needs of ageing populations. It also recommends that future research continue to investigate the dynamic relationships among personal agency, social engagement, and health in later life, considering the diverse experiences of older adults throughout Europe.

5.9 References

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