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The Irish Longitudinal
Study on Ageing

TILDA Wave 6 Report

Shaping the Future: Longitudinal Trends and Opportunities for Transformation in Health and Social Care in Ireland

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Contents

Key Findings 11

Chapter 1:
Introduction. Life Gets Better after 50: quality of life, caring, and emotional, physical, and social health 17

Rose Anne Kenny and Cathal McCrory

Chapter 2:
Methodology 23

Siobhan Scarlett, Silvin Knight, Morgana Afonso Shirsath, Aisling O’Halloran, and Ann Monaghan

Chapter 3:
Loneliness in Older Age: long-term trends, health impacts, and lessons from the COVID-19 pandemic 39

Mark Ward

Chapter 4:
The Unmet Need: bridging the gaps of unmet healthcare needs in later life 69

Robert Briggs and Rose Anne Kenny

Chapter 5:
The Age-Friendly Health Systems 4Ms Framework: a longitudinal analysis using TILDA 97

Cathal McCrory

Chapter 6:
Family Caring in Later Life: prevalence, impact, and the need for policy support 137

Christine McGarrigle

List of Tables

Chapter 2: Methodology

Table 2.1: Topics covered in the CATI and SCQ 28
Table 2.2: Wave 6 self-interview response rates, by age group and sex 30
Table 2.3: Reasons for sample attrition at Wave 6 31
Table 2.4: Characteristics of of participants aged 50 years and older who completed a CAPI or CATI at Waves 1 to 6 32
Table 2.5: Wave 6 SCQ response rates by, age group and sex 33
Table 2.6: Wave 6 health assessment response rates, by location, age group and sex 33
Table 2.7: Wave 1, 3 and 6 health assessment response rates, by location 34
Table 2.8: Cognitive assessment sub-study response rates, by age 34

Chapter 3: Loneliness in Older Age: long-term trends, health impacts, and lessons from the COVID-19 pandemic

Table 3.1: Population characteristics at Wave 1 and mean UCLA loneliness scores 45
Table 3.2: Sample characteristics at Wave 1 and how often lonely in the previous week 47
Table 3.3: Social isolation and health status, by mean loneliness scores 48
Table 3.4: Social isolation and health status, by how often lonely in the previous week 49
Table 3.5: Baseline characteristics associated with latent group membership 54
Table 3.6: Social isolation and health outcomes at Wave 6 associated with latent class membership 56
Table 3.7: Multinomial logistic regression showing likelihood of Group 2 and Group 3 membership, compared to Group 1 58
Table 3.8: Percentage of older adults in the three latent trajectory groups, by social isolation scores and health outcomes 59
Table 3.9: Multinomial logistic regression showing likelihood of Group 2 and Group 3 membership compared to Group 1, by social isolation and health at Wave 6 60

Chapter 4: The Unmet Need: bridging the gaps of unmet healthcare needs in later life

Table 4.1: Summary of objective and self-reported measures, by condition 74

List of Tables

Chapter 5: The Age-Friendly Health Systems 4Ms Framework: a longitudinal analysis using TILDA

Table 5.1: Irish population by age group from 1950-2023 100
Table 5.2: Population weighted distribution of TUG performance (seconds) from Waves 1- 6 105
Table 5.3: Descriptive statistics for TUG performance (seconds) from Waves 1- 6 106
Table 5.4: Expected TUG performance (seconds) in 10-year age intervals, by sex 109
Table 5.5: Expected TUG performance (seconds) in 10-year age intervals, according to highest level of educational attainment 110
Table 5.6: Population weighted distribution of medications count from Waves 1- 6 113
Table 5.7: Descriptive statistics for number of medications prescribed across waves 114
Table 5.8: Expected medication count in 10-year age intervals, by sex 116
Table 5.9: Expected medication count in 10-year age intervals, according to highest level of educational attainment 117
Table 5.10: Population weighted distribution of Verbal Fluency scores from Waves 1- 6 120
Table 5.11: Descriptive statistics for QoL 120
Table 5.12: Expected Verbal Fluency scores in 10-year age intervals, by sex 122
Table 5.13: Expected Verbal Fluency scores in 10-year age intervals, according to highest level of educational attainment 124
Table 5.14: Population weighted distribution of CASP-12 QoL scores from Waves 1-6 127
Table 5.15: Descriptive statistics for CASP-12 QoL 127
Table 5.16: Expected CASP-12 QoL score in 10-year age intervals, by sex 129
Table 5.17: Expected CASP-12 QoL score in 10-year age intervals, according to highest level of educational attainment 132

Chapter 6: Family Caring in Later Life: prevalence, impact, and the need for policy support

Table 6.1: Mean predicted QoL, depressive symptoms and perceived stress scores over time, by caring status and hours of caring 149

List of Figures

Introduction

Figure 1.1: Cumulative percentage increases in population: all ages and 65+ years for Ireland and EU-27, 2014 - 2023 18

Chapter 2: Methodology

Figure 2.1: Wave 6 fieldwork timeline 29
Figure 2.2: Graphical illustration of how the (a) longitudinal and (b) cross-sectional weights were derived 37

Chapter 3: Loneliness in Older Age: long-term trends, health impacts, and lessons from the COVID-19 pandemic

Figure 3.1: Analytic framework to examine pattens of loneliness over time 43
Figure 3.2: How often older adults felt lonely at each wave 50
Figure 3.3: Mean UCLA loneliness scores at each wave 51
Figure 3.4: Distribution of UCLA loneliness scores at each wave 52
Figure 3.5: Predicted latent class (group) trajectories of loneliness across seven timepoints 53

Chapter 4: The Unmet Need: bridging the gaps of unmet healthcare needs in later life

Figure 4.1: Longitudinal trends in prevalence of uncontrolled and undiagnosed hypertension, among adults aged 50+ years at Waves 1, 3 and 6 76
Figure 4.2: Absence of antihypertensive treatment in people with hypertension on BP measurement, aged 50 and older 77
Figure 4.3: Prevalence of population with undiagnosed and uncontrolled hypercholesterolaemia, from Waves 1, 3 and 6 79
Figure 4.4: Proportion of uncontrolled cholesterol in adults aged 50+ years with known hypercholesterolaemia 79
Figure 4.5: Prevalence of population with uncontrolled diabetes and Hba1c>53 mmol/mol, at Wave 6 81
Figure 4.6: Mean HbA1c (mmol/mol) in older adults with diabetes, from Wave 1 to 6 81
Figure 4.7: Prevalence estimates for falls and falls-risk increasing drugs amongst older people, between Waves 1, 3 and 6 83

Figure 4.8: Percentage falls, ED attendance and fractures in population aged 70 years and older, by proposed regional health area, at Wave 6 48
Figure 4.9: Proportion of osteoporosis diagnosis and treatment in older adults with osteoporotic heel ultrasound, at Wave 6 86
Figure 4.10: Prevalence estimates for prescribing osteoporosis treatment and FRIDs with hip/wrist fracture, at Waves 1, 3 and 6 86
Figure 4.11: Major depressive disorder incidence and symptoms reporting, by age group at Wave 6 88
Figure 4.12: Psychotherapy and antidepressant use in people with a major depressive episode in the last 12 months, at Waves 3 and 6 89
Figure 4.13: WHO ladder analgesia in those with moderate-severe chronic pain, by age group 90

Chapter 5: The Age-Friendly Health Systems 4Ms Framework: a longitudinal analysis using TILDA

Figure 5.1: Irish population structure from 1950-2023 99
Figure 5.2: Schematic illustration of the 4Ms Framework as operationalised within TILDA across the six measurement occasions 102
Figure 5.3: Graphical illustration depicting the performance demands of the TUG task 104
Figure 5.4: Kernel density plot showing shifts in the distribution of TUG performance (seconds) across measurement occasions for individuals who participated in all 6 waves of data collection 106
Figure 5.5: Predicted trajectory in TUG performance (seconds) across the age span, estimated from the growth curve model 107
Figure 5.6: Expected TUG performance (seconds) across the age span, by sex 108
Figure 5.7: Difference in expected TUG performance (seconds) across the age span, by sex 109
Figure 5.8: Expected TUG performance (seconds) across the age span, according to highest level of educational attainment 111
Figure 5.9: Expected differences in TUG performance (seconds) across the age span 111
Figure 5.10: Distribution of medication count, by wave for those who participated in all six waves 113
Figure 5.11: Predicted trajectory of change in medication count across the age span from the multi-level model 114
Figure 5.12: Expected medication count across the age span, by sex 115
Figure 5.13: Expected difference in count of medications across the age span 116
Figure 5.14: Expected count of medications across the age span, according to highest level of educational attainment 118
Figure 5.15: Difference in expected medication count across the age span 118

Figure 5.16: Functional form of change in Verbal Fluency scores across the age span 121
Figure 5.17: Expected Verbal Fluency scores across the age span, by sex 122
Figure 5.18: Expected Verbal Fluency scores across the age span, by sex 123
Figure 5.19: Expected Verbal Fluency scores across the age span, according to highest level of educational attainment 124
Figure 5.20: Expected difference in Verbal Fluency across the age-span, according to highest level of educational attainment 125
Figure 5.21: Functional form of change in CASP-12 QoL across the age span 128
Figure 5.22: Expected CASP-12 QoL score across the age-span, by sex 129
Figure 5.23: Expected differences in CASP-12 QoL score across the age-span, by sex 130
Figure 5.24: Expected CASP-12 QoL score according to highest level of educational attainment 131
Figure 5.25: Expected difference in CASP-12 QoL score across the age-span, according to highest level of educational attainment 131

Chapter 6: Family Caring in Later Life: prevalence, impact, and the need for policy support

Figure 6.1: Proportion of adults aged 60 years and older who report they cared for someone in the last month by sex: Wave 5 to Wave 6, including the COVID-19 SCQ study 140
Figure 6.2: Prevalence of the population providing care to family and friends, by age group and sex: Wave 5 to Wave 6 141
Figure 6.3: Prevalence of the population providing care to family and friends, by marital status and sex: Wave 5 to Wave 6 141
Figure 6.4: Prevalence of the population providing care to family and friends, by educational attainment and sex: Wave 5 to Wave 6 142
Figure 6.5: Prevalence of the population providing care to family and friends, by area of residence, age group and sex: Wave 5 to Wave 6 142
Figure 6.6: Prevalence of hours of caring in the last week for those who provide care: Wave 5 to Wave 6 143
Figure 6.7: The main care recipient for those who reported they cared for someone in the last month: Wave 5 to Wave 6 144
Figure 6.8: Conditional multilevel growth model trajectories of Quality of life (CASP-12), depressive symptoms (CES-D8) and perceived stress (PSS4), by caring status in Wave 6 146
Figure 6.9: Conditional multilevel growth model trajectories of Quality of life (CASP-12), depressive symptoms (CES-D8) and perceived stress (PSS4), by hours of care in Wave 6 147

Glossary

Abbreviation	Full Term
ADL	Activities of Daily Living
AMT	Abbreviated Mental Test
BP	Blood Pressure
CAPI	Computer-Assisted Personal Interview
CASP-12	Control, Autonomy, Self-Realisation and Pleasure - 12-item scale
CATI	Computer-Assisted Telephone Interview
CBT	Cognitive Behavioural Therapy
CES-D	Center for Epidemiological Studies Depression
CI	Confidence Interval
CSO	Central Statistics Office
EOL	End-of-Life
EU-27	European Union – 27
FRID	Falls-Risk Increasing Drug
HbA1c	Haemoglobin A1c (glycated haemoglobin)
HSE	Health Service Executive
IADL	Instrumental Activities of Daily Living
ISSDA	Irish Social Science Data Archive
LGCM	Latent Growth Class Models
MMSE	Mini Mental State Examination
MoCA	Montreal Cognitive Assessment
NI	Northern Ireland
NIRS	Near infra-red spectroscopy
NSAID	Non-steroidal anti-inflammatory drug
PSS4	Perceived Stress Scale – 4 item scale
QoL	Quality of Life
ROI	Republic of Ireland
RR	Relative Risk
SART	Sustained Attention to Response Task
SCQ	Self-completion questionnaire
SD	Standard deviation
SEM	Structural equation modelling
TILDA	The Irish Longitudinal Study on Ageing
UCLA	University College Los Angeles
WHO	World Health Organization

Key Findings

Chapter 2: Methodology

- Wave 6 fieldwork was completed during September 2020 – December 2023.
- Interview data were collected using computer-assisted telephone interviews (CATI) rather than face-to-face interviews as in previous waves.
- A total of 4,228 self-interview CATIs were captured, achieving a response rate of 76%.
- Proxy CATI interviews for 104 participants were also completed where the participant had a physical or cognitive impairment and a spouse, relative or close friend completed the interview on their behalf. This represented a response rate of 68%. A further 174 End-of-Life CATI interviews were completed where a participant had passed away. This represented a response rate of 51%.
- At Wave 6, the health assessment cohort was divided into two groups: one undergoing core health assessments and the other participating in a substudy that utilised a more detailed cognitive assessment.
- Health assessment participation remained high at Wave 6 (77%), with a continued shift towards home assessments (26%) as the cohort ages.

Key Findings

Chapter 3: Loneliness in Older Age: long-term trends, health impacts, and lessons from the COVID-19 pandemic

- Loneliness is a subjective assessment of an individual's satisfaction with their social relationships, distinct from social isolation, which has a weak relationship to loneliness.

- At baseline, 79.8% of older adults reported feeling lonely rarely or not at all, with smaller proportions feeling lonely more frequently.

- Loneliness scores more than doubled during the pandemic, however levels and frequency of loneliness returned to pre-pandemic levels by Wave 6.

- Three loneliness trajectories were identified. Group membership was influenced by baseline social isolation, functional limitations, and depression.

    - *Group 1 (Low increasing): 42.2% - Initially low loneliness, gradually increasing.*
    - *Group 2 (Consistently higher loneliness): 24.5% - Persistently elevated loneliness.*
    - *Group 3 (Lowest with pandemic spike): 33.3% - Generally low loneliness, spiked during the pandemic.*

- Despite being quite static over time, a significant proportion of older adults experience loneliness and this experience is associated with poorer health outcomes including functional limitations, poorer self-rated health, and a higher number of depressive symptoms.

Key Findings

Chapter 4: The Unmet Need: bridging the gaps of unmet healthcare needs in later life

- A significant proportion of older adults remain undiagnosed or under-treated for key conditions including hypertension, hypercholesterolaemia, diabetes, osteoporosis, depression, and chronic pain.
- At Wave 6, 36% of older adults had undiagnosed hypertension and 45% had undiagnosed high cholesterol based on clinical thresholds.
- Nearly half of older adults with known diagnoses of hypertension or diabetes had poor control of their condition despite treatment.
- Fall-related hospital attendances have increased from 24% to 31% since Wave 1, yet prescription of medications that increase falls risk has increased by 17% across the same timeframe. Only 25% of adults who experienced a fall had accessed physiotherapy.
- While 12% of older adults had clinically significant depressive symptoms, fewer than half received appropriate treatment, and over 45% had not reported their symptoms to any healthcare provider.
- One-third of older adults reported chronic pain, yet two-thirds of those with moderate to severe symptoms received no pain-relieving medication.

Key Findings

Chapter 5: The Age-Friendly Health Systems 4Ms Framework: a longitudinal analysis using TILDA

- The Age-Friendly Health Systems 4Ms Framework addresses 4 key areas for health and wellbeing: Mobility, Medication, Mind, What Matters.

- **Mobility** declines steadily with age, worsening more sharply in older age.
  - *Women perform better than men at age 50 years but decline faster, performing worse than men by age 80.*
  - *Those with lower education show consistently worse mobility, with disparities widening over time.*

- **Medication** use increases substantially with age.
  - *Women take more medications at midlife, but men's use increases faster, overtaking women's by age 80.*
  - *People with lower education take more medications throughout life, though their rate of increase slows in older age.*

- **Mind:** Cognitive function declines with age, with sharper drops after 60.
  - *Women decline faster than men, scoring significantly lower by age 60 . years and older.*
  - *Tertiary-educated individuals start with higher cognitive function but also decline faster—though they maintain an advantage at all ages.*

- **What Matters:** Quality of Life (QoL) improves slightly until mid-60s, then declines, but remains high until around age 80.
  - *Women report higher QoL at midlife, but this declines faster, narrowing the sex gap in older age.*
  - *A 15-year disparity in QoL exists between the least and most educated, highlighting significant socio-economic inequality.*

- Ageing is non-linear and multidimensional: while mobility and cognitive function decline, QoL can initially improve before declining in later years.

- There is substantial individual variation in ageing; most differences are between people, not within individuals over time.

- Evidence supports the male–female health–survival paradox: women live longer but experience more health-related decline.

Key Findings

Chapter 6: Family Caring in Later Life: prevalence, impact, and the need for policy support

- The level of care provided by older adults has returned to what it was before the COVID-19 pandemic, indicating a reestablishment of pre-pandemic caregiving patterns.
- In the past month, approximately 3% of men and 5% of women have reported engaging in caregiving activities, highlighting a small but consistent gender difference.
- Most caregivers provide assistance to their spouse or other family members; however, a considerable proportion also provide care to friends or neighbours.
- Carers who provide more than fifty hours of care each week report poorer mental health and reduced overall well-being, highlighting the emotional strain of high-intensity caregiving.
- Among these caregivers, women in particular were more likely to report increased symptoms of depression, pointing to a gendered impact of prolonged caregiving responsibilities.

Introduction

1

Rose Anne Kenny and Cathal McCrory

Life Gets Better After 50: quality of life, caring, and emotional, physical, and social health

Introduction

1

Ireland is one of the fastest ageing countries in Europe and the fastest ageing country in the EU 27. The significant increase in the proportion of older individuals has led to a rapidly ageing demographic profile with the populationaged 65 and older projected to double by 2051, accounting for 25% of the total population. This demographic shift will place increasing pressure on public services particularly health and social care and will require significant planning and adaptation. Such rapid population ageing signals an increase in health disorders, particularly chronic diseases involving the musculoskeletal, cardiovascular and metabolic systems, sensory systems and poor mental and cognitive health. In this report, we have addressed key domains affected by such population ageing: the impact on caregiving, loneliness, and social isolation and the changing burden of co-morbidities.

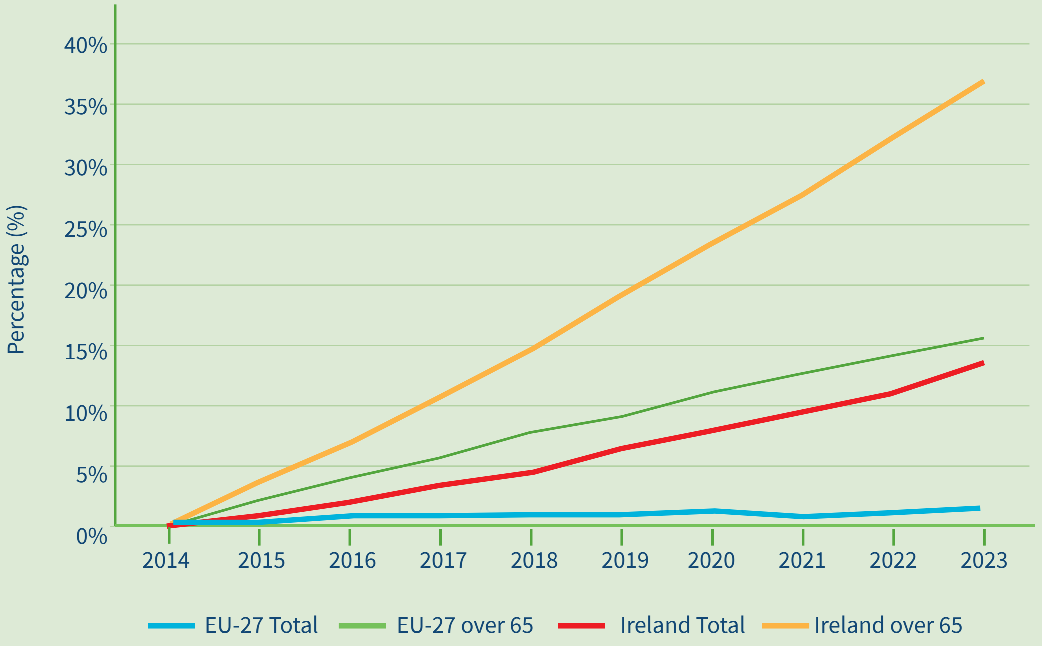

Figure 1.1: Cumulative percentage increases in population: all ages and 65+ years for Ireland and EU-27, 2014 - 2023 (Health in Ireland, Key Trends 2024)

TILDA is an longitudinal study observing patterns and changes in social, and economic characteristics of people aged 50 years and older in Ireland. By definition, a longitudinal study is a research method that involves tracking the same individuals repeatedly over an extended period, often many years. The duration of data collection is a key strength of a longitudinal study. By repeatedly measuring the same variables, TILDA can reveal patterns, and cause and effect relationships that a single snapshot in time, like a cross-sectional study, might miss.

In this report, we present longitudinal data from six waves of TILDA over a 14-year period, monitoring change over time and revealing long-term trends for Ireland’s adults, for a host of important health, social and economic characteristics. This allows us to understand the normative and expected pattern of change in multiple aspects of older lives from mid-life into late old age, using data for 8,171 participants aged 50-97 years. At baseline, the randomly selected population sample represented almost one in 156 adults in Ireland. Data collections have taken place every two years since 2009 (Wave 1), with an additional collection during the pandemic.

The global pandemic was caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), with 1,153,799 cases and 9,796 deaths in Ireland as of March 2025. Eighty-nine percent of those who died were aged 65 and older. Referred to as COVID-19, it triggered ensuing national public health emergency measures. Major social restrictions were imposed between March 2020 and February 2022. The virus placed a dramatic strain on Ireland’s health care service, damage to its economy and far-reaching impacts on its society. Emergency measures and their enforcement disproportionately affected older people, many of whom experienced a significant level of isolation and dislocation from friends and families and prolonged disconnection from social supports. In Chapter 2, we detail the methodology applied at each wave of the study, including variations introduced at Wave 6, such as switching to computer-assisted telephone interviews (CATI) conducted by a trained social interviewer, to collect participant data during the pandemic, when face-to-face interviews were no longer permitted.

Social determinants of health encompass a broad canvas of conditions which impact on a person’s overall health and well-being. We have chosen to present change and impact of loneliness during the period of data collection. Loneliness is increasingly recognised as a global public health concern due to its impact on physical, mental and cognitive health and on mortality. In Chapter 3, we describe patterns of loneliness during the lifetime of TILDA, including the impact of and recovery from the pandemic. Overall, one in five experienced loneliness. Despite a twofold increase in loneliness during the pandemic, the degree to which older adults in Ireland experienced loneliness did not change significantly. Older adults with limitations in activities of daily living (ADL) and in instrumental activities of daily living (IADL) were more likely to report frequent loneliness. Self-rated health was also associated with loneliness: 85.6% of those reporting excellent or very good health rarely or never felt lonely, and only 1.3% reported feeling lonely all the time. In contrast, among those reporting fair or poor health, 63.7% rarely or never felt lonely, while 6.6% reported being lonely all the time. Depressive symptomatology also correlated with loneliness frequency, with depression scores increasing in parallel to how often loneliness was experienced—highlighting high-risk groups for targeted intervention. This is the first time loneliness has been examined among the same group of people over such an extended period. Notably, TILDA is the only study to capture the experience of older adults in Ireland before, during, and after the COVID-19 pandemic. Our findings show that loneliness levels have remained relatively stable over the decade, challenging the narrative that loneliness inevitably increases with age. They also reveal that patterns of loneliness vary across individuals and groups, and do not follow a uniform trajectory.

Ageing is a gradual and irreversible pathophysiological process. It presents with declines in tissue and cell functions and significant increases in the risks of various ageing-related diseases, including neurodegenerative diseases, cardiovascular diseases, metabolic diseases, musculoskeletal diseases, and immune system diseases. Although the development of modern medicine has promoted human health and greatly extended life expectancy, with the ageing of society a variety of chronic diseases have gradually become important causes of disability and death. Nonetheless, many of these chronic illnesses and their consequences can be prevented or modified by early targeted treatments. While not all age-related diseases have cures, early management can notably impact the course of the disease and overall well-being. Common modifiable disorders include hypertension, osteoporosis, hypercholesterolaemia, depression and diabetes. In Chapter 4, we detail the extent of unmet need for common modifiable disorders.

Untreated hypertension, hypercholesterolaemia and diabetes lead to stroke, heart failure, and kidney disease. Falls are also a major public health concern, contributing to substantial morbidity and mortality and the principal cause of fractures, the latter being further exacerbated by the presence of osteoporosis. Fractures often lead to prolonged hospitalisation, disability, and reduced life expectancy. These conditions are amenable to early intervention yet the extent of this unmet need in Ireland is of serious concern. Amongst older adult who were not prescribed blood pressure medications, 38% met criteria for hypertension based on their blood pressure measurement, including 50% of those aged 75 years and older, unmasking a high level of unmet need. The prevalence of undiagnosed hypertension has remained relatively stable across the study waves. This consistency suggests that despite ongoing public health efforts, a substantial proportion of older adults with hypertension continue to go unrecognised. Of those who did not report a diagnosis of high cholesterol, 45% met criteria for hypercholesterolaemia. Of those with a diagnosis, one third had cholesterol levels above clinical targets. This These findings highlight the extent of undiagnosed or unrecognised high cholesterol within the older population. Furthermore, one third of older adults taking cholesterol-lowering medication did not report a diagnosis of hypercholesterolaemia, suggesting poor awareness or communication regarding their condition. This lack of awareness may impact motivation for lifestyle changes and long-term adherence to treatment.

Among older adults with self-reported diabetes, over two-thirds had a HbA1c level above the recommended treatment target of 48 mmol/mol (HbA1c is a measure of average blood glucose over the past two to three months), and 45% had levels exceeding 53 mmol/mol, indicating suboptimal diabetic control. One in five individuals with a diabetes diagnosis were not prescribed any pharmacological treatment. Among those without a reported diagnosis, 2% met the criteria for diabetes based on a HbA1c level above 48 mmol/mol at Wave 6. Overall, fewer than one in three older adults with diabetes had HbA1c levels within recommended targets. This places a substantial proportion of individuals at increased risk of serious complications, including cardiovascular disease, kidney disease, vision loss, and stroke.

The proportion of older adults reporting any fall annually has risen from 24% at Wave 1 to 31% at Wave 6, reflecting an upward trend in fall prevalence over time. Prescription of falls-risk-increasing drugs (FRID) has also increased, from 29% at Wave 1 to 34% at Wave 6, highlighting a growing need for frequent and regular medication review and more comprehensive deprescribing strategies for fall prevention.

Over one in ten older adults in Ireland met the criteria for current clinically significant depressive symptoms. However, fewer than half of those meeting the criteria for a major depressive episode reported their symptoms to a doctor. Just over 20% reported symptoms to any healthcare professional, while more than 45% did not report them at all. Chronic pain, which also affects quality of life and independence, was significantly associated with reduced daily functioning. Despite this, one third of older adults were not appropriately treated in line with World Health Organization (WHO) recommendations. In conclusion, nearly 50% of older adults with hypertension, one third with hypercholesterolaemia, and 50% with diabetes had uncontrolled conditions based on international guidelines. These common and modifiable disorders are not adequately captured in current screening programmes, leading to notable healthcare and personal consequences due to under-detection and poor control.

The Age-Friendly Health Systems 4Ms Framework is designed to address the complex and multifaceted needs of older adults by focusing on four key areas that influence health and well-being: Mobility, Medications, Mind, and What Matters. Recently adopted by Ireland’s Health Service Executive (HSE), the 4Ms Framework offers a practical, problem-solving approach that helps healthcare professionals prioritise and optimise care for older people. Originally developed in the United States, the 4Ms Framework is now used internationally, with strong evidence supporting improved outcomes when these domains are addressed. The HSE aims to enhance health and care experiences while promoting dignity, independence, and well-being. For comprehensive implementation, normative data are essential.

In Chapter 5, we present normative and expected patterns of change across the 4Ms using longitudinal data from the first six waves of TILDA. Mobility declined steadily with age, with a temporary slowing in midlife—particularly among women—followed by accelerated decline in later years. Medication use increased consistently across waves, with a sharper rise from around age 70. At age 50, women had a higher average medication burden than men, and both sexes experienced a steady increase with age. Cognitive function also declined with age, with women showing a faster rate of decline. Conversely, 'What Matters', measured through Quality of Life (QoL) indicators, improved from age 50, peaking around 65–66 years before declining more steeply. Notably, QoL did not fall below age-50 levels until around age 80. This pattern suggested that most older adults in Ireland maintained a relatively high QoL well into later life. To support clinical application, we developed population-weighted normative tables for each of the 4Ms.

While community-based care can facilitate ageing in place and has the potential to delay admission to a nursing home and improve quality of life, our previous research has highlighted that a substantial proportion of caring for older adults is unpaid, informal care by a family member. In Chapter 6, we describe and quantify caring delivered by the population aged 60 years and older in Ireland post the pandemic, noting that caring, which rose threefold during the pandemic, returned to baseline levels by Wave 6. Three percent of men and five percent of women engage in caregiving activities, to spouses, family members, friends and neighbours. Caring networks are complex, and transitions into and out of the caring role in addition to sharing tasks with other more specialised caregivers becomes increasingly important, particularly as the care recipient's health decreases. Overall, carers, both current and those who had previously provided care but were no longer caring, experienced a decline in well-being by Wave 6, compared to earlier waves. All reported lower QoL, and higher depressive symptoms over time compared to non-carers.

Finally, in this report we invited key stakeholders to give their perspective on our findings. Stakeholders representing the HSE, ALONE, and Family Carers Ireland, contributed their expert insights, highlighting how our findings align with current policy and practice priorities, and inform policy planning and development. Their contributions add a valuable context, embedding our research within the complexities of health and social care provision, and current and future needs.

Methodology

2

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Contents

Key Findings 24

2.1 Introduction 25
2.1.1 Computer-assisted telephone interview and interview subtypes 25
2.1.2 Wave 6 health assessments 26
2.1.3 Replenishment 27
2.1.4 Wave 6 fieldwork timelines 29

2.2 CATI response rates 29
2.2.1 Reasons for attrition at Wave 6 30
2.2.2 Participant demographics Waves 1 to 6 31

2.3 Self-completion questionnaire response rates 32

2.4 Health assessment response rates 33
2.4.1 Cognitive assessment sub-study response rates 34

2.5 Dataset 34

2.6 Analytical methods employed in this report 34
2.6.1 Point estimates and confidence intervals 34
2.6.2 Weighting 35
2.6.3 Software 37

Methodology

2

Key Findings

- Wave 6 fieldwork was completed during September 2020 – December 2023.
- Interview data were collected using computer-assisted telephone interviews (CATI) rather than face-to-face interviews as in previous waves.
- A total of 4,228 self-interview CATIs were captured, achieving a response rate of 76%.
- Proxy CATI interviews for 104 participants were also completed where the participant had a physical or cognitive impairment and a spouse, relative or close friend completed the interview on their behalf. This represented a response rate of 68%. A further 174 End-of-Life CATI interviews were completed where a participant had passed away. This represented a response rate of 51%.
- At Wave 6, the health assessment cohort was divided into two groups: one undergoing core health assessments and the other participating in a sub-study that utilised a more detailed cognitive assessment.
- Health assessment participation remained high at Wave 6 (77%), with a continued shift towards home assessments (26%) as the cohort ages.

2.1 Introduction

Interviews were sought for 6,024 participants during the Wave 6 fieldwork. Details of the sampling methods used have been reported previously (1-8).

Fieldwork for Wave 6 took place from September 2020 to December 2023. Adjustments were made to data collection methods owing to ongoing COVID-19 lockdown restrictions during the fieldwork period (9).

2.1.1 Computer-assisted telephone interview and interview subtypes

Computer-assisted personal interviews (CAPI) had been used to capture interview data at each previous wave. Collection of participant data at Wave 6 was instead captured using computer-assisted telephone interviews (CATI) conducted by a trained social interviewer. Following their interview, participants were also posted a self-completion booklet (SCQ) which they were asked to complete in their own time. CATI interviews could take place as either a self-interview, proxy interview or end-of-life (EOL) interview. During the interview, participants were asked questions about their health, economic, social and family circumstances. The SCQ asked further questions around relationship quality, social and creative activities, quality of life, mental health, behavioural health and attitudes toward ageing.

2.1.1.1 Self-interview CATI

A self-interview is administered where the participant is capable of answering the majority of questions themselves. An assisted self-interview is also possible where the participant can have help from a close relative or friend with answering some of the more complex sections such as the financial sections.

2.1.1.2 Proxy CATI

Some participants may be unable to complete a self-interview where a physical or cognitive impairment is present. In these cases, where prior consent has been provided, a proxy participant will complete the interview on behalf of the original participant. Proxy participants will be an individual who is knowledgeable about the participants life, typically a close relative or friend. Proxy participants are not asked to complete the SCQ following their interview.

All participants were evaluated at previous waves for cognitive impairment using the Mini-Mental State Examination (MMSE) (10). Where an interviewer or member of the household was concerned about the ability of the participant to complete the interview, the Abbreviated Mental Test (AMT) was instead administered at the beginning of the interview (11). It was not possible to administer the full MMSE over telephone interviews. Instead, the AMT was administered to all participants to evaluate cognitive impairment during Wave 6.

2.1.1.3 End-of-Life CATI

EOL interviews were also sought from a spouse, relative or close friend where a participant had passed away prior to the Wave 6 data collection period. EOL interviews cover the health, social and financial circumstances of the participant in the year before they had died. In previous waves, EOL interviews were sought concurrently with self and proxy interviews.

2.1.2 Wave 6 health assessments

All participants who completed a CATI were invited to undergo a health assessment. At Wave 6, the health assessment cohort was divided into two groups: one undergoing traditional health assessments and the other undergoing a suite of more detailed cognitive assessments as part of their health assessment protocol. The assessments covered multiple cognitive domains, including memory, executive function (such as attention), language, orientation, and visuospatial ability.

Participants aged 65 and older who had completed a CATI were eligible for recruitment into the cognitive assessment sub-study. A total of 1,830 participants were randomly selected to be offered these assessments, which were conducted in the home by trained nurses.

In addition to cognitive testing, the assessments included grip strength measurement, waist circumference, and mobility testing (Timed Up and Go). Blood samples were also collected to align with the core health assessments.

The remaining CATI participants were offered a comprehensive health assessment that aligned with those conducted during Waves 1 and 3. Assessments were conducted in both the TILDA Health Assessment Centre and in participants' homes. Centre assessments were conducted by a team of trained health practitioners. A trained phlebotomist was also employed to collect blood samples. Home assessments were completed by trained nurses. A total of 2,497 participants were eligible to participate.

The COVID-19 pandemic presented significant challenges for data collection, and particularly for face-to-face procedures. Both the core health assessment and cognitive assessment sub-study fieldwork took place during the pandemic, with strict protocols enacted to minimise transmission risk. Assessment schedules were adjusted to reduce participant crossover, and vision tests were removed to accommodate timing changes. All staff wore masks on-site, while non-essential personnel worked from home. The health assessment corridor was restricted to the assessment team and project manager, with hand sanitiser stations placed throughout. Health practitioners were required to be vaccinated and undergo twice-weekly antigen testing, staying home for at least five days if they tested positive, showed symptoms, or were household close contacts. Centre participants completed two COVID-19 pre-screening questionnaires 48 and 24 hours before their visit and wore a facemask while on-site. An isolation room was available for anyone who became symptomatic on-site. Home participants were also required to complete COVID-19 pre-screening and wear a facemask for the duration of their assessment.

Topics covered in the CATI and SCQ, and assessments carried out during the health assessment are outlined in Table 2.1.

2.1.3 Replenishment

In addition to the core Wave 6 fieldwork, TILDA conducted a replenishment of participants aged 45 to 64 years, adding 2,194 new individuals to the study. A forthcoming report will detail the methodology and present comparisons between the main cohort and the replenishment cohort across key health, social, and economic measures.

Table 2.1: Topics covered in the CATI and SCQ

	Domain	Measures
CATI / SCQ	**Demographics**	Marital status; marriage history; education; migration history; childhood; ethnicity
	Social circumstances	Transfers to/from children/parents/others; help with (instrumental) activities of daily living; social connectedness; social networks; volunteering; caring; social participation; religion; relationship quality; driving and travel; social activities; creative activities; digital access
	Health and healthcare	Physical (self-rated health; limiting long-standing illness; sensory function; cardiovascular and non-cardiovascular disease; falls; fear of falling; fractures; pain; oral health; health screening); cognitive (self- rated memory; word-list learning; verbal fluency); psychological (depressive symptoms; anxiety; life satisfaction; loneliness; worry; quality of life; perceived stress; coping); behavioural (smoking; physical activity; sleep; alcohol; dietary intake; gambling); medications; healthcare utilisation; health insurance; vaccinations
	Employment, retirement & assets, lifelong learning	Employment situation; job history; planning for retirement; sources of income; home ownership; other assets; expectations; advance care planning
Health Assessment	**Neuropsychological**	Montreal Cognitive Assessment (MoCA); Sustained Attention to Response Task (SART); Choice Reaction Time; Color trails test; depressive symptoms; state anxiety.
	Cardiovascular	Blood pressure; pulse wave velocity; phasic blood pressure; heart rate variability; near infra-red spectroscopy (NIRS).
	Gait and physical function	Timed Up-and-Go; repeated chair stands; gait (normal pace, maximum pace, normal pace with cognitive task); grip strength.
	Bone health	Heel bone ultrasound.
	Anthropometry / Other	Height; weight; waist circumference; dental assessment; accelerometry.
	Biological samples	Blood samples; faecal microbiome

2.1.4 Wave 6 fieldwork timelines

All components of Wave 6 fieldwork took place between September 2020 and December 2023. EOL interviews were conducted from September to December 2020, followed by Self and Proxy CATI between January and December 2021. Health assessments were carried out from July 2022 to June 2023, and the cognitive sub-study ran from November 2021 through to December 2023. Figure 2.1 outlines the fieldwork timelines for each component of Wave 6.

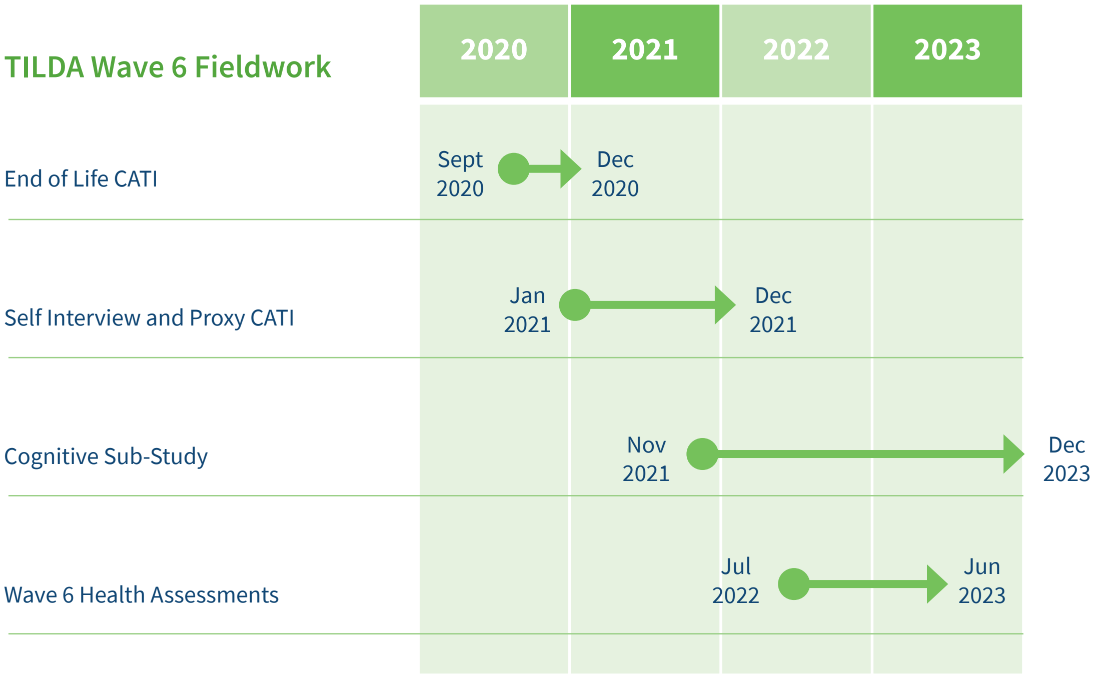

Figure 2.1: Wave 6 fieldwork timeline

2.2 CATI response rates

Of the 6,204 participants followed up for Wave 6, 4,506 participants completed a form of interview. Five participants who had not previously taken part but were a spouse or partner of an original participant joined the study during fieldwork.

A total of 4,228 participants completed a self-interview, with a further 104 completing a proxy interview and 174 completing an EOL interview.

Table 2.2 presents the CATI response rates and counts by age group and sex. CATI response rates are calculated as the number of completed self-interview at Wave 6 relative to the total number of potential interviews. Potential interviews include eligible participants from before Wave 6, excluding any participant who had withdrawn, passed away, moved outside of the target area or needed a proxy interview. The CATI (n=4,228) self-interview response rate for Wave 6 was 76%. The mean age of participants was 71 years.

Table 2.2: Wave 6 self-interview response rates, by age group and sex

	Male % (n)	Female % (n)	Total % (n)
<60 years	83 (10)	80 (131)	80 (141)
60-64 years	79 (340)	80 (469)	80 (809)
65-74 years	78 (824)	82 (1,082)	80 (1,906)
≥75 years	71 (643)	69 (729)	70 (1,372)
Total	75 (1,817)	77 (2,411)	76 (4,228)

The proxy interview response rate was calculated as the number of proxy interviews completed relative to the number of participants eligible for a proxy interview during fieldwork. The proxy interview (n=104) response rate for Wave 6 was 68%. The average age of proxy respondents was 83 years.

2.2.1 Reasons for attrition at Wave 6

Table 2.3 lists the reasons for sample attrition during the Wave 6 fieldwork period. The majority of cases of non-participation for self-interview participants were cases of refusal (46%), where a participant for example reported they were too busy, not interested, it was a bad time in general etc. Of the self-interview refusals, 20% stated they were not interested in completing the interview as a telephone interview rather than face to face, as in previous waves. Participants who refuse to complete the interview at any given wave are still eligible to participate in future waves.

For potential proxy participants, 15% of non-participation were refusals and a further 16% were cases where the participant had passed away. In previous waves, an EOL interview could be requested at this stage if appropriate, but as EOL fieldwork was completed in advance of self and proxy interview fieldwork, EOL interviews will be requested for these participants during Wave 7 fieldwork. The majority (57%) of non-participation was the result of no prior proxy consent, or no proxy being identified to complete the interview on the participant’s behalf.

Table 2.3: Reasons for sample attrition at Wave 6

Reason	Potential Participants		Potential proxy Participants	
	%	n	%	n
Refusal	46	605	15	15
Withdrawn	25	335	7	7
Unable to contact participant	23	301	5	5
EOL postponed until next wave	5	59	16	16
Moved outside ROI/NI	1	9	-	-
No permission to seek proxy, proxy not identified, or other	-	-	57	58
Total	100	1,313	100	101

2.2.2 Participant demographics Waves 1 to 6

An overview of the demographic characteristics of participants aged 50 years or older who completed either a CAPI or CATI in Waves 1 to 6 is provided in Table 2.4. The mean age of the sample has increased from 63.8 years at Wave 1 to 71.4 years at Wave 6. As expected, the biggest shift in age groups is among those aged 50-64 years, who represented 57% of the sample in Wave 1, and just under a quarter (23%) by Wave 6.

The distribution of the sample remained largely consistent across waves, as did their residential location. At Wave 1, 54% of participants were women, with a marginally higher prevalence of 57% by Wave 6. Just under half (48%) lived in a rural area at Wave 1, 28% lived in another town or city, and 24% in Dublin City or County. The prevalence of rural participants remained the same in Wave 6, while 25% resided in Dublin City or County and 27% in another town or city. The largest shift in demographics was in educational attainment. At baseline, 31% reported primary or no education compared with 29% of participants reporting third level or higher education. By Wave 6, just 18% of participants reported primary level or no education, with 43% reporting third level or higher education.

Table 2.4: Characteristics of participants aged 50 years and older who completed a CAPI or CATI at Waves 1 to 6

	Wave 1 (n=8,171)	Wave 2 (n=7,280)	Wave 3 (n=6,615)	Wave 4 (n=5,940)	Wave 5 (n=5,204)	Wave 6 (n=4,321)
Age in years, Mean (SD)	63.8 (9.8)	65.2 (9.6)	66.9 (9.4)	68.5 (9.2)	69.9 (8.8)	71.4 (8.1)
Age Group, % (N)						
50-64 years	57 (4,665)	53 (3,825)	46 (3,033)	39 (2,319)	33 (1,694)	23 (988)
65-74 years	27 (2,164)	29 (2,112)	32 (2,110)	36 (2,114)	38 (1,979)	44 (1,899)
75+ years	16 (1,342)	19 (1,343)	22 (1,472)	25 (1,507)	29 (1,531)	33 (1,431)
Sex, % (N)						
Male	46 (3,743)	45 (3,293)	44 (2,938)	44 (2,628)	44 (2,285)	43 (1,860)
Female	54 (4,428)	55 (3,987)	56 (3,677)	56 (3,312)	56 (2,919)	57 (2,461)
Education, % (N)						
Primary / None	31 (2,503)	28 (2,060)	26 (1,736)	24 (1,440)	22 (1,157)	18 (769)
Secondary	40 (3,262)	40 (2,870)	40 (2,609)	39 (2,337)	39 (2,036)	40 (1,714)
Third / Higher	29 (2,402)	32 (2,338)	34 (2,268)	36 (2,163)	39 (2,011)	43 (1,838)
Location, % (N)						
Dublin City or County	24 (1,935)	24 (1,736)	24 (1,591)	25 (1,458)	24 (1,265)	25 (1,062)
Another Town or City	28 (2,312)	28 (2,065)	28 (1,838)	30 (1,775)	29 (1,503)	27 (1,173)
A Rural Area	48 (3,924)	48 (3,479)	48 (3,186)	46 (2,707)	47 (2436)	48 (2,086)

2.3 Self-completion questionnaire response rates

Unlike previous waves, the SCQ was posted to participants following their CATI. A prepaid envelope was included with the pack for participants to return the booklet to TILDA. Table 2.5 presents the SCQ response rates at Wave 6 by age and sex. The SCQ response rate for Wave 6 was 83% (3,501, mean age = 71 years). Response rates were highest in the 65–74 year age group (84%) among both male (82%) and female (86%) participants.

Table 2.5: Wave 6 SCQ response rates, by age group and sex

	Male % (n)	Female % (n)	Total % (n)
<60 years	70 (7)	80 (105)	79 (112)
60-64 years	79 (267)	82 (384)	80 (651)
65-74 years	82 (675)	86 (932)	84 (1,607)
≥75 years	81 (519)	84 (612)	82 (1,131)
Total	81 (1,468)	84 (2,033)	83 (3,501)

2.4 Health assessment response rates

Table 2.6 outlines the response rates for participation in the health assessment at Wave 6, with cognitive assessment sub-study response rates reported separately. As in previous waves, the majority of participants attended a centre-based assessment (74%), while 26% opted for a home assessment. Women were more likely than men to attend assessments both in the centre (57% vs. 43%) and at home (59% vs. 41%). The 60-74 age group had the highest representation in the centre, with a relatively even gender split, whereas home assessments were more common among older participants (≥75 years). Notably, men aged 75 and older accounted for 39% of home visits but only 19% of centre visits.

Table 2.6: Wave 6 health assessment response rates, by location, age group and sex

	Centre % (n)		Home % (n)	
	Male	**Female**	**Male**	**Female**
All ages	43 (613)	57 (798)	41 (207)	59 (295)
<60 years	1 (8)	10 (76)	1 (3)	7 (22)
60-64 years	37 (225)	41 (325)	27 (55)	26 (76)
65-74 years	43 (263)	38 (301)	33 (68)	134 (100)
≥75 years	19 (117)	12 (96)	39 (81)	33 (97)

The proportion of participants attending centre-based assessments decreased over time, from 86% in Wave 1, to 80% in Wave 3 and 74% in Wave 6, while home assessments became more frequent, rising from 14% in Wave 1 to 20% in Wave 3 and 26% in Wave 6 (Table 2.7). The decrease in response rates at Wave 6 may be attributed to the COVID-19 pandemic. These findings also highlight the importance of offering both centre and home assessments to ensure continued participation.

Table 2.7: Wave 1, 3 and 6 health assessment response rates, by location

	Wave 1		Wave 3		Wave 6	
Response Rates	72 (6,149)		81 (5,388)		77 (1,918)	
	Centre	**Home**	**Centre**	**Home**	**Centre**	**Home**
Response Rates	86 (5,274)	14 (875)	80 (4,306)	20 (1,082)	74 (14,14)	26 (5,042)

2.4.1 Cognitive assessment sub-study response rates

The cognitive assessment sub-study achieved an overall response rate of 73% at Wave 6, with participation highest among those aged 65-74 (76%) and gradually decreasing with age (72% for 75-84 years and 65% for those aged 85 years and older) (Table 2.8). These response rates indicate strong engagement across all age groups but also highlight the challenges of retaining participation among the oldest cohort.

Table 2.8: Cognitive assessment sub-study response rates, by age

Response Rate	(%, n)
Overall	73 (1,344)
65-74 years	76 (790)
75-84 years	72 (441)
85+ years	65 (113)

2.5 Dataset

The results of this report are generated through the TILDA datasets: CATI v6.6.1 and AuditTracker_W1-W6 v3. The CATI dataset included completed self and proxy interviews from 4,321 participants (4,191 aged 60 years and older) at Wave 6. SCQ data are also available for 3,501 participants (3,389 aged 60 years and older).

A publicly available pseudo-anonymised version of the Wave 6 dataset will be made available in the Irish Social Science Data Archive (ISSDA) (https://www.ucd.ie/issda/accessdata/).

2.6 Analytical methods employed in this report

Statistical methods used to calculate the estimates presented in this report are described below. These methods aim to correct for potential biases in survey data estimates, in addition to determining correctly the uncertainty surrounding those estimates.

2.6.1 Point estimates and confidence intervals

The majority of estimates in the report are to reflect the percentage of adults in Ireland that fall within specific groups with different analysis criteria. Means or medians of specific continuous quantities are reported where appropriate.

The TILDA cohort is representative of adults aged over 50 in Ireland. Each member of the study cohort thus corresponds with a given number of individuals in the population of Ireland population aged 50 years and older. The initial cohort in Wave 1 was recruited only from community-dwelling adults; however, participants recruited in Wave 1 who later moved to an institutional setting are followed up at all subsequent waves where possible. Due to the random nature of the population sampling process, there is some inherent uncertainty in the derived estimates. To account for this, most estimates in this report are presented with 95% confidence intervals (CI). Formally, the 95% CI indicates that with repeated sampling, 95% of the CIs calculated would contain the true population parameter. The 95% CI can therefore be interpreted as the range within which there is a 95% chance that the true population parameter will lie.

2.6.2 Weighting

2.6.2.1 Longitudinal weights

Longitudinal weights were designed to follow participants over time and adjust for attrition (i.e., those who dropped out or did not complete subsequent SCQs / health assessments). First, Wave 1 CAPI baseline population weights were derived using iterative proportional fitting, sometimes referred to as raking, to match key demographic distributions (namely: age (50-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80+), sex (male, female), educational attainment (primary/none, secondary, third/higher), marital status (never married, married, separated/divorced, widowed), and region (urban, rural)) to the 2011 census totals (illustrated by the green arrow in Figure 2.2 (a)).

For each subsequent wave (Waves 2 through 6), the probability of continued participation was calculated via multivariate logistic regression, using baseline predictors (namely: three-way interaction: age and sex with education, two-way interaction: age with marital status, smoking status, health insurance, medication, geographic location, cluster socio-economic stratum, employment, self-rated health, depression, disabilities, cardiovascular conditions, diabetes, high cholesterol, vision, and cognition).

The longitudinal weight (W_l) was then calculated as:

$$W_l = \frac{W_{t-1}}{p_t}$$

where W_{t-1} is the weight from the previous test and p_t the probability of continued participation to wave t. This longitudinal attrition weighting is illustrated by the blue arrows in Figure 2.2 (a).

2.6.2.2 Cross-sectional weights

For each wave of the study, cross-sectional weights were also created to ensure that the sample was as representative as possible of the older adult population in Ireland at the time of that wave. The nearest available census data were used to benchmark these weights.

Specifically:

- Wave 1, Wave 2, and Wave 3 weights were aligned with 2011 Census data.
- Wave 4 and Wave 5 weights were aligned with 2016 Census data.
- Wave 6 weights were aligned with 2022 Census data.

Within each wave, iterative proportional fitting was applied to match the same key demographics used in the longitudinal weights to the corresponding census totals (illustrated by the green arrows in Figure 2.2 (b)).

For participants who completed an SCQ or HA in each wave, a secondary adjustment was made to ensure that respondents remained representative of the overall older adult population. Similar to the longitudinal weighting, this involved weighting participants by the inverse of their probability of completing an SCQ / HA, conditional on having participated in the main interview (CAPI or CATI), using the same baseline predictors as were used in the longitudinal weights. These steps are illustrated by the blue arrows in Figure 2.2 (b).

For both longitudinal and cross-sectional weights two variants were created, namely:

1. Self-interviews only: proxy interviews were treated as attrition.
2. Self + proxy interviews: proxy interviews were counted as continued participation.

This distinction allowed for flexibility in analyses where proxy data might or might not be included. For example, chapters focusing on cognitive or health measures that require direct self-report would use the self-interviews-only weight, while broader demographic analyses might include proxy interviews.

All weights were trimmed at 99th percentiles to reduce the influence of extremely large weights, and then rescaled to ensure the sum of weights matched the target population totals. This approach helps control for outliers while maintaining population-level representation. Missing probabilities were imputed as the mean and all missing weights were set to zero.

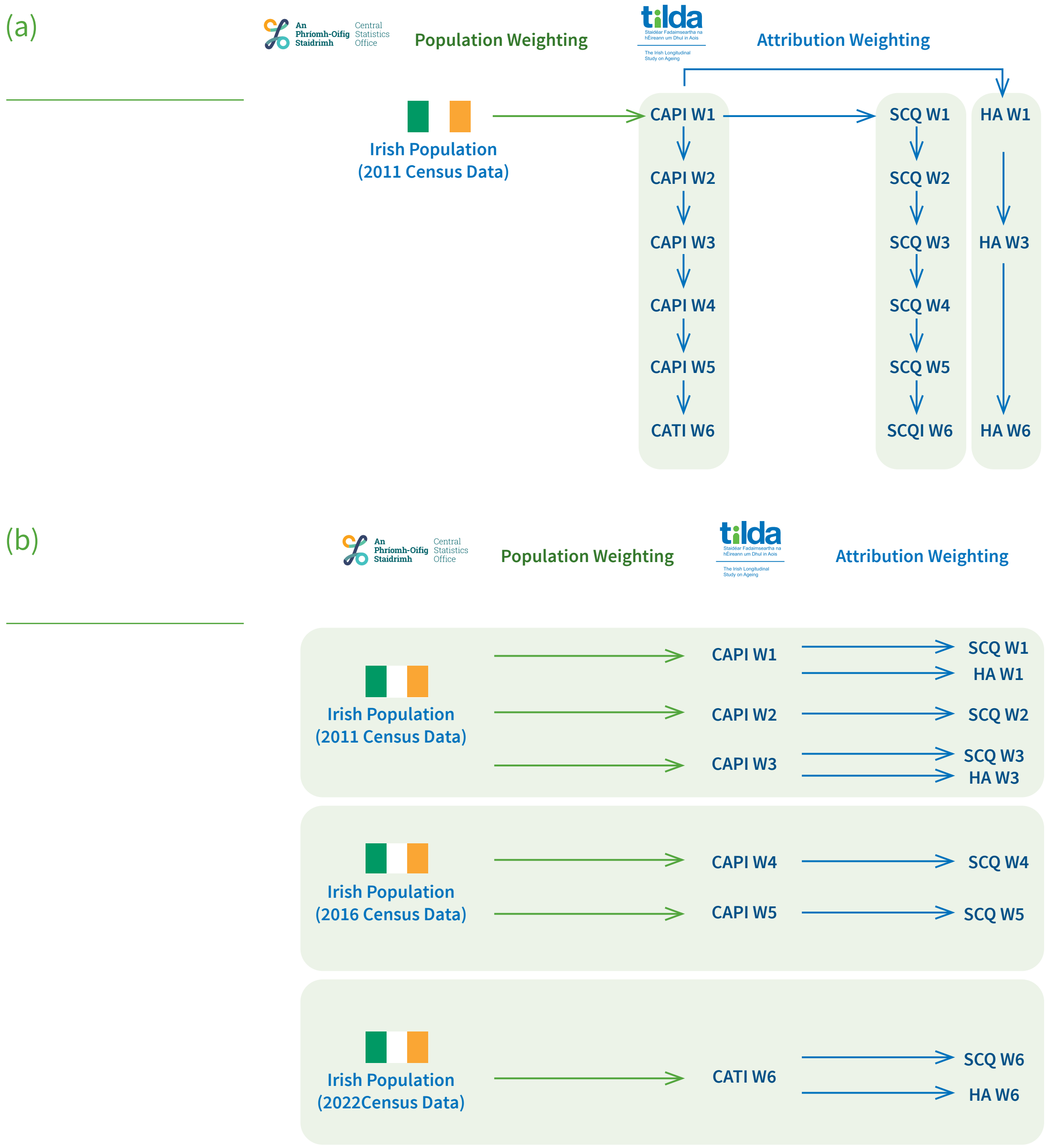

Figure 2.2: Graphical illustration of how the (a) longitudinal and (b) cross-sectional weights were derived

CAPI = Computer-Assisted Personal Interview, CATI = Computer-Assisted Telephone Interview, HA = Health Assessment, SCQ = Self - Completion Questionnaire

2.6.3 Software

All analyses in this report were conducted using Stata 18.5 (12) and RStudio 2023.12.1(13).

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Loneliness in Older Age: long-term trends, health impacts, and lessons from the COVID-19 pandemic

3

Mark Ward

Contents

Key Findings: 40

3.1 Introduction 41
3.2 Methodology 42
3.2.1 Sample 42
3.2.2 Statistical analysis 42
3.2.3 Indicators 43

3.3 Loneliness among older adults at Wave 1 45
3.3.1 Socio-demographic correlates of loneliness 45
3.3.2 Health outcomes associated with loneliness 48

3.4 Loneliness at each wave 50
3.4.1 Prevalence of loneliness among older adults from Wave 1 to Wave 6 50

3.5 Loneliness trajectories 53
3.5.1 Loneliness trajectories among older adults from Wave 1 to Wave 6 53
3.5.2 Baseline characteristics associated with different loneliness trajectories 54
3.5.3 Health outcomes associated with different loneliness trajectories 58

3.6 Discussion 61

3.7 Conclusions 62

3.8 Stakeholder perspective 63

3

Loneliness in Older Age: long-term trends, health impacts, and lessons from the COVID-19 pandemic

Key Findings

- Loneliness is a subjective assessment of an individual's satisfaction with their social relationships, distinct from social isolation, which has a weak relationship to loneliness.

- At baseline, 79.8% of older adults reported feeling lonely rarely or not at all, with smaller proportions feeling lonely more frequently.

- Loneliness scores more than doubled during the pandemic, however levels and frequency of loneliness returned to pre-pandemic levels by Wave 6.

- Three loneliness trajectories were identified. Group membership was influenced by baseline social isolation, functional limitations, and depression.
  - Group 1 (Low increasing): 42.2% - Initially low loneliness, gradually increasing.
  - Group 2 (Consistently higher loneliness): 24.5% - Persistently elevated loneliness.
  - Group 3 (Lowest with pandemic spike): 33.3% - Generally low loneliness, spiked during the pandemic.

- Despite being quite static over time, a significant proportion of older adults experience loneliness and this experience is associated with poorer health outcomes including functional limitations, poorer self-rated health, and a higher number of depressive symptoms.

3.1 Introduction

Loneliness is a social issue that is increasingly recognised as a global public health concern due to its negative effect on physical; mental (1,2); cognitive health (3); and premature mortality, especially deaths from cardiovascular conditions (4–8). It is also associated with several harmful health behaviours such as smoking, alcohol use, an increased sedentary lifestyle, less restorative sleep and even suicide (3,5). These ill-effects of loneliness are observed across the life-course and accumulate over time to accelerate physiological ageing (9). Conversely, strong social ties protect against emotional distress, cognitive decline, and physical disability (10,11).

Beyond the impacts on the individual, loneliness also has negative social and political consequences as it is associated with lower levels of trust and civic engagement (12–15). Although loneliness is often framed as an issue of ageing, existing evidence suggests that the association between age and loneliness is in fact U-shaped, with loneliness lowest and quite stable during mid-life and higher in younger and older adulthood (16–18). Prior to the COVID-19 pandemic, nearly one third of adults aged 50 and older in Ireland report feeling lonely at some point during their lives (16).

Conceptually, loneliness is a marker of social disconnection that is distinct from social isolation or simply being alone (19,20). Instead, it reflects individuals' negative assessment of the quantity and quality of their social relationships (21). Applying the theory of cognitive discrepancy, loneliness can be understood as a mismatch between an individual's desired and actual social connections (21).

During the COVID-19 pandemic, lockdown restrictions greatly reduced the opportunities for social interaction increasing the threat of loneliness. During the initial lockdown period, people aged 60 and older in Ireland reported mean loneliness two times higher than in 2019/2020 (16). Those aged 70 years and older were asked to cocoon (7), which is an extreme form of social isolation in which a person would isolate themselves in their home to minimise interactions with others including family and friends. During the pandemic lockdown, older people reported to have increased levels of loneliness and lower levels of quality of life worldwide (13).

The long-term effects of these restrictions put in place to control the spread of COVID-19 on psychological and physical well-being are still unknown; however, it has already been demonstrated that physical and mental illnesses are strongly associated with increased loneliness during the pandemic (8). It is therefore important that the levels of loneliness in a population are measured over time so we can understand the impact of important events and changes at the individual-level, as well as the effect that changes to our social and physical environments have on the experience and consequences of loneliness. By leveraging TILDA's rich longitudinal data collected from a nationally representative sample of older adults over 14 years, this chapter seeks to describe the different patterns of loneliness over time while also identifying factors associated with these patterns. To achieve this, the following chapter begins by examining the prevalence of loneliness during the lifetime of TILDA which covers 7 time points of data collection: Wave 1 (2009-2011), Wave 2 (2012), Wave 3 (2014), Wave 4 (2016), Wave 5 (2018), COVID-19 sub-study (2020) and Wave 6 (2020-2023).

3.2 Methodology

3.2.1 Sample

For the analyses of the frequency that loneliness was experienced, the baseline sample consisted of 8,171 community-dwelling adults aged 50 years and older. For the UCLA loneliness scores, described below, the baseline sample included 6,685 older adults. The difference between the two sample sizes is because the UCLA loneliness measure was included in the SCQ which has fewer respondents than the full CAPI. The characteristics of the sample are described in Table 3.1.

3.2.2 Statistical analyses

Descriptive statistics (percentages and means) are reported for every variable. As these estimates are derived from a randomly selected sample, with a known level of uncertainty around the point estimates, 95% confidence intervals are also reported throughout. These intervals indicate the range within which the true population value is expected to fall with a high (95%) level of confidence. In the final section, the results of multinomial logistic regressions are shown. These analyses are reported to identify factors associated with different patterns of loneliness over time. The Relative Risks (RRs) reported show how the chance of being in each outcome category (compared to the reference group) changes with each factor, taking into account the other variables in the model.

Finally, to identify the latent (unobserved) groups that capture and can be used to summarise different patterns of loneliness over time, the Structural Equation Modelling (SEM) framework was used to develop Latent Growth Class Models (LGCM). This statistical modelling technique identifies distinct latent unobserved subgroups of individuals with similar patterns of change over time. This means that we first identified different patterns of loneliness over time and then assigned those who shared broadly similar patterns to one of three groups Due to the distribution of UCLA loneliness scores that include a high proportion of zeros, a Poisson model specification was used with a logit link using “gsem” in Stata 15/MP 15.1 (22). Statistical weights as described in the methods chapter were applied to all descriptive analyses.

This statistical approach was informed by our analytic framework captured in Figure 3.1. Applying this framework we first describe the baseline socio-demographic characteristics of the sample, along with loneliness, social isolation, and health status. Latent loneliness trajectory groups are then identified, and we identify the baseline characteristics that are associated with group membership. Finally, we then examine whether group membership is associated with social isolation and health at the end of the study period.

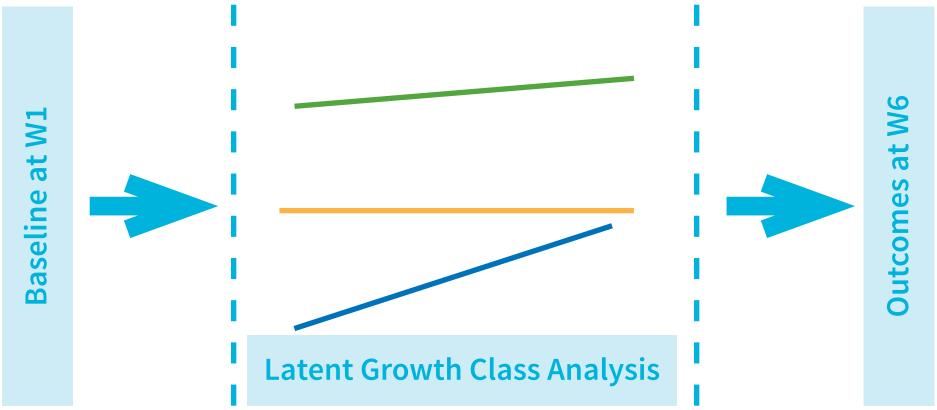


Figure 3.1: Analytic framework to examine pattens of loneliness over time

3.2.3 Indicators

3.2.3.1 Loneliness

Loneliness is a subjective assessment of an individual's satisfaction with their social relationships. Loneliness is a negative experience that reflects individuals' unfavourable assessment of the quantity and quality of their social relationships (21). While most often considered the psychological embodiment of social isolation, it can also be experienced by highly sociality integrated individuals. In fact, the relationship between loneliness and social isolation tends to be weak (17,23). TILDA includes two indicators to capture participants' levels of loneliness – a single-item question and a multi-item measurement tool. The single item question is asked at every wave of data collection as part of the CAPI questionnaire. This question asks participants how often in the previous week they felt lonely. The available response categories are: rarely or none of the time (less than 1 day); some or a little of the time (1-2 days); occasionally or a moderate amount of time (3-4 days); all of the time (5-7 days).

TILDA also uses a commonly used modified 5-item version of the University of California Los Angeles (UCLA) Loneliness Scale to measure loneliness (24). This modified scale asks five questions: four positively framed, and one negatively framed question.

> *How often do you feel you lack companionship?*
> *How often do you feel left out?*
> *How often do you feel isolated from others?*
> *How often do you feel in tune with people around you?*
> *How often do you feel lonely?*

The scale offers three possible responses: 0 (hardly ever or never), 1 (some of the time), and 2 (often). The responses to each item were summed, with the resultant scores ranging from 0-10, and higher scores indicating higher levels of loneliness.

3.2.3.2 Social isolation

Social isolation was measured using the Berkman-Syme Social Network Index (SNI) (25). The SNI includes four types of social connection:

Marital status;
Close ties with children, relatives, and friends;
Membership in a church group; and
Membership in voluntary organisations

A score of 0–1 indicates 'most isolated', with a score of 4 indicating 'most integrated'.

3.2.3.3 Depression

Depressive symptomology was measured using the short 8-item version of the Center for Epidemiological Studies Depression (CES-D) scale (26). This validated scale measures the frequency that respondents experienced a variety of depressive symptoms within the past week, with higher scores indicating increased depressive symptomology. The CES-D8 is a valid short form of the original longer form CES-D, with high reliability ($\alpha = 0.72$). CES-D8 scores ranged from zero to 24 and a score > 8 has been shown to identify those with clinically significant depressive symptoms. The 8 items included in this scale are:

'I felt depressed'.
'I felt that everything I did was an effort.'
'My sleep was restless.'
'I was happy.'
'I felt lonely.'
'I enjoyed life.'
'I felt sad.'
'I could not get 'going'.

One of the questions asked as part of the CES-D8 refers to loneliness, so this has been removed. The resulting scores of the new 7-item indicator ranged from 0 to 21 with higher scores indicating more depressive symptoms. This 7-item version of the CES-D scale (CES-D7) had good reliability ($\alpha = 0.94$) that was comparable to that of the 8-item version.

3.2.3.4 Functional limitations

Both Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) were examined. ADL included difficulties with dressing, walking across a room, bathing or showering, eating, getting in or out of bed, and using the toilet, while IADL included preparing meals, doing household chores, shopping, using the telephone, taking medications, and managing money.

3.3. Loneliness among older adults at Wave 1

3.3.1 Socio-demographic correlates of loneliness

3.3.1.1 UCLA loneliness scores

Table 3.1 shows the socio-demographic characteristics of older adults at Wave 1. Average UCLA loneliness scores are also presented along with 95% confidence intervals. These data have been statistically weighted so that the sample is representative of the population age 50 years and older at Wave 1. On average, women reported slightly higher levels of loneliness (2.2) than men (2.1). The mean age of older adults was approximately 63.8 years and loneliness scores were similar across the different age groups. Educational attainment appeared to be linked with loneliness levels. Older adults with only primary education had the highest mean loneliness score (2.3), followed by those with secondary education (2.1), while individuals with third-level qualifications reported the lowest score (1.9). There was little difference in loneliness between people living in urban and rural areas, with both groups reporting an mean score of 2.1. However, marital status was associated with loneliness. Older adults who were not married reported significantly higher loneliness scores (3.0) compared to those who were married (1.7). Parenthood also played a role. Older adults without children reported higher loneliness (2.7) than those with children, while those living with their children had the lowest loneliness score of 1.9.

Table 3.1: Population characteristics at Wave 1 and mean UCLA loneliness scores

	% (95% CI)	**Mean loneliness (95% CI)**
Male	48.6 (47.5, 49.7)	2.1 (2.0, 2.2)
Female	51.4 (50.3, 52.5)	2.2 (2.1, 2.2)
Mean age	63.8 (63.4, 64.1)	R^2 -0.0001
50-64 years	58.7 (57.0, 60.3)	2.1 (2.0, 2.2)
65-74 years	24.2 (22.9, 25.5)	2.0 (1.9, 2.1)
≥75 years	17.1 (15.9, 18.4)	2.2 (2.0, 2.3)
Primary education	30.7 (29.1, 32.3)	2.3 (2.2, 2.5)
Secondary	46.6 (45.2, 48.0)	2.1 (2.0, 2.1)
Third level	22.7 (21.5, 24.0)	1.9 (1.8, 2.0)
Urban	56.3 (52.6, 60.0)	2.1 (2.0, 2.2)
Rural	43.7 (40.0, 47.4)	2.1 (2.0, 2.2)
Not married	34.8 (33.3, 36.4)	3.0 (2.8, 3.1)
Married	65.2 (63.6, 66.7)	1.7 (1.6, 1.7)
No children	18.9 (17.6, 20.2)	2.7 (2.5, 2.9)
Children not living with them	71.5 (70.0, 72.9)	2.0 (1.9, 2.1)
Children living with them	9.7 (8.8, 10.6)	1.9 (1.7, 2.1)

3.3.1.2 Frequency of loneliness in the previous week

Table 3.2 presents the frequency of loneliness experienced in the past week by the socio-demographics of older adults. When asked at baseline how often they felt lonely in the previous week, 79.8% of older adults said they felt lonely rarely or none of the time (<1 day), 12.4% some or a little of the time (1–2 days), 5.5% occasionally or a moderate amount of time (3–4 days), and 2.4% all the time (5–7 days). A greater proportion of men (85.1%) than women (75.5%) reported rarely or never feeling lonely, while women were more likely to report feeling lonely more frequently, particularly in the higher frequency 1–2 day and 5–7 days categories. In terms of age, there were only small differences in the frequency that older adults experienced loneliness with older age groups reporting more frequent loneliness. However, these differences were not statistically significant. Older adults with primary education experienced loneliness more frequently that those with third-level education. The frequency that older adults reported loneliness in the past week did also not differ between those living in urban and rural areas.

Married older adults were significantly more likely to report rarely feeling lonely (86.8%) compared to those who are not married (67.6%). Married people were also less likely to report experiencing loneliness frequently (1.1% vs 4.6% for loneliness “all the time”).

Finally, there were clear differences between older adults who did not have any children and those who had children living with them. Those living with children were the least likely to report frequent loneliness, while those without children or whose children lived elsewhere had somewhat higher rates of loneliness.

Table 3.2: Sample characteristics at Wave 1 and how often lonely in the previous week

	Rarely or none of the time (<1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	All the time (5-7 days)
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Male	85.1 (83.5, 86.5)	9.1 (7.9,10.3)	4.3 (3.5,5.2)	1.6 (1.2,2.3)
Female	75.5 (73.7, 77.1)	15.0 (13.6,16.4)	6.6 (5.7,7.6)	3.0 (2.4,3.7)
Mean age	63.5 (63.1, 63.9)	63.8 (63.0, 64.7)	65.3 (63.8, 66.7)	66.1 (64.1, 68.1)
50-64 years	80.7 (79.1,82.2)	12.2 (11.0,13.5)	5.1 (4.3,5.9)	2.0 (1.5,2.6)
65-74 years	81.9 (79.6,83.9)	11.1 (9.6,12.8)	4.7 (3.7,6.0)	2.3 (1.6,3.3)
≥75 years	75.6 (72.5,78.5)	3.0 (10.9,15.5)	7.7 (5.9,10.1)	3.6 (2.6,5.1)
Primary education	76.7 (74.4,78.8)	13.5 (11.8,15.5)	6.5 (5.3,7.9)	3.3 (2.5,4.4)
Secondary	81.4 (79.6,83.1)	11.8 (10.5,13.2)	4.9 (4.0,6.0)	1.9 (1.4,2.6)
Third level	82.3 (80.3,84.1)	10.7 (9.3,12.3)	5.2 (4.2,6.4)	1.8 (1.2,2.6)
Urban	79.1 (77.3,80.8)	12.6 (11.3,14.0)	5.7 (4.9,6.8)	2.6 (2.1,3.3)
Rural	81.5 (79.8,83.1)	11.5 (10.2,12.9)	5.1 (4.2,6.1)	2.0 (1.5,2.7)
Not married	67.6 (65.1,70.0)	18.0 (16.2,20.1)	9.8 (8.3,11.4)	4.6 (3.7,5.7)
Married	86.8 (85.5,88.0)	8.9 (8.0,9.9)	3.1 (2.6,3.8)	1.1 (0.9,1.5)
No children	77.8 (74.7,80.7)	11.9 (9.8,14.4)	7.3 (5.6,9.5)	2.9 (1.9,4.4)
Children not living with	79.9 (78.5,81.2)	12.6 (11.6,13.8)	5.2 (4.5,5.9)	2.3 (1.9,2.9)
Children living with them	86.4 (83.1,89.2)	8.4 (6.3,11.0)	3.9 (2.5,6.2)	1.3 (0.6,2.9)

3.3.2 Health outcomes associated with loneliness

Table 3.3 shows the distribution (%) of social isolation scores, and health-related outcomes: ADL, IADL, self-rated health, and mean CES-D7 depression scores. Older adults who were most socially isolated reported the highest mean loneliness scores, with a mean of 3.4. In contrast, those who were most socially integrated had significantly lower loneliness levels, averaging just 1.4. Functional limitations were also associated with increased loneliness. Older adults who reported difficulties with ADL, or with IADL had significantly higher loneliness scores compared to those without such difficulties (2.0). Although only nine percent of older adults reported these challenges, their loneliness levels were notably higher. In terms of self-rated health, older adults who rated their health as fair or poor reported higher mean loneliness scores of 3.4, compared to 2.3 among those with 'good' health and just 1.6 among those who described their health as excellent or very good. Finally, higher levels of depression were also linked with increased loneliness. The average CES-D7 depression score among older adults was 2.8, and the association between depression and loneliness accounted for a substantial portion of the variation in loneliness ($R^2 = 17.7$).

Table 3.3: Social isolation and health status, by mean loneliness scores

	% (95% CI)	**Mean loneliness score**
Social isolation		
Most isolated	9.0 (8.0, 10.0)	3.4 (3.1, 3.7)
2	29.0 (28.0, 31.0)	2.6 (2.4, 2.7)
3	40.0 (38.0, 41.0)	1.9 (1.8, 2.0)
Most integrated	22.0 (21.0, 23.0)	1.4 (1.3, 1.5)
Any ADL		
No	91.0 (91.0, 92.0)	2.0 (2.0, 2.1)
Yes	9.0 (8.0, 9.0)	2.9 (2.7, 3.2)
Any IADL		
No	92.6 (91.8, 93.4)	2.0 (2.0, 2.1)
Yes	7.4 (6.6, 8.2)	3.2 (3.0, 3.5)
Self-rated health		
Excellent/Very Good	54.0 (53.0, 56.0)	1.6 (1.6, 1.7)
Good	30.0 (29.0, 32.0)	2.3 (2.2, 2.4)
Fair/Poor	15.0 (14.0, 16.0)	3.4 (3.2, 3.6)
Depression		
Mean	2.8 (2.7, 2.9)	R^2 17.7

Table 3.4 shows the associations between the frequency of experiencing loneliness and both social isolation and poorer health. Among the most socially isolated older adults, just 61.2% reported rarely or never feeling lonely, compared to 90.0% of the most socially integrated older adults. Frequent loneliness (5–7 days) was reported by 6.3% of the most isolated, compared to only 0.3% of the most integrated.

Older adults with limitations in ADL were also more likely to report frequent loneliness (7.1%) than those without such limitations (1.9%). Similarly, those with limitations in IADL reported more frequent loneliness (7.4%) than those without (1.9%). Self-rated health was also associated with loneliness frequency. Among those reporting excellent or very good health, 85.6% rarely or never felt lonely, and only 1.3% reported feeling lonely all the time. In contrast, among those reporting fair or poor health, 63.7% rarely or never felt lonely, and 6.6% reported being lonely all the time. Finally, depressive symptomology, as measured by the CES-D7 scale described earlier, was correlated with the frequency of loneliness. The average depression score rose from 1.9 among older adults who rarely felt lonely to 11.2 among those who felt lonely all the time. This association was linear, meaning that depression scores increase in parallel to the frequency that loneliness was experienced in the past week.

Table 3.4: Social isolation and health status, by how often lonely in the previous week

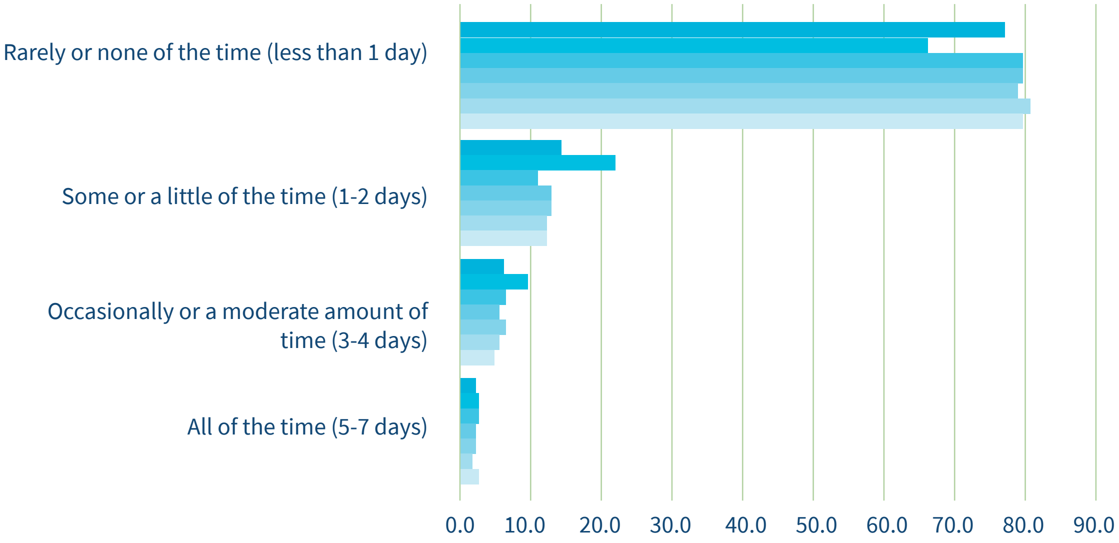
	Rarely or none of the time (<1 day)	**Some or a little of the time (1-2 days)**	**Occasionally or a moderate amount of time (3-4 days)**	**All the time (5-7 days)**
	% (95% CI)	**% (95% CI)**	**% (95% CI)**	**% (95% CI)**
Social isolation				
Most isolated	61.2 (56.1,66.0)	19.9 (16.2,24.3)	12.7 (9.5,16.7)	6.3 (4.2,9.3)
2	75.0 (72.5,77.3)	15.4 (13.5,17.6)	6.2 (5.0,7.7)	3.3 (2.5,4.4)
3	82.7 (80.9,84.3)	10.6 (9.4,12.0)	4.9 (4.0,5.9)	1.8 (1.4,2.5)
Most integrated	90.0 (88.3,91.5)	7.1 (5.8,8.7)	2.5 (1.8,3.5)	0.3 (0.1,0.7)
Any ADL				
No	81.5 (80.2,82.7)	11.6 (10.7,12.6)	5.0 (4.4,5.7)	1.9 (1.5,2.3)
Yes	65.8 (61.1,70.2)	17.1 (13.9,21.0)	10.0 (7.5,13.3)	7.1 (4.9,10.0
Any IADL				
No	81.6 (80.4,82.8)	11.6 (10.6,12.6)	4.9 (4.3,5.5)	1.9 (1.6,2.4)
Yes	61.3 (56.0,66.2)	18.8 (15.2,23.1)	12.5 (9.2,16.7)	7.4 (5.2,10.6
Self-rated health				
Excellent/Very Good	85.6 (84.2,86.9)	9.4 (8.3,10.5)	3.8 (3.1,4.5)	1.3 (0.9,1.8)
Good	78.9 (76.6,80.9)	13.2 (11.5,15.0)	5.9 (4.8,7.3)	2.1 (1.5,2.9)
Fair/Poor	63.7 (60.1,67.2)	9.6 (16.9,22.6)	10.0 (7.9,12.7)	6.6 (5.0,8.8)
Depression				
Mean	1.9 (1.8,2.0)	5.2 (4.9,5.5)	7.2 (6.7,7.7)	11.2 (10.2,12.2)

3.4 Loneliness at each wave

3.4.1 Prevalence of loneliness among older adults from Wave 1 to Wave 6

3.4.1.1 How often older adults felt lonely at each wave

Figure 3.2 shows the frequency that older adults reported that they felt lonely in the previous week for each wave of data collection. Overall, the frequency that older adults felt lonely in the previous week were very similar at each time point. The only notable change was observed during the COVID-19 pandemic when a greater percentage of older adults reported feeling lonely occasionally (three to four days) or some of the time (one or two days). Conversely, 66% said they had rarely felt lonely if at all which compares to roughly 80% before and after the pandemic.



	All of the time (5-7days)	Occasionally or a moderate amount of time (3-4 days)	Some or a little of the time (1-2 days)	Rarely or none of the time (less than 1 day)
■ Wave 6	2.1	6.4	14.4	77.§
■ C19 Wave	2.5	9.5	22.0	65.9
■ Wave 5	2.4	6.5	11.4	79.7
■ Wave 4	2.1	5.9	13.1	78.9
■ Wave 3	2.2	6.2	12.7	78.9
■ Wave 2	1.7	5.1	12.4	80.8
■ Wave 1	2.4	5.5	12.4	79.8

Figure 3.2: How often older adults felt lonely at each wave

3.4.1.2 Mean UCLA loneliness scores

Turning to mean loneliness scores measured using the multi-item UCLA measure, we see a similar pattern with average loneliness scores of close to 2.0 (from a maximum of 10) at each wave of data collection (Figure 3.3). Again, the exception to this was during the pandemic when loneliness scores more than doubled before returning to pre-pandemic levels after the pandemic.

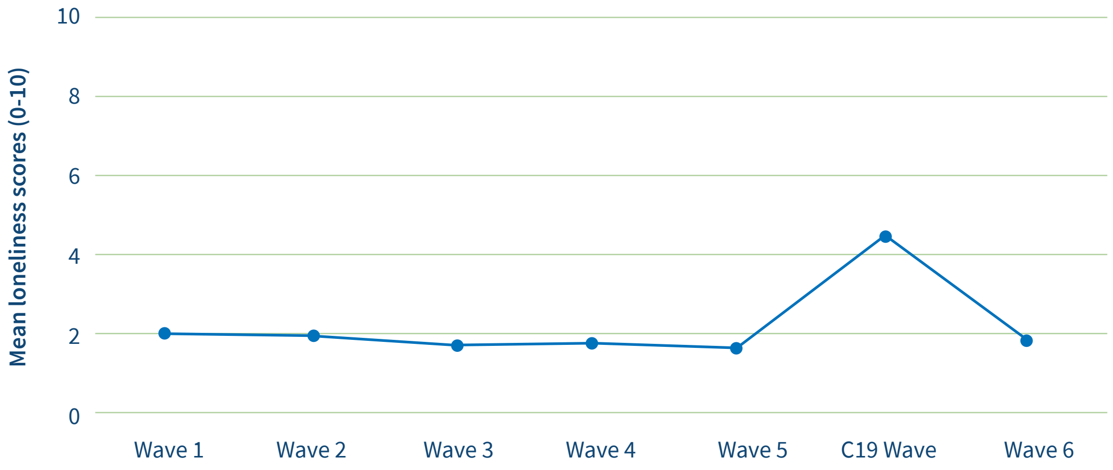


Figure 3.3: Mean UCLA loneliness scores at each wave

3.4.1.3 Distribution of UCLA loneliness among older adults from Wave 1 to Wave 6

An examination of the distribution of UCLA loneliness scores at each wave in Figure 3.4 shows a dramatic shift across the population of older adults. While many older adults had a score of zero in most waves, the most commonly occurring score (modal) was three during the pandemic. By examining these distributions graphically, it is clear that the distribution of loneliness scores is very similar at each wave of data collection, but most older adults experienced at least some increase in loneliness during COVID-19 pandemic.

Figure 3.4: Distribution of UCLA loneliness scores at each wave

3.5 Loneliness trajectories

3.5.1 Loneliness trajectories among older adults from Wave 1 to Wave 6

In this section, we present the results of the Latent Growth Class Models. The model presented here is the quadratic solution that captures different rates of change over time (Figure 3.5). In comparison to this, a linear model assumes a constant rate and direction of change over time and therefore often fails to capture the true direction of change. Before deciding on this choice of model, we assessed the utility and fit of both linear and cubic solutions as well as different numbers of classes for these linear, and cubic models as well as alternative quadratic models. Having compared the fit statistics of all of these potential solutions, we found this quadratic three-class latent trajectories model to best represent the data. To derive these classes, we controlled for sex and age (standardised). The groups are defined as follows: **Group 1 (Low increasing)** includes those with initially low but gradually increasing loneliness; **Group 2 (Consistently higher loneliness)** includes individuals with persistently elevated loneliness levels; and **Group 3 (Lowest loneliness with pandemic spike)** includes those with generally low loneliness interrupted by a spike during the pandemic period. Overall, just over two in five older adults (42.2%) were classified in Group 1, with smaller proportions in Group 2 (24.5%) and Group 3 (33.3%).

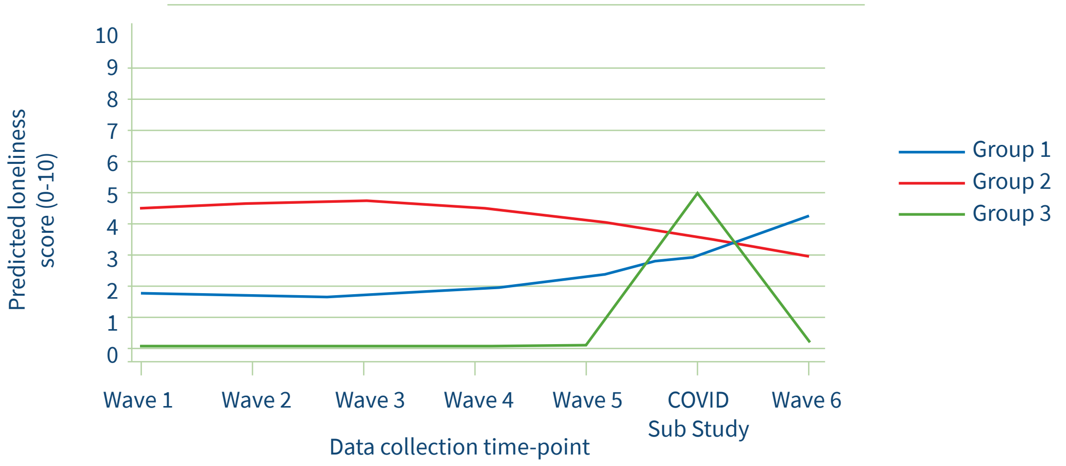


Figure 3.5: Predicted latent class (group) trajectories of loneliness across seven timepoints (Waves 1 to 6 plus the COVID-Sub-study wave)

3.5.2 Baseline characteristics associated with different loneliness trajectories

Table 3.5 presents baseline socio-demographic characteristics of older adults according to their membership in the three latent groups capturing longitudinal loneliness patterns. Proportions of each subgroup within the three latent groups are presented with 95% confidence intervals. The percentage of men and women in each group were similar. Adults aged 75 years and older were more likely to belong to Group 1 (50.0%) and less likely to be in Group 3 (26.4%) than younger age groups.

In terms of education, individuals with third-level education were more likely to belong to Group 3 (38.6%) compared to those with primary education (28.8%). Conversely, older adults with primary education were somewhat more likely to be in Group 2 (27.0%) than those with third-level education (22.9%).

Table 3.5: Baseline characteristics associated with latent group membership

	Group 1 – Low increasing	**Group 2 – Consistently higher loneliness**	**Group 3 – Lowest loneliness with pandemic spike**
	% (95% CI)	**% (95% CI)**	**% (95% CI)**
Total	42.2 (40.9,43.5)	24.5 (23.3,25.8)	33.3 (32.0,34.6)
Male	41.8 (39.9,43.7)	23.9 (22.2,25.7)	34.3 (32.5,36.1)
Female	42.6 (40.9,44.4)	25.1 (23.5,26.7)	32.3 (30.7,34.0)
Mean age	64.6 (64.1,65.1)	63.1 (62.4,63.8)	62.9 (62.5,63.4)
50-64 years	39.3 (37.6,41.0)	25.7 (24.0,27.5)	35.0 (33.2,36.8)
65-74 years	43.8 (41.3,46.2)	22.2 (20.2,24.4)	34.0 (31.8,36.3)
≥75 years	50.0 (46.7,53.4)	23.5 (20.7,26.6)	26.4 (23.5,29.5)
Primary education	44.2 (41.8,46.7)	27.0 (24.7,29.4)	28.8 (26.6,31.0)
Secondary	42.8 (40.8,44.8)	23.6 (21.8,25.4)	33.7 (31.8,35.6)
Third level	38.5 (36.2,40.8)	22.9 (20.9,25.0)	38.6 (36.3,40.9)
Urban	41.8 (40.1,43.5)	24.3 (22.6,26.1)	33.9 (32.1,35.7)
Rural	42.8 (40.8,44.7)	24.8 (23.1,26.5)	32.5 (30.7,34.3)
Not married	43.8 (41.4,46.2)	37.7 (35.4,40.1)	18.5 (16.7,20.4)
Married	41.4 (39.9,42.9)	17.5 (16.2,18.8)	41.2 (39.5,42.8)
No children	42.1 (38.7,45.6)	34.0 (30.7,37.5)	23.8 (21.1,26.8)
Children not living with them	43.0 (41.6,44.5)	22.3 (21.0,23.7)	34.7 (33.2,36.2)
Children living with them	36.6 (32.8,40.5)	22.2 (18.9,25.9)	41.2 (37.3,45.2)

Marital status was also associated with latent group membership. Older adults who were not married were more likely to belong to Group 2 (37.7%) and less likely to be in Group 3 (18.5%) compared to married individuals, among whom only 17.5% were in Group 2 and 41.2% in Group 3. Group membership also varied by parental status. Older adults with no children were more likely to belong to Group 2 (34.0%) and less likely to be in Group 3 (23.8%) compared to those living with their children, among whom 41.2% were in Group 3 and only 22.2% in Group 2. There was no clear difference in group membership between older adults living in urban versus rural areas.

Table 3.6 presents the distribution of social isolation and health status indicators by the loneliness trajectory groups. Among the most isolated older adults, nearly equal proportions were in Group 1 (41.7%) and Group 2 (43.7%), while a substantially smaller proportion were in Group 3 (14.6%). In contrast, among the most socially integrated, 45.6% were in Group 3, compared to only 13.6% in Group 2. This means that more socially integrated older adults were more likely to belong to the group characterised by generally low loneliness and less likely to be in the consistently lonely group.

Differences in functional limitations were also associated with group membership. Older adults with no limitations in ADLs were more likely to be in Group 3 (34.3%) than those with ADL limitations (22.5%). Conversely, 38.3% of those with ADL limitations belonged to Group 2, compared to only 23.2% of those without. A similar pattern was observed for IADLs: 42.8% of those with IADL limitations were in Group 2, while only 14.9% were in Group 3. These patterns show that greater functional impairment was associated with more persistent loneliness.

There were also differences according to self-reported health status. Among those reporting excellent or very good health, 40.2% were in Group 3 and only 16.6% in Group 2. In contrast, of those with fair or poor health, 44.2% were in Group 2 and only 17.4% in Group 3. Finally, mean depressive symptom scores (CES-D7) varied substantially by group. Those in Group 2 had the highest average depression score (5.0), followed by Group 1 (2.6), while Group 3 had the lowest (1.5).

Table 3.6: Social isolation and health outcomes at baseline associated with latent class membership

	Group 1 – Low increasing	Group 2 – Consistently higher loneliness	Group 3 – Lowest loneliness with pandemic spike
	% (95% CI)	**% (95% CI)**	**% (95% CI)**
Social isolation			
Most isolated	41.7 (36.8,46.7)	43.7 (38.8,48.8)	14.6 (11.4,18.5)
2	41.5 (39.0,44.0)	32.1 (29.7,34.6)	26.4 (24.3,28.7)
3	43.7 (41.7,45.7)	20.6 (18.9,22.4)	35.7 (33.8,37.6)
Most integrated	40.8 (38.4,43.3)	13.6 (12.0,15.5)	45.6 (43.0,48.2)
Any ADL			
No	42.5 (41.1,43.9)	23.2 (21.9,24.5)	34.3 (33.0,35.7)
Yes	39.2 (34.8,43.8)	38.3 (33.9,42.9)	22.5 (18.9,26.5)
Any IADL			
No	42.2 (40.9,43.6)	23.0 (21.8,24.3)	34.7 (33.4,36.1)
Yes	42.3 (37.1,47.6)	42.8 (37.8,48.0)	14.9 (11.6,19.0)
Self-rated health			
Excellent/Very Good	43.2 (41.4,44.9)	16.6 (15.3,18.0)	40.2 (38.4,42.0)
Good	42.5 (40.0,45.0)	28.4 (26.2,30.7)	29.1 (27.0,31.4)
Fair/Poor	38.4 (35.0,41.9)	44.2 (40.6,47.8)	17.4 (15.0,20.1)
Depression			
Mean	2.6 (2.5,2.8)	5.0 (4.7,5.3)	1.5 (1.4,1.6)

Table 3.7 shows the results of a multinomial logistic regression examining associations between socio-demographic, social, and health characteristics and latent group membership in loneliness trajectories. Relative risks (RR) and 95% confidence intervals (CIs) are reported for membership in Group 2 (Consistently higher loneliness) and Group 3 (Lowest loneliness with pandemic spike), with Group 1 (Low increasing loneliness) as the reference category.

Being married was significantly associated with a lower likelihood of being in the Group 2 (RR = 0.51, 95% CI: 0.42–0.63), indicating that married older adults were about half as likely to experience persistently high loneliness compared to those who were not married.

Older age was associated with a lower likelihood of group membership (RR = 0.98, 95% CI: 0.97–0.99, $p < 0.001$), suggesting a small but statistically significant decline in the relative risk with increasing age. Living in a rural area (vs. urban) was also associated with higher odds of belonging to Group 2 (RR = 1.17, 95% CI: 1.01–1.35) compared to Group 1.

Greater depressive symptoms were strongly associated with being in Group 2 (RR = 1.15, 95% CI: 1.13–1.18, $p < 0.001$), as was poorer self-rated health. Those reporting 'good' (RR = 1.51, 95% CI: 1.28–1.78) or 'fair/poor' health (RR = 1.77, 95% CI: 1.43–2.19) were significantly more likely to experience consistently high loneliness than those in excellent/very good health.

In contrast to Group 2 membership, being married was associated with significantly increased odds of belonging to Group 3 (RR = 2.01, 95% CI: 1.67–2.43), indicating that married individuals were more likely to have low levels of loneliness except for a temporary pandemic-related increase.

Rural residence was associated with a lower likelihood of being in Group 3 (RR = 0.87, 95% CI: 0.77–0.99), as was reporting good (RR = 0.83, 95% CI: 0.71–0.96) or fair/poor self-rated health (RR = 0.69, 95% CI: 0.55–0.87). This suggests that better health status was associated with a more favourable loneliness trajectory.

While higher depressive symptoms were associated with greater risk of persistent loneliness (Group 2), they were associated with lower odds of being in Group 3 (RR = 0.85, 95% CI: 0.83–0.88), highlighting a consistent pattern in mental health differences across groups.

A small but statistically significant association was also found with social isolation, with higher isolation increased the odds of being in Group 3 (RR = 1.09, 95% CI: 1.01–1.19).

Table 3.7: Multinomial logistic regression showing likelihood of Group 2 and Group 3 membership, compared to Group 1

	Group 2: Consistently higher loneliness	Group 3: Lowest loneliness with pandemic spike
	RR (95% CI)	**RR (95% CI)**
Female	0.88 (0.76, 1.03)	1.12 (0.99, 1.27)
Age	0.98 (0.97, 0.99)***	0.99 (0.98, 1.00)*
Primary	Ref	Ref
Secondary	0.98 (0.81, 1.18)	0.97 (0.83, 1.13)
Third/higher	1.13 (0.91, 1.40)	1.16 (0.98, 1.38)
Rural	1.17 (1.01, 1.35)*	0.87 (0.77, 0.99)*
Married	0.51 (0.42, 0.63)***	2.01 (1.67, 2.43)***
No children	Ref	Ref
Children not living with them	0.90 (0.72, 1.11)	0.99 (0.80, 1.22)
Children with them	1.04 (0.75, 1.44)	1.09 (0.83, 1.43)
Social isolation	0.91 (0.82, 1.00)	1.09 (1.01, 1.19)*
Depression	1.15 (1.13, 1.18)***	0.85 (0.83, 0.88)***
Any ADL	1.02 (0.77, 1.36)	1.27 (0.97, 1.68)
Any IADL	1.17 (0.88, 1.56)	0.73 (0.51, 1.04)
Excellent/V good SRH	Ref	Ref
Good	1.51 (1.28, 1.78)***	0.83 (0.71, 0.96)*
Fair/Poor	1.77 (1.43, 2.19)***	0.69 (0.55, 0.87)**

* p<0.05; ** p<0.01; *** p<0.001

3.5.3 Health outcomes associated with different loneliness trajectories

The final analysis in this chapter examined whether membership of different loneliness trajectory groups was associated with social isolation and health (ADL, IADL, self-rated health, and depression) at the final measurement time. The results are reported in Table 3.8. There was a strong association between prior loneliness trajectories and social isolation. Social isolation was most strongly associated with Group 2. Almost half of Group 3 (49.4%) were in the most socially integrated category. These are the group of older adults who prior to the pandemic reported the lowest levels of loneliness which then increased substantially during the pandemic before returning to pre-pandemic levels in by Wave 6.

There were also differences in functional health outcomes. Individuals in Group 2 were more likely to report limitations in IADL at Wave 6 (47.9%) than those in Group 3 (14.7%). A similar pattern was observed for ADL. Group membership was also clearly associated with self-related health at Wave 6. Among those in Group 3, 45.0% reported excellent or very good health, compared to only 14.7% of Group 2. In contrast, 36.4% of Group 2 members rated their health as fair or poor, significantly more than the 24.4% in Group 3. Finally, levels of depressive symptoms, differed substantially across the groups. Group 2 had the highest mean score (4.9), followed by Group 1 (3.2), while Group 3 had the lowest (2.2).

Table 3.8: Percentage of older adults in the three latent trajectory groups, by social isolation scores and health outcomes

	Group 1 – Low increasing	**Group 2 – Consistently higher loneliness**	**Group 3 – Lowest loneliness with pandemic spike**
	% (95% CI)	**% (95% CI))**	**% (95% CI)**
Total	39.7 (37.6, 41.8)	21.8 (20.0, 23.7)	38.5 (36.4, 40.7)
Social isolation			
Most isolated	39.3 (32.9,46.2)	41.6 (35.0,48.5)	19.0 (14.1,25.2)
2	40.0 (36.3,43.7)	25.2 (21.9,28.8)	34.8 (31.2,38.7)
3	39.4 (36.3,42.7)	17.8 (15.4,20.6)	42.7 (39.5,46.0)
Most integrated	39.8 (35.4,44.4)	10.8 (8.4,13.8)	49.4 (44.6,54.2)
Any ADL			
No	39.6 (37.5,41.8)	21.7 (19.9,23.6)	38.7 (36.5,40.9)
Yes	41.5 (26.2,58.6)	30.7 (17.8,47.6)	27.8 (15.7,44.2)
Any IADL			
No	39.7 (37.6,41.9)	21.0 (19.2,22.9)	39.3 (37.1,41.4)
Yes	37.4 (25.3,51.3)	47.9 (34.0,62.1)	14.7 (8.6,24.1)
Self-rated health			
Excellent/Very Good	40.2 (37.4,43.1)	14.7 (12.7,17.1)	45.0 (42.1,48.0)
Good	39.2 (35.5,42.9)	24.7 (21.5,28.2)	36.2 (32.6,39.8)
Fair/Poor	39.2 (34.3,44.3)	36.4 (31.5,41.6)	24.4 (20.2,29.2)
Depression			
Mean	3.2 (3.0, 3.4)	4.9 (4.5, 5.2)	2.2 (2.0, 2.4)

Table 3.9 shows the results of a multinomial logistic regression model examining the associations between health and social indicators and latent group membership in loneliness trajectories among older adults. Relative risks (RR) and 95% confidence intervals (CIs) are reported for membership in Group 2 (Consistently higher loneliness) and Group 3 (Lowest loneliness with pandemic spike), with Group 1 (Low increasing loneliness) as the reference category.

Higher depressive symptoms were strongly associated with belonging to Group 2 (RR = 1.12, 95% CI: 1.08–1.16), as was poorer self-rated health. Compared to those in excellent or very good health, respondents reporting 'good' (RR = 1.66, 95% CI: 1.25–2.21) or 'fair/poor' health (RR = 1.91, 95% CI: 1.35–2.70) were significantly more likely to be in Group 2.

Older adults in Group 2 reported higher levels of social isolation at Wave 6 (RR = 0.80, 95% CI: 0.68–0.93), compared to those in Group 1.

On the other hand, older adults in Group 3 had lower levels of depressive symptoms (RR = 0.88, 95% CI: 0.84–0.91), indicating better mental health relative to the low Increasing group (Group 1). Older adults with IADL limitations were significantly less likely to be in Group 3 (RR = 0.48, 95% CI: 0.23–0.99), suggesting that better functional independence was associated with more favourable loneliness trajectories.

Table 3.9: Multinomial logistic regression showing likelihood of Group 2 and Group 3 membership, compared to Group 1 by social isolation and health at Wave 6

	Group 2: Consistently higher loneliness	**Group 3: Lowest loneliness with pandemic spike**
	RR (95% CI)	**RR (95% CI)**
Social isolation	0.80 (0.68, 0.93)	1.07 (0.95, 1.21)
Depression	1.12 (1.08, 1.16)	0.88 (0.84, 0.91)
Any ADL	0.67 (0.24, 1.86)	1.30 (0.55, 3.09)
Any IADL	1.87 (0.82, 4.26)	0.48 (0.23, 0.99)
Excellent/V good SRH	*Ref*	*Ref*
Good	1.66 (1.25, 2.21)	0.92 (0.74, 1.14)
Fair/Poor	1.91 (1.35, 2.70)	0.73 (0.52, 1.01)

* p<0.05; ** p<0.01; *** p<0.001. Model controls for baseline gender, age, education, location, marital status, and children in household.

Overall, persistent loneliness (Group 2) was associated with higher depressive symptoms, poorer self-rated health, and somewhat higher social isolation at Wave 6, while more favourable loneliness trajectories (Group 3) were associated with better mental health and greater functional independence.

3.6 Discussion

By exploring the unique longitudinal data structure of TILDA, this chapter has described patterns of loneliness among a nationally representative sample of older adults over 14 years. This is the first time that loneliness has been examined among the same group of people over such a long timeframe. Notably, TILDA is the only study that has collected information on older adults in Ireland that captures their experience before, during, and after the COVID-19 pandemic.

Our examination of loneliness using both the UCLA Loneliness Scale and a single question that asked how often older adults experienced loneliness in the previous week, shows that levels of loneliness have remained relatively stable over the between Wave 1 and Wave 6. This finding challenges the narrative that increasing loneliness is an inescapable feature of ageing. However, this overall stability conceals important variation across individuals and groups. We have also shown that patterns of loneliness as we age are different for different individuals and groups and do not necessarily follow the same trajectory for everyone.

Our specific analyses identified three distinct patterns of change in loneliness: one group that included older adults with initially low but gradually increasing loneliness; a second group (consistently higher loneliness) that includes individuals with persistently elevated loneliness levels; and a third group (lowest loneliness with pandemic spike) consisting of older adults with generally low loneliness interrupted by a sharp increase during the COVID-19 pandemic period. We have also shown that membership of these different groups can be differentiated according to levels of social isolation, functional limitations, self-rated health and the experience of depressive symptoms.

Loneliness among older adults in the context of ageing populations has been of concern to public health practitioners for some time and the importance of this issue increased dramatically since the onset of the COVID-19 pandemic. The dramatic increase in loneliness shown here and an associated parallel increase in depressive symptomology (27) during this period highlighted the crucial role of social interactions and relationships in promoting healthy ageing. Research on loneliness had previously identified the types of circumstances and behaviours that protect older adults, with social participation and strong social ties particularly important. When the COVID-19 pandemic started in March 2020, older adults were precluded from many of the ways in which to participate in their communities and maintain strong social ties, as social contact was severely restricted by efforts to control the spread of the virus.

In this chapter, we have shown that loneliness, measured using the UCLA Loneliness Scale, increased dramatically for all older adults during the pandemic. We have also shown that while average loneliness scores and the frequency that older adults experience loneliness have largely returned to pre-pandemic levels, although some groups including older adults who were not married, including those who were widowed; as well as those who lived alone remained lonelier than they had been (compared to other groups) before the COVID-19 pandemic.

Our findings again demonstrate the close link between loneliness, and both physical and mental health among older adults. They also reinforce the value of examining patterns over time, so that we can better understand factors that protect against or exacerbate loneliness in ageing, identify the most vulnerable individuals and groups, and design ways to protect against its worst effects.

3.7 Conclusions

This chapter provides the first in-depth longitudinal analysis of loneliness among older adults in Ireland, drawing on over a decade of nationally representative data from TILDA. While mean levels of loneliness remained largely stable, individual trajectories varied considerably, revealing three distinct patterns: gradual increase, consistent high levels, and temporary spikes during the pandemic.

A particularly notable finding was the sharp, though temporary, rise in loneliness during the COVID-19 pandemic, reflecting the vulnerability of older adults' social well-being to external societal disruption. For most, loneliness levels returned to baseline by 2021. However, those who were unmarried, living alone, or in poorer health continued to experience elevated levels of loneliness.

Persistent loneliness was associated with poorer outcomes across multiple domains, including mental health, functional ability, and perceived health. In contrast, older adults with stronger social networks and better health appeared more resilient—even during the pandemic.

These findings underscore the need to prioritise social connection as a core component of healthy ageing. Addressing loneliness should be integrated into wider ageing policies, particularly those focusing on mental health, community inclusion, and support for independent living. Interventions must be targeted and evidence-based, ensuring support reaches those most vulnerable to chronic loneliness and its adverse health consequences.

3.8 Stakeholder perspective

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ALONE strongly welcomes and congratulates Dr Mark Ward and the TILDA team on the publication of this chapter. We are fortunate to have TILDA in Ireland: a world-class, longitudinal study uniquely positioned to provide robust data on the lived experiences of older people. It remains the only study to have captured the impact of loneliness among older adults before, during, and after the COVID-19 pandemic. The insights it provides are of both national and international significance, offering critical evidence to inform future policy and practice.

This publication reinforces the urgent need to keep loneliness on the national agenda. Critically, it highlights that approximately 20% of older adults in Ireland report feeling lonely at least some of the time, and this experience is not uniform. Older people are not a homogeneous group, and we must recognise their diverse needs when designing services and supports. The data shows that loneliness is persistently higher among older adults who are not married, are widowed, or live alone; patterns that worsened during the pandemic and, for many, have yet to return to pre-pandemic levels.

As a national organisation supporting older people to age well at home, ALONE supported over 43,000 individuals across our services in 2024. Loneliness was one of the most frequent reasons older people reached out to us, with around half presenting with loneliness and approximately 6% experiencing long-term social isolation. Our own data echoes the findings in this chapter: loneliness is more commonly reported by women and by those living alone.

Importantly, this chapter highlights the strong connections between loneliness and key challenges in later life, including difficulties with daily living, mental health issues such as depression, and reduced social integration. This is supported by other evidence from TILDA and international research which shows loneliness profoundly harms the health and well-being of older people. Indeed, in ALONE, we also see how loneliness often coexists with other issues.

This number of older people in Ireland is set to grow significantly in the years ahead. Census projections indicate that by 2057, almost 1.9 million people in Ireland will be over the age of 65, with the number aged 80 and older expected to double. This demographic transformation is unprecedented, and the pace at which it is unfolding far exceeds our current rate of infrastructure, housing, health, and social care development. Without bold, strategic, and sustained investment, we believe we are heading toward a national crisis, where thousands of older people could be left without the support they need to live independently and safely in their communities.

We must remember that loneliness is not an inevitable part of ageing. The data presented here clearly shows that while some people experience persistent or increasing loneliness, this is not the case for all. This knowledge must guide how we design policy, services, and community responses to support older people. We know that with the right interventions, loneliness can be alleviated. For example, ALONE's recently published impact assessment found that use of our Support and Befriending services is associated with reduced levels of loneliness among older people.

The findings in this chapter must be a catalyst for change. At a national level, there has been a long-standing commitment to addressing loneliness and social isolation. The Government's Roadmap for Social Inclusion 2020–2025 includes a pledge to develop an action plan on loneliness, but this has not yet materialised. The National Loneliness Taskforce, established in 2018, is currently finalising a comprehensive action plan, and we hope this will be brought to Government later in 2025. Internationally, the World Health Organization (WHO) has launched a global Commission on Social Connection, while countries like the UK, Denmark, and the Netherlands have implemented national strategies to combat loneliness and social isolation.

ALONE thank Dr Ward and the TILDA team for continuing to shine a light on loneliness as a critical issue. We hope these findings will serve as a powerful evidence base to support targeted action, sustained investment, and the development of a national action plan to reduce loneliness among older people in Ireland.

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The Unmet Need: bridging the gaps of unmet healthcare needs in later life

Robert Briggs and Rose Anne Kenny

Contents

Key Findings 70

4.1 Introduction 71

4.2 Methodology 72
4.2.1 Chapter design 72
4.2.2 Unmet need 72
4.2.3 Longitudinal trends 73
4.2.4 Objective and self-reported measures 73

4.3 Cardiovascular risk factors 75
4.3.1 Hypertension 75
4.3.2 Hypercholesterolaemia 77
4.3.3 Diabetes 80

4.4 Falls and factures 82
4.4.1 Falls 82
4.4.2 Osteoporosis and Fractures 84

4.5 Depression and chronic pain 87
4.5.1 Depression 87
4.5.2 Chronic pain 89

4.6 Discussion 91

4.7 Conclusion 92

4.8 Stakeholder perspective 93

4

The Unmet Need: bridging the gaps of unmet healthcare needs in later life

Key Findings

- A significant proportion of older adults remain undiagnosed or undertreated for key conditions including hypertension, hypercholesterolaemia, diabetes, osteoporosis, depression, and chronic pain.
- At Wave 6, 36% of older adults had undiagnosed hypertension and 45% had undiagnosed high cholesterol based on clinical thresholds.
- Nearly half of older adults with known diagnoses of hypertension or diabetes had poor control of their condition despite treatment.
- Fall-related hospital attendances have increased from 24% to 31% since Wave 1, yet prescription of medications that increase falls risk has increased by 17% across the same timeframe. Only 25% of adults who experienced a fall had accessed physiotherapy.
- While 12% of older adults had clinically significant depressive symptoms, fewer than half received appropriate treatment, and over 45% had not reported their symptoms to any healthcare provider.
- One-third of older adults reported chronic pain, yet two-thirds of those with moderate to severe symptoms received no pain-relieving medication.

4.1 Introduction

The number of older people in Ireland is projected to double over the next 25 years (1). This remarkable demographic shift reflects a major societal achievement, signalling progress in public health, medical innovation, and overall quality of life. Longer lifespans offer individuals more time to spend with loved ones, pursue personal interests, and contribute meaningfully to their families, communities, and society at large.

However, increased longevity also brings with it significant challenges-particularly for healthcare systems, social support structures, and resource planning. As people live longer, there is a corresponding rise in the prevalence of chronic illness, frailty, and dependency, which places increased demand on already stretched health and social care services (2). Central to addressing these challenges is the imperative not just to extend life, but to extend healthy life. Preventing or delaying the onset of chronic disease and functional decline is essential to ensure that added years are lived with quality, independence, and purpose.

Unmet healthcare need in later life represents an important barrier to achieving this goal. When older people are unable to access the care they need, whether due to system constraints, lack of awareness, or socioeconomic factors, they face a heightened risk of adverse health outcomes. These include unmanaged chronic disease, avoidable hospitalisations, and ultimately, a loss of independence and quality of life (3).

TILDA provides a unique and comprehensive dataset, combining both self-reported and clinically measured information to assess health status and healthcare access among older people in Ireland. Through this data, we can quantify the extent and consequences of unmet healthcare needs on a national scale.

In our analysis, we focus on three priority areas of healthcare that are particularly consequential in later life, where there are evident mismatches between the healthcare needs of older people and the services they receive:

- **Cardiovascular disease prevention:** Despite the high burden of cardiovascular risk factors in older people, there remain gaps in the identification, monitoring, and management of these risks—leading to preventable heart attacks, strokes, and other complications.
- **Falls and fracture care:** Falls are a leading cause of injury, disability, and loss of independence in later life, yet many older people do not receive appropriate risk assessments, preventative interventions, or follow-up care after a fall or fracture.
- **Identification and treatment of depression and chronic pain:** Mental health conditions and persistent pain are common in later life, yet they are frequently under-reported, under-diagnosed, and undertreated. This contributes to poor quality of life, social isolation, and functional decline.

By drawing attention to these critical gaps, we highlight the importance of proactive, person-centred healthcare models that address the specific and evolving needs of older people. Reducing unmet need is not only essential for improving individual outcomes, but also for ensuring the sustainability and equity of Ireland's healthcare system as the population continues to age.

4.2 Methodology

4.2.1 Chapter design

This chapter utilises data from Waves 1, 3 and 6 of TILDA. Wave 1 data was collected from 2009 to 2011, Wave 3 was collected from 2014 to 2015, and Wave 6 was collected from 2020 to 2023.

The following three areas were analysed:

- Cardiovascular risk factors
- Falls and fractures
- Depression and chronic pain

4.2.2 Unmet need

Two broad areas of unmet need were assessed: undiagnosed and under-treated conditions.

Undiagnosed conditions were assessed by comparing self-report of an established diagnosis of chronic conditions against objective measures used to diagnose these conditions. For example, self-report of diagnosis of hypertension was compared with the objectively measured blood pressure during the health assessment.

Undertreated conditions were assessed by comparing objective measures against international guidelines for treatment of the condition, for example blood cholesterol targets in people with high cholesterol or established treatment recommendations in people with chronic pain.

4.2.3 Longitudinal trends

Longitudinal analyses were conducted, comparing data for unmet need across Waves 1, 3 and 6 of TILDA. These waves were chosen as they included a health assessment with objective measures.

To account for attrition across waves, analysis was weighted to ensure that for the estimates presented, subgroups within the sample are represented proportionate to the number of that subgroup present in the population of Ireland.

Data was presented descriptively, with proportions for binary variables and means for normally distributed continuous variables with 95% confidence intervals.

4.2.4 Objective and self-reported measures

To assess unmet need, both objective and self-reported data were collected across key health domains. The objective measures used in this chapter were drawn from clinical assessments in TILDA, while self-reported measures were obtained via structured interviews.

Table 4.1 below summarises the key conditions analysed, the objective clinical measures used to assess them, and their corresponding self-reported indicators.

Table 4.1: Summary of objective and self-reported measures, by condition

Condition	Objective Measure	Self-Reported Measure
Hypertension	Average of two seated blood pressure readings using Omron digital cuff	Self-report of doctor-diagnosed high blood pressure
Hyper-cholesterolaemia	Blood test for total cholesterol and LDL levels	Self-report of doctor-diagnosed high cholesterol
Diabetes	Blood test for HbA1c (≥48 mmol/mol = diabetes)	Self-report of doctor-diagnosed diabetes
Osteoporosis	Heel ultrasound to assess bone mineral density	Self-report of doctor-diagnosed osteoporosis
Depression	CES-D 8-item scale and CIDI diagnostic interview	Self-report of depression or other mental health diagnosis
Chronic Pain	Report of being “frequently troubled” by pain lasting >3 months and severity scoring	Self-report of chronic pain and its impact on daily activities
Falls	Not applicable (based on incident reporting and medication review)	Self-report of falls in past 12 months
Fractures	Not applicable (based on incident reporting and medication review)	Self-report of fracture history

4.3 Cardiovascular risk factors

4.3.1 Hypertension

Hypertension, or high blood pressure, is a major modifiable risk factor for several serious health conditions, including stroke, ischaemic heart disease, heart failure, and chronic kidney disease. It contributes significantly to the global burden of cardiovascular morbidity and mortality (6). According to international clinical guidelines, hypertension is defined as a systolic blood pressure of 140 mm Hg or higher and/or a diastolic blood pressure of 90 mm Hg or higher.

Early detection and effective management of hypertension are critical in reducing the risk of long-term complications. The risks associated with elevated blood pressure can be substantially mitigated through a combination of lifestyle interventions and pharmacological treatment. Recommended lifestyle changes include regular physical activity, weight management, dietary modifications such as salt restriction and the DASH (Dietary Approaches to Stop Hypertension) diet, smoking cessation, and moderation of alcohol intake (7). In cases where lifestyle modifications are insufficient, blood pressure-lowering medications may be prescribed to achieve target blood pressure levels (8). Optimal management of hypertension not only improves individual health outcomes but also alleviates pressure on healthcare systems by reducing the incidence of preventable cardiovascular events.

Unmet Need

At Wave 6 of the study, 43% of adults aged 50 years and older reported having received a diagnosis of hypertension. The prevalence of self-reported hypertension increased progressively with age: 33% among those aged 50–64 years, 43% in the 65–74 age group, and 53% in those aged 75 years and older. These figures reflect the well-established trend of rising hypertension prevalence with advancing age.

Among those who reported having hypertension, nearly half (47%) had blood pressure measurements above the recommended target levels for hypertension management, suggesting suboptimal control or treatment resistance in a significant portion of older people. Additionally, 36% of those who did not report a diagnosis of hypertension were found to have elevated blood pressure readings that met the diagnostic criteria for hypertension, indicating a substantial burden of undiagnosed or unrecognised high blood pressure within the population.

Fifty-two percent of adults aged 50 years and older in Ireland were prescribed medications that lower blood pressure (Anatomic Therapeutic Classification (ATC) codes c02, c03, c07, c08, c09) at Wave 6. This included 91% of those who reported a diagnosis of hypertension and 22% who did not.

Regarding pharmacological management, 52% of adults aged 50 years and older were prescribed at least one medication known to lower blood pressure. Among those with self-reported hypertension, 91% were receiving antihypertensive treatment, whereas 22% of those without a reported diagnosis of hypertension were also prescribed such medications, possibly for other conditions such as heart failure, arrhythmias, or secondary prevention of cardiovascular disease.

Age-stratified analysis showed increasing use of blood pressure-lowering medications with age: 36% in those aged 50–64 years, 49% in the 65–74 age group, and 68% in adults in Ireland aged 75 years and older. However, even among those not prescribed antihypertensive medications, a significant proportion (38% overall) met the diagnostic criteria for hypertension based on measured blood pressure levels. This figure was particularly high in the oldest age group, where half of those aged 75 years and older who were not receiving blood pressure-lowering medications still had elevated blood pressure, highlighting a potential gap in the identification and treatment of hypertension among older adults.

These figures highlight opportunities for improving detection, adherence to clinical guidelines, and optimisation of treatment to reduce the burden of uncontrolled and undiagnosed hypertension amongst older people in Ireland.

Longitudinal Trends

Figure 4.1 illustrates the trends over time in two key indicators of unmet need in hypertension care among older adults, as measured across Waves 1, 3, and 6: uncontrolled hypertension and undiagnosed hypertension.

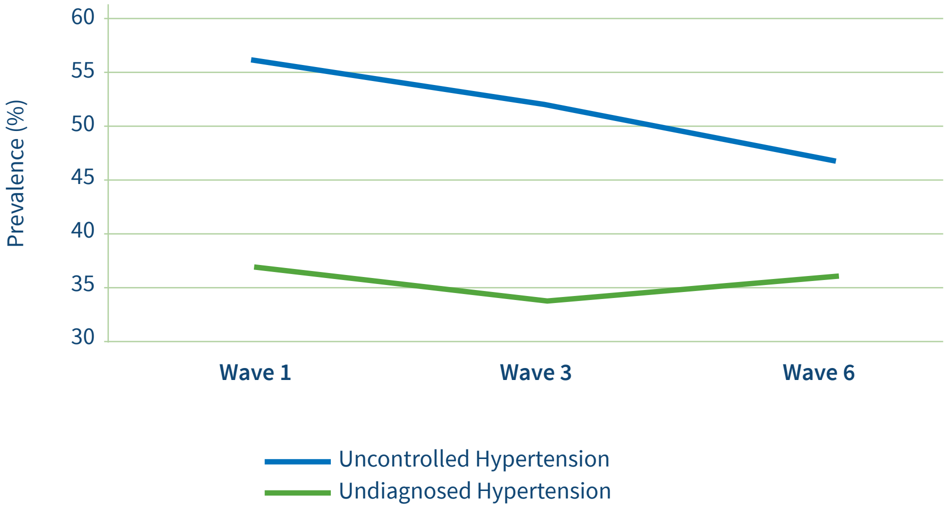

Figure 4.1: Longitudinal trends in prevalence of uncontrolled and undiagnosed hypertension, among adults aged 50 and older at Waves 1, 3 and 6

The prevalence of undiagnosed hypertension has remained relatively stable across the study waves. This consistency suggests that despite ongoing public health efforts, a substantial proportion of older adults with hypertension continue to go unrecognised. In contrast, the proportion of older adults with known but uncontrolled hypertension has shown a gradual decline over time. At Wave 1, 56% (95% CI: 54–58%) of adults aged 50 years and older with a hypertension diagnosis had uncontrolled blood pressure. This figure declined modestly to 52% (95% CI: 49–54%) at Wave 3 and further to 47% (95% CI: 43–52%) at Wave 6. These improvements suggest some progress in the management of hypertension over the study period, potentially reflecting enhanced adherence to treatment guidelines, wider availability of effective antihypertensive medications, and the impact of structured care initiatives such as the Chronic Disease Management Programme in general practice. However, despite this downward trend, nearly half of those with a known diagnosis still have inadequately controlled blood pressure, indicating ongoing challenges in treatment adherence, medication optimisation, and lifestyle modification.

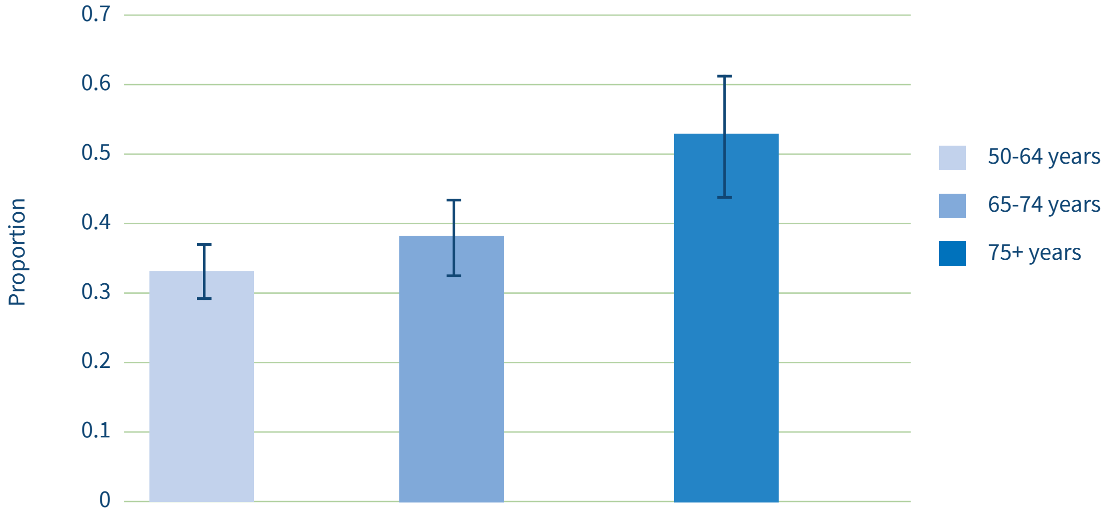

Figure 4.2: Absence of antihypertensive treatment in people with hypertension on BP measurement, aged 50 and older

Overall, only 37% of older adults with objectively measured hypertension were on blood pressure lowering treatment, including one third of those aged between 50 and 64 years (Figure 4.2).

4.3.2 Hypercholesterolaemia

Hypercholesterolaemia refers to the presence of elevated cholesterol levels in the blood and is a major modifiable risk factor for atherosclerotic cardiovascular diseases, including ischaemic heart disease and stroke (8). According to international clinical guidelines, hypercholesterolaemia is typically defined by a total cholesterol concentration greater than 5 mmol/L and/or low-density lipoprotein cholesterol (LDL) levels above 3 mmol/L (8).

The health risks associated with hypercholesterolaemia can be substantially mitigated through both lifestyle and pharmacological interventions. Recommended lifestyle changes include adopting a heart-healthy diet, while reducing intake of saturated and trans fats. Smoking cessation and moderation of alcohol consumption are also strongly advised (8,9). For individuals with persistently high cholesterol levels or those at elevated cardiovascular risk, pharmacological treatment may be necessary (9).

Unmet Need

At Wave 6, 46% of adults aged 50 years and older reported having been diagnosed with hypercholesterolaemia. Prevalence was relatively consistent across age groups, with 43% of those aged 50–64 years, 47% of those aged 65–74 years, and 47% of those aged 75 years and older reporting a diagnosis.

However, among those who reported a diagnosis of hypercholesterolaemia, over one-third had total cholesterol and/or LDL cholesterol levels above established clinical targets, indicating suboptimal control. In addition, 45% of those who did not report a diagnosis of high cholesterol were found to meet the diagnostic criteria for hypercholesterolaemia based on their blood test results at Wave 6. This highlights a significant level of undiagnosed or unrecognised high cholesterol within the older population.

Overall, 46% of adults aged 50 years and older were prescribed lipid-lowering medications, including statins, fibrates, or ezetimibe. This included 72% of those who reported a diagnosis of hypercholesterolaemia and 24% of those who did not, suggesting that a notable proportion of individuals are receiving treatment in the absence of an acknowledged diagnosis, potentially for secondary prevention or due to other cardiovascular risk factors.

When analysed by age, the percentage of those prescribed cholesterol-lowering medications increased with age: 34% in the 50–64 age group, 46% in those aged 65–74 years, and 55% among those aged 75 years and older. Despite this, a large proportion of untreated individuals continued to have elevated cholesterol. Among those who were not prescribed lipid-lowering medication, more than half (58%) met the criteria for hypercholesterolaemia based on their laboratory results. This was particularly striking in the oldest age group, where 64% of those aged 75 years and older who were not on cholesterol-lowering medication had elevated cholesterol levels.

Longitudinal Trends

The percentage of older people reporting a diagnosis of high cholesterol has increased steadily over time, rising from 37% at Wave 1 to 46% at Wave 6. Among those who reported a diagnosis of high cholesterol, the proportion with total cholesterol and/or

LDL cholesterol levels above established clinical targets has declined consistently across Waves, indicating improvements in cholesterol management over time (Figure 4.3).

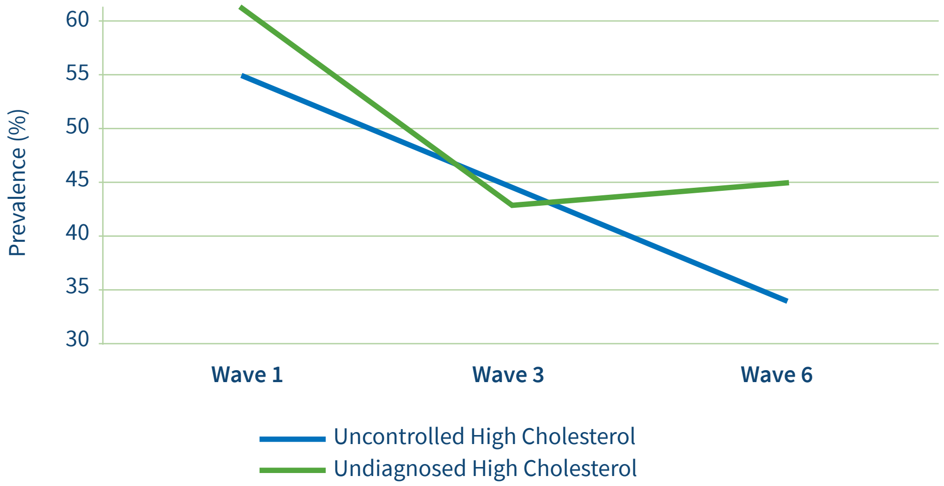

Figure 4.3: Prevalence of population with undiagnosed and uncontrolled hypercholesterolaemia, from Waves 1, 3 and 6

Additionally, as illustrated in Figure 4.3, there has been a reduction in the percentage of adults aged 50 years and older that did not report a diagnosis of high cholesterol but were found to have elevated cholesterol levels on blood testing. This suggests some progress not only in treatment effectiveness but also in the detection of previously unrecognised cases of hypercholesterolaemia.

Overall, over one third of adults with known hypercholesterolaemia had either total cholesterol or LDL above established target levels, including over 40% of those aged between 50 and 64 years (Figure 4.4).

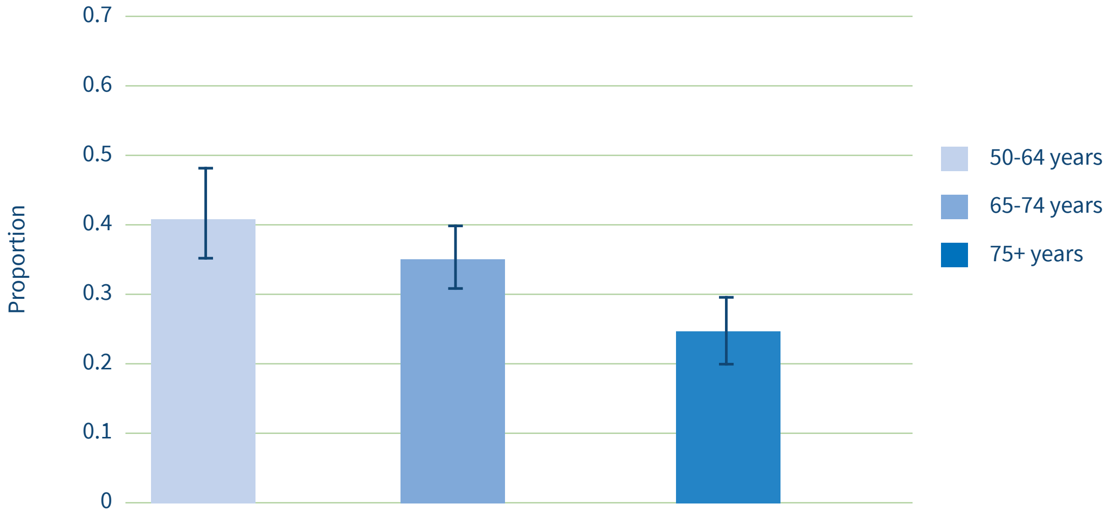

Figure 4.4: Proportion of uncontrolled cholesterol in adults aged 50+ years with known hypercholesterolaemia

Since Wave 1, there has been a consistent reduction in the proportion of older people who have high cholesterol that is not adequately controlled, and in the proportion who have high cholesterol on TILDA blood tests but had not been diagnosed.

4.3.3 Diabetes

Diabetes, characterised by an inability to produce sufficient insulin and/or effectively use the insulin the body produces, significantly increases the risk of heart disease, stroke, kidney disease, vision loss and nerve damage if not managed appropriately (10). It is diagnosed when haemoglobin A1c (HbA1c), a blood test that assesses average blood sugar levels over a period of months, measures ≥48mmol/mol (6.5%) (10). Diabetes can be managed effectively by lifestyle changes including increasing exercise, dietary modification and weight reduction. Pharmacological treatment generally involves oral medications that lowers blood glucose levels and/or subcutaneous injections including insulin. Treatment targets in diabetes are often personalised and may relate to factors such as general health and well-being, duration of diabetes and risk of hypoglycaemia/low blood sugar. In general, a treatment target of Hba1c<48 mmol/ml is used for healthy, otherwise well individuals, while a target of <53mmol/mol may be used for older people with comorbidities/frailty (11).

Unmet Need

At Wave 6, 12% of adults aged 50 years and older reported having a diagnosis of diabetes. This included 10% of those aged 50–64 years, 11% of those aged 65–74 years, and 14% of those aged 75 years and older.

Among those with self-reported diabetes, over two-thirds had HbA1c levels above the recommended treatment target (HbA1c ≥48 mmol/mol), and 45% had levels above the threshold indication indicating suboptimal glycaemic control (HbA1c >53 mmol/mol). The percentage of individuals with uncontrolled diabetes (HbA1c >53 mmol/mol) by age group is shown in Figure 4.5.

Notably, almost 20% of those with diagnosed diabetes were not prescribed any pharmacological treatment. In this group, the mean HbA1c was 54.7 mmol/mol (95% CI: 52.9–56.6). Engagement with lifestyle interventions was also low, only 36% reported using diet or exercise to manage their condition, and nearly half reported low overall physical activity levels. Among those without a reported diagnosis of diabetes, just 2% met the criteria for diabetes based on an HbA1c >48 mmol/mol at Wave 6.

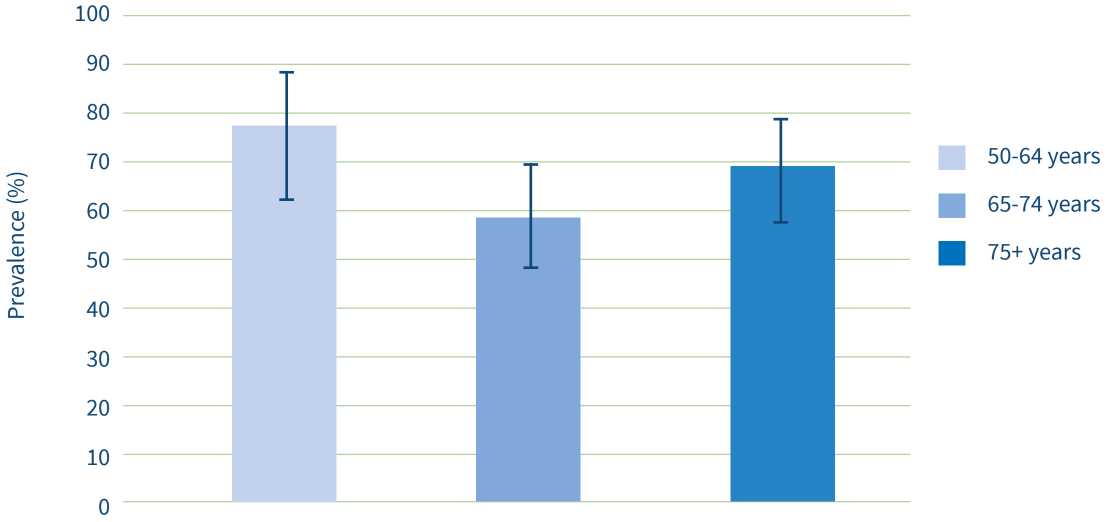

Figure 4.5: Prevalence of population with uncontrolled diabetes and HbA1c>53 mmol/mol, at Wave 6

Longitudinal Trends

The prevalence of diabetes among adults aged 50 years and older at baseline has increased from 8% at Wave 1 to 12% at Wave 6. Mean HbA1c levels in those with diabetes have also risen over time, reflecting a trend toward poorer glycaemic control across the cohort (Figure 4.6).

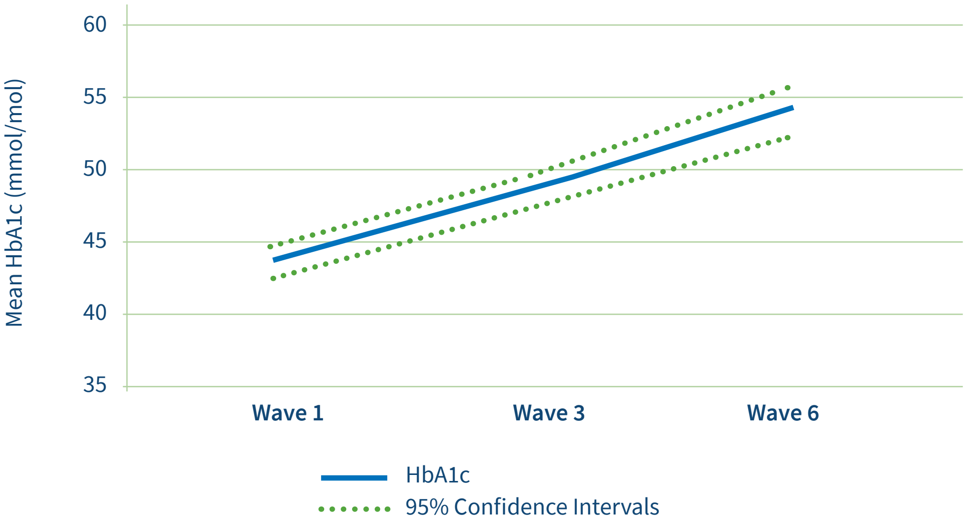

Figure 4.6: Mean HbA1c (mmol/mol) in older adults with diabetes, from Wave 1 to 6.

4.4 Falls and fractures

4.4.1 Falls

Falls are the most frequent cause of hospital admission among older people in Ireland, often marking a tipping point in their health and independence (12). A single fall can lead to a cascade of negative outcomes, including functional decline, increased use of healthcare services, and, in many cases, admission to long-term residential care. Beyond the immediate physical consequences such as fractures or head injuries, falls can also lead to psychological impacts like fear of falling, which further reduces mobility and quality of life (13).

Despite the serious consequences, many falls are preventable with timely and appropriate intervention. Evidence shows that access to comprehensive, specialist multidisciplinary care, encompassing medical, physiotherapy, occupational therapy, and pharmacy input, can significantly reduce fall risk (14). However, in Ireland, falls prevention services are currently fragmented. There are relatively few dedicated specialist falls clinics, and no coordinated national clinical programme or strategy for falls care exists.

A key component of effective falls prevention is the identification and management of falls-risk-increasing drugs (FRIDs). These include medications that impair balance, cognition, blood pressure regulation, or muscle function (15). Older adults are particularly vulnerable to the side effects of these medications due to age-related physiological changes and polypharmacy. To support healthcare professionals in systematically identifying FRIDs, STOPPFall (Screening Tool of Older Persons Prescriptions in older adults with high fall risk) has been developed (15). This evidence-based tool helps clinicians recognise medications that may be contributing to falls and guides safer prescribing decisions.

Unmet Need

One in ten adult aged 50 years and older reported in Ireland experiencing a fall in the past 12 months that was serious enough to require medical attention. The likelihood of such falls increased with age: 7% among those aged 50–64 years, 9% among those aged 65–74 year and 13% among those aged 75 years and older. Additionally, 1 in 20 attended an emergency department due to a fall in the previous year, including: 4% of those aged 50–64, 5% of those aged 65–74 and 7% of those aged 75 years and older.

Among those who experienced a fall requiring medical attention, nearly half were prescribed at least one FRID, such as sedatives, antidepressants, or antihypertensives. Alarmingly, over one-in five were taking more than one FRID, compounding their risk. Falls are often not isolated incidents. Almost half of those who reported a serious fall at Wave 6 had also reported a fall at Wave 5. Over one-quarter had previously experienced a fall that resulted in injury.

Despite the high burden and clear need for intervention, access to rehabilitation and specialist services remains limited. Only 24% of older adults who experienced a medically significant fall reported receiving physiotherapy in the past year, whether through public or private services. Among those aged 75 and older with a serious fall, just 19% had accessed physiotherapy. Additionally, nearly one-quarter of older adults who required medical attention for a fall were unable to access a dedicated falls clinic within their regional health area, highlighting a significant gap in post-fall care and prevention services.

Longitudinal Trends

The proportion of older adults reporting any fall annually rose from 24% at Wave 1 to 31% at Wave 6, reflecting an upward trend in fall prevalence over time. Meanwhile, prescription of FRIDs, as measured using the STOPPFall tool, has also increased, from 29% at Wave 1 to 34% at Wave 6, highlighting a growing need for medication review and deprescribing strategies in fall prevention (Figure 4.7).

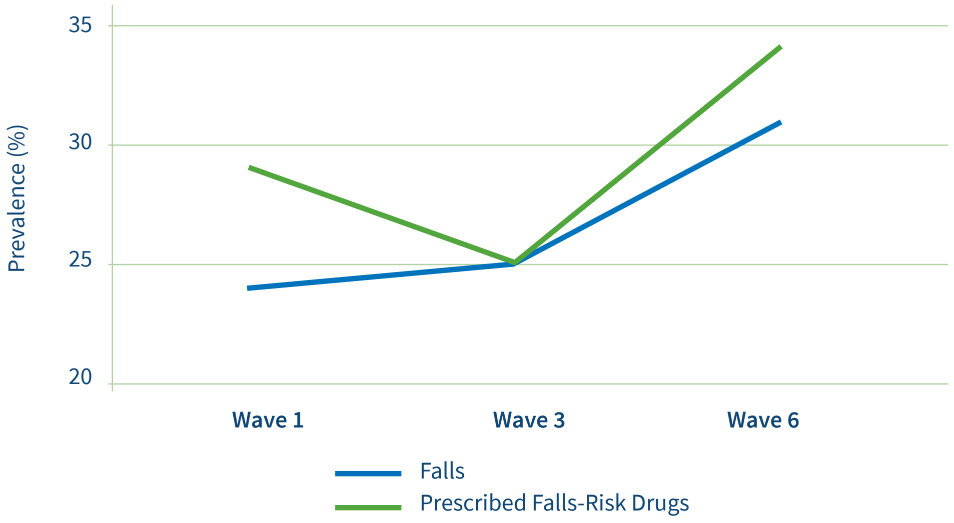

Figure 4.7: Prevalence estimates for falls and falls-risk increasing drugs amongst older people, between Waves 1, 3 and 6

One in eight people aged 70 years and older required medical attention for a fall in a 12-month period, while one in 16 presented to the emergency department with a fall, yet almost one quarter of those with a fall requiring medical attention cannot access a specialist falls clinic within their regional health area (Figure 4.8).

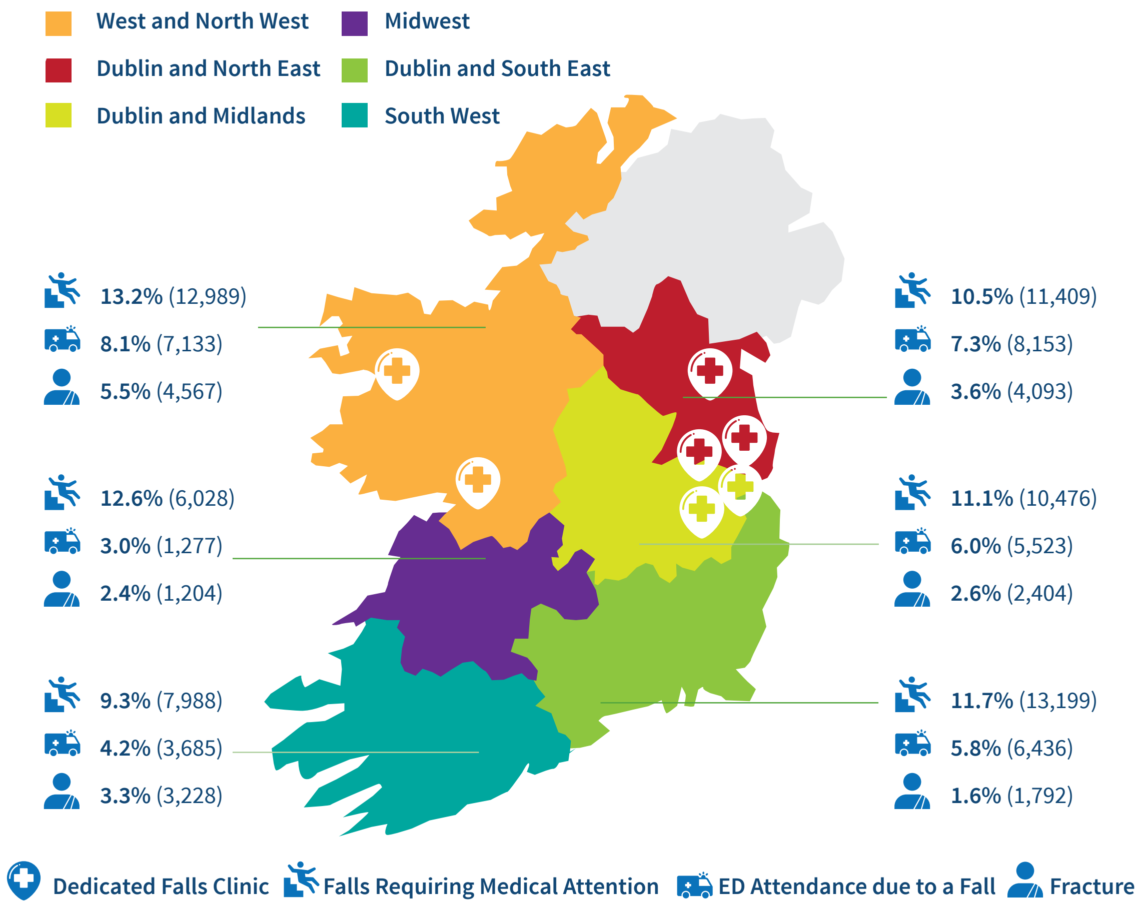

Figure 4.8: Percentage falls, ED attendance and fractures in population aged 70 years and older, by proposed regional health area, at Wave 6

4.4.2 Osteoporosis and fractures

Osteoporosis is a common skeletal disorder characterised by reduced bone mineral density and deterioration in bone microarchitecture, leading to increased bone fragility and a heightened risk of fractures. These fractures, often referred to as fragility fractures, typically occur in the hip, wrist, and vertebrae, and are usually the result of low-impact trauma, such as a fall from standing height (16). Often described as a 'silent disease', osteoporosis progresses without symptoms until a fracture occurs. By the time it is diagnosed, many individuals have already sustained one or more fractures, with little or no prior warning. Among older adults, falls are the leading cause of osteoporotic fractures, highlighting the close relationship between falls risk and the importance of preventing both in geriatric care (16).

The impact of fractures on older adults is profound. Hip fractures are associated with significant pain, reduced mobility, prolonged hospital stays, and a high risk of long-term care placement. Vertebral fractures can cause chronic pain, height loss, and spinal deformity, while wrist fractures may lead to reduced function and independence in daily activities (17). Despite the serious nature of these outcomes, osteoporosis is often underdiagnosed and undertreated. This is concerning, as effective treatments are available that can reduce the risk of fractures by more than 50%. These include pharmacological therapies such as bisphosphonates, denosumab, and other anti-resorptive agents. In addition to medication, lifestyle interventions, including adequate calcium and vitamin D intake, weight-bearing exercise, smoking cessation, and reduced alcohol consumption are important components in maintaining and improving bone health (18).

Unmet Need

Despite these advances, a considerable unmet need persists. At Wave 6 of the study, nearly one in five older adults in Ireland reported a diagnosis of osteoporosis, with prevalence increasing with age: 11% among those aged 50–64, 18% in those aged 65–74, and 23% among those aged 75 and older. Alarmingly, treatment rates remain low. Only one-quarter of those diagnosed with osteoporosis were prescribed an osteoporosis-specific medication, with treatment uptake declining by age group: 33% for ages 50–64, 29% for ages 65–74, and just 21% for those 75 and older. Calcium and vitamin D supplementation was somewhat more common, with 57% of diagnosed older adults in Ireland receiving prescriptions—ranging from 54% in the youngest group to 60% among those aged 75 and older.

There is also a substantial burden of undiagnosed and untreated osteoporosis. Among older adults in Ireland whose heel ultrasound results fell within the osteoporotic range, fewer than 40% reported having received a diagnosis, and only one in ten were on active treatment. Fracture rates remain a significant concern: since the last interview, nearly 3% of older adults in Ireland experienced a new fracture involving the hip, wrist, or spine—almost 90% of which were fall-related. Yet, just 38% of those with a recent fracture reported an osteoporosis diagnosis. Fewer than 10% were prescribed an anti-resorptive treatment, and fewer than 40% received calcium and vitamin D supplementation. Alarmingly, over 43% of older adults in Ireland who sustained a recent fracture were prescribed at least one FRID, highlighting serious gaps in secondary prevention and the need for more coordinated and proactive care approaches (Figure 4.9).

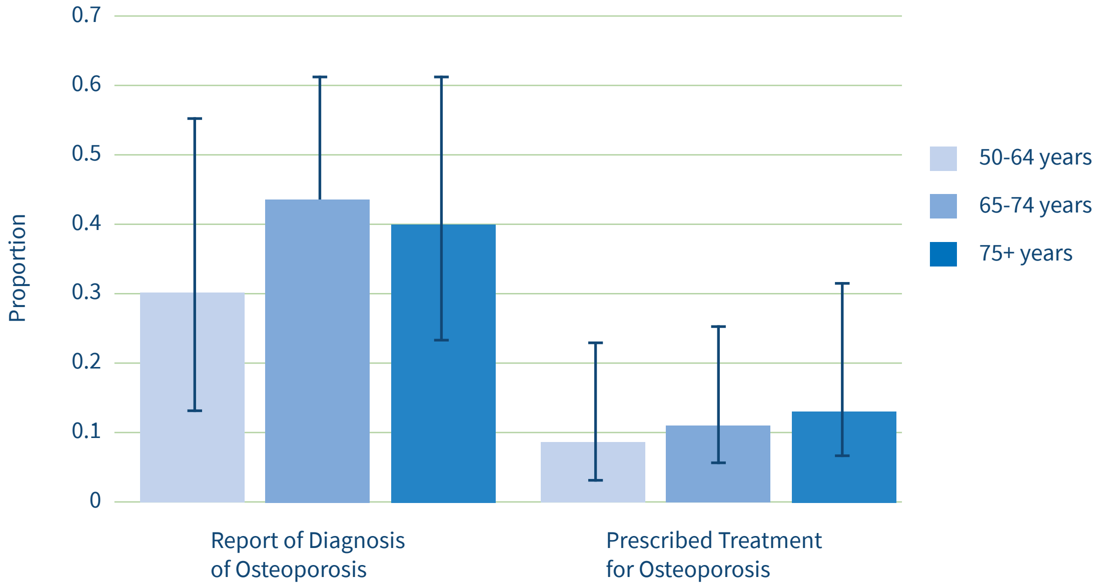

Figure 4.9: Proportion of osteoporosis diagnosis and treatment in older adults with osteoporotic heel ultrasound, at Wave 6

Longitudinal Trends

Over time, there has been only a marginal increase in the prescription of definitive bone protection for older adults reporting a history of hip or wrist fracture from 8% at Wave 1 to 10% at Wave 6. This remains surprisingly low, especially given the known benefits of treatment in preventing further fractures. In contrast, the prescription of FRIDs in those with prior fractures has increased significantly, further compounding fracture risk in a highly vulnerable group (Figure 4.10).

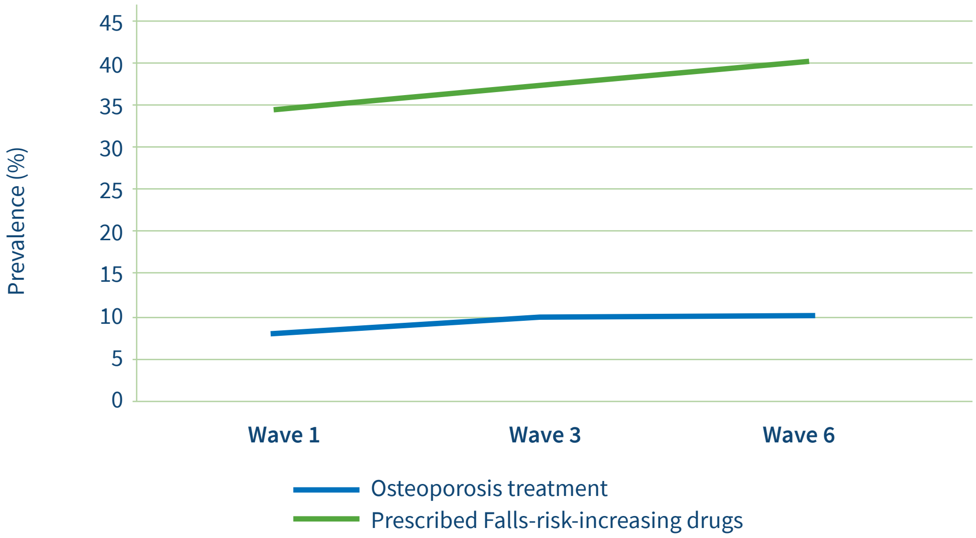

Figure 4.10: Prevalence estimates for prescribing osteoporosis treatment and falls-risk-increasing drugs with hip/wrist fracture, at Waves 1, 3 and 6

4.5 Depression and chronic pain

4.5.1 Depression

Depression is a common and serious mental health condition characterised by persistent low mood, diminished interest or pleasure in previously enjoyable activities, feelings of hopelessness, fatigue, and disturbances in sleep, appetite, or concentration. While ageing is often associated with greater emotional resilience and well-being, depression remains both under-recognised and undertreated among older adults in Ireland, affecting a significant proportion of this population (19). Late-life depression is not a normal part of ageing, yet it is frequently misattributed to physical illness or viewed as natural consequence of ageing, leading to delayed diagnosis and treatment (19).

The consequences of untreated depression in older adults are substantial. It is strongly associated with cognitive decline, including increased risk of dementia, as well as functional impairment, reduced quality of life, and greater dependence on healthcare services. Depression also contributes to loneliness and social withdrawal, further compounding mental and physical health difficulties (20). Effective management of depression in later life begins with accurate diagnosis, which can be complicated as symptoms can often present differently than in younger populations. Treatment typically involves a combination of psychological therapy and pharmacological treatment with antidepressants where appropriate (20).

Unmet Need

Despite the availability of evidence-based treatments, a significant unmet need remains. Almost 1 in 20 older adults in Ireland aged 50 and older reported a diagnosis of depression, with prevalence declining with age: 7% among those aged 50–64, 4% among those aged 65–74, and 3% among those aged 75 and older. An additional 1 in 20 reported a different mental health condition, including 5% of those aged 50–64 and 3% of those aged 65 and older. Among those with a self-reported diagnosis of depression, 71% were prescribed antidepressant medication and 46% had engaged in psychotherapy within the previous year. In total, 83% of this group had received some form of active treatment. However, these figures still reflect only a subset of those affected.

A much larger proportion of older adults in Ireland appear to be living with undiagnosed or untreated depression. Over 12% met the threshold for clinically significant depressive symptoms on the CES-D scale, with similar prevalence across all age groups. More than 1 in 20 met diagnostic criteria for a major depressive episode in the previous 12 months. Among those meeting these clinical criteria, only 36% had received a diagnosis of depression or another mental health condition, and fewer than half were receiving any treatment. Overall, just 56% had been diagnosed or treated. Alarmingly, over 45% had not reported their symptoms to any healthcare provider (Figure 4.11). Fewer than half had discussed symptoms with their GP, and only about 20% had talked to another health professional. These figures suggest that stigma, low awareness, or barriers to accessing care are contributing to a large burden of unrecognised and untreated depression in later life.

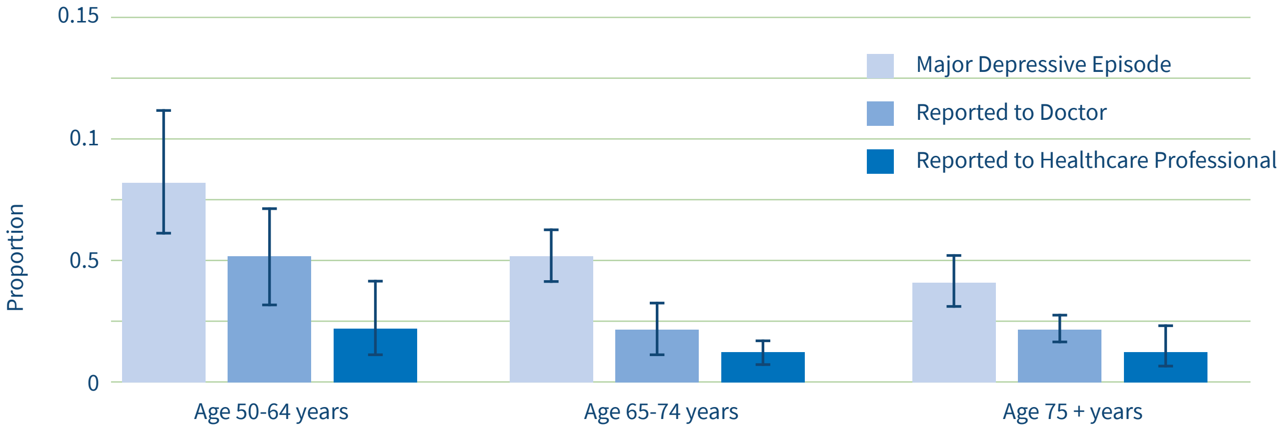

Figure 4.11: Major depressive disorder incidence and symptoms reporting, by age group at Wave 6

Longitudinal Trends

Longitudinal data further highlight these challenges. The percentage of older adults in Ireland meeting criteria for a major depressive episode remained unchanged at 5% between Wave 3 and Wave 6 (Figure 4.12). Use of psychotherapy increased modestly, from 18% at Wave 3 to 24% at Wave 6. However, antidepressant prescribing remained static, with only 38% of those experiencing major depression receiving medication at both time points.

In summary, depression is common but underdiagnosed among older adults in Ireland. Approximately 1 in 10 (12%) experience clinically significant symptoms at any given time, but only about one-third of those with major depression report receiving a formal diagnosis. Treatment gaps persist, with fewer than half receiving either psychological therapy or medication. Most concerningly, nearly half do not disclose their symptoms to any healthcare professional, reflecting a significant gap in awareness, engagement, and access to mental healthcare.

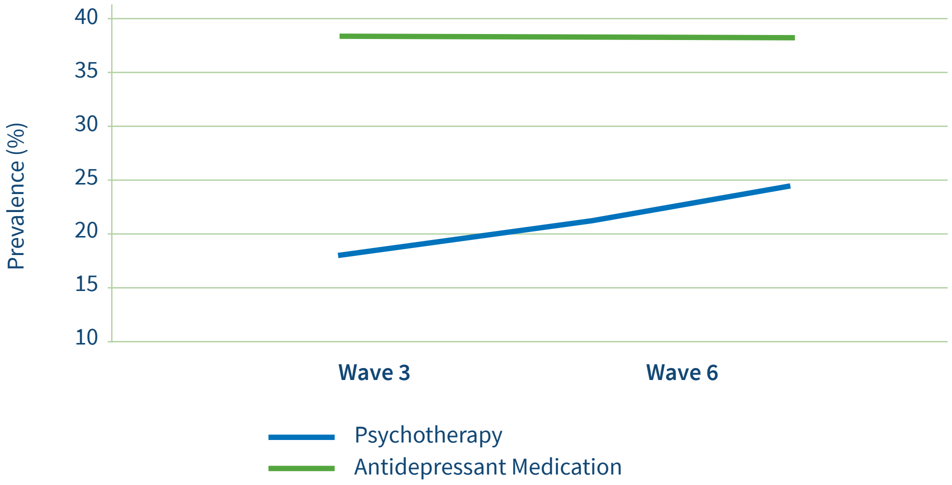

Figure 4.12: Psychotherapy and antidepressant use in people with a major depressive episode in the last 12 months, at Waves 3 and 6

4.5.2 Chronic pain

Chronic pain is defined as pain that persists or recurs for more than three months (21). It is strongly associated with poorer quality of life, low mood, sleep disturbances, functional impairment, and increased risk of social isolation. In older adults, it frequently contributes to loss of independence, greater fall risk, and increased use of healthcare services, including frequent GP visits, emergency department attendances, and hospitalisations. Chronic pain is also closely linked with depression and anxiety, forming part of a complex interplay of physical and mental health burdens that can further complicate management (21).

Effective management of chronic pain involves both pharmacological and non-pharmacological strategies. Therapies such as physiotherapy, occupational therapy, Cognitive Behavioural Therapy (CBT), mindfulness, and graded exercise programs have been shown to improve mood, function, and coping—even when pain cannot be completely eliminated. Pharmacological treatment typically follows the World Health Organisation (WHO) analgesic ladder, starting with non-opioid analgesics like paracetamol and NSAIDs, followed by weak opioids, and progressing to strong opioids if pain remains inadequately controlled (22).

Unmet Need

Despite the high prevalence of chronic pain, treatment remains inadequate for many. Over one-third of older adults in Ireland reported being frequently troubled by pain lasting longer than three months, consistent with a diagnosis of chronic pain. This prevalence was consistent across age groups: 37% in those aged 50–64, 35% among those aged 65–74, and 38% for those aged 75 and older. Among those with chronic pain, 25% described it as mild, 56% as moderate, and 19% as severe. Importantly, over one in five reported that pain interfered with their day-to-day activities.

Despite this burden, pain management was often lacking. More than two-thirds of older adults in Ireland with moderate to severe chronic pain were not prescribed any medication on the WHO analgesic ladder, including basic treatments such as paracetamol, NSAIDs, or opioids. Among those whose pain significantly impacted daily functioning, only 33% were receiving WHO ladder analgesia, while 67% remained untreated with even the most basic pharmacological options (Figure 4.13).

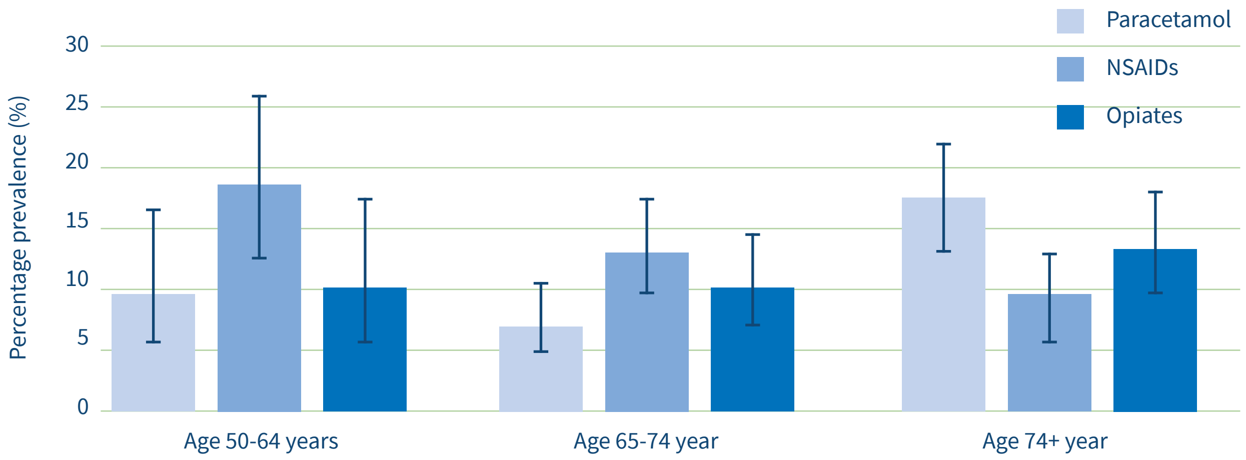

Figure 4.13: WHO ladder analgesia in those with moderate-severe chronic pain, by age group

In conclusion, chronic pain is a widespread and functionally limiting condition among older adults in Ireland. One in three are affected, and one in five report that pain limits their daily activities. Despite this, pain management is frequently inadequate, with almost three-quarters of those with chronic pain not receiving appropriate pharmacological treatment. Even when pain is clearly disabling, the majority remain untreated, reflecting a major gap in clinical care and pain management strategies for older populations.

4.6 Discussion

This chapter uses TILDA data to demonstrate important areas of unmet healthcare need amongst older people in Ireland, focusing on cardiovascular disease risk factor management, falls and fractures prevention, and the treatment of depression and chronic pain.

Cardiovascular risk factors

As we age, our risk for cardiovascular disease including heart disease and stroke, increases due to changes in the cardiovascular system and accumulation of risk factors like high blood pressure, high cholesterol, and diabetes (23). Addressing these risk factors, through a combination of lifestyle measures such as exercise and diet, and pharmacological treatment where indicated, has been shown to significantly reduce the risk of death due to cardiovascular disease (24). Currently, cardiovascular disease accounts for one third of deaths in Ireland annually (25). The benefits of preventative strategies for cardiovascular disease are not limited to lower mortality however, and include better outcomes for other chronic medical conditions, lower healthcare costs and improved quality of life (26).

It is concerning then that we show that almost half of older people with hypertension, one third with high cholesterol and half of those with diabetes are uncontrolled based on international guidelines. Further, one third of older people without a diagnosis of hypertension met criteria for high blood pressure, while almost half of older people without a diagnosis of hypercholesterolaemia had high cholesterol. This current high burden of undetected and undertreated risk factors occurs in the context of generally lower rates of undiagnosed conditions since Wave 1, possibly related to the chronic disease management scheme in general practice.

These findings underscore a critical gap in the detection and management of cardiovascular risk among older adults in Ireland. Despite some progress in diagnosis rates since Wave 1, a substantial proportion of older individuals remain either undiagnosed or inadequately treated, placing them at heightened risk for serious health outcomes. Strengthening preventative care through expanded screening, improved adherence to treatment guidelines, and enhanced support for lifestyle modification in primary care is essential to reducing the long-term burden of cardiovascular disease.

Falls and fractures

Falls and fractures often represent a seminal event in the life of an older person, frequently heralding functional and cognitive decline, increased health care use and nursing home admission. The incidence of falls amongst older people in Ireland has grown steadily since Wave 1, and currently 1 in 10 older people have a fall that requires medical attention annually, while 3% sustain a fracture.

Falls and fracture prevention should therefore be a public health priority, however there is currently no dedicated clinical program for falls in Ireland. Falls care is generally fragmented, with poor access to dedicated falls clinics and care pathways across the country. This is reflected in our findings where alongside the increasing incidence of falls, prescription of falls-risk increasing drugs has increased significantly, less than 10% of older people with fractures are treated for osteoporosis and only one quarter of older people who require medical attention after a fall access physiotherapy services.
This growing burden highlights the urgent need for a coordinated national approach to falls prevention and post-fall care. A comprehensive clinical program, integrated across primary, secondary, and community services, is essential to reduce fall-related injuries, improve outcomes, and support healthy ageing.

Depression and chronic pain

Early identification and management of depression and chronic pain are crucial components of comprehensive health care for older people. Low mood and pain can worsen physical illness, accelerate cognitive decline, increase disability and mortality, and undermine independence in later life (19,21).

While annual rates of major depressive episodes amongst older people have remained stable at Wave 6 at 5%, almost half do not report symptoms to a healthcare professional, and less than a quarter engage with psychotherapy (albeit increased from 18% at Wave 3). Over two thirds of older people with moderate-severe chronic pain were prescribed no WHO ladder analgesia.

These findings highlight a pressing need to improve the detection and treatment of depression and chronic pain in older adults. Strengthening routine screening in primary care, increasing access to multidisciplinary support, and addressing stigma around mental health problems in later life are important steps in this regard.

4.7 Conclusion

This chapter highlights critical gaps in healthcare delivery for older adults in Ireland, using TILDA data to focus on three key areas: cardiovascular risk factor management, falls and fracture prevention, and the treatment of depression and chronic pain. Despite clear evidence that prevention and early intervention in these domains can improve health outcomes, quality of life, and reduce healthcare costs, many older people remain undiagnosed, untreated, or inadequately managed. These findings call for a stronger, more integrated public health response that prioritises proactive screening, equitable access, and targeted national strategies to address these growing and interconnected challenges of ageing.

4.8 Stakeholder perspective

Dr Colm Henry

Chief Clinical Officer, Health Service Executive

The greatest risk in healthcare planning for older people is viewing through the prism of demographic expansion alone. Seen this way, we anticipate and plan for utilisation corresponding to an ageing population without considering their actual needs beyond current utilisation. The findings of the TILDA Wave 6 Report dispel the notion that current utilisation corresponds to need. The immediate focus of the report is on the key conditions which we now know are underdiagnosed and undertreated in older people: hypertension, hypercholesterolaemia, diabetes, osteoporosis, depression, and chronic pain. The findings demonstrate critical unmet need, both in those cohorts who are already treated and those who have not been diagnosed. The gap between need and utilisation widens with age: in those not prescribed antihypertensive medication, a significant proportion met the diagnostic criteria for hypertension, and this increased with age. While TILDA brings valuable insights that should inform planning for the target conditions, we should be mindful of their application across a wider spectrum. If need is unidentified or under addressed for hypertension or diabetes, what does this mean for stroke care, cancer and heart disease? The trajectory of healthcare points towards greater inclusion and application of benefits to older people and our planning must adapt accordingly.

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5

The Age-Friendly Health Systems 4Ms Framework: a longitudinal analysis using TILDA

Cathal McCrory

Contents

Key Findings 98

5.1 Introduction 99

5.2 Analytical Approach 103

5.3 Mobility 104
5.3.1 Change in TUG across the age span 107
5.3.2 Sex differences in TUG 108
5.3.3 Educational differentials in TUG performance 110

5.4 Medications 112
5.4.1 Change in medication usage across the age span 114
5.4.2 Sex differences in medication usage 115
5.4.3 Educational differentials in medication usage 117

5.5 Mind 119
5.5.1 Change in verbal fluency across the age span 120
5.5.2 Sex differentials in verbal fluency 121
5.5.3 Educational differentials in Verbal Fluency 123

5.6 What Matters 126
5.6.1 Change in QoL across the age span 128
5.6.2 Sex differentials in QoL 128
5.6.3 Educational differentials in QoL 130

5.7 Summary and Conclusions 132

5.8 Stakeholder Perspective 134

5

The Age-Friendly Health Systems 4Ms Framework: a longitudinal analysis using TILDA

Key Findings

- The Age-Friendly Health Systems 4Ms Framework addresses 4 key areas for health and wellbeing: Mobility, Medication, Mind, What Matters.

- **Mobility** declines steadily with age, worsening more sharply in older age.
  - *Women perform better than men at age 50 years but decline faster, performing worse than men by age 80.*
  - *Those with lower education show consistently worse mobility, with disparities widening over time.*

- **Medication** use increases substantially with age.
  - *Women take more medications at midlife, but men's use increases faster, overtaking women's by age 80.*
  - *People with lower education take more medications throughout life, though their rate of increase slows in older age.*

- **Mind:** Cognitive function declines with age, with sharper drops after age 60.
  - *Women decline faster than men, scoring significantly lower by age 60 years and older.*
  - *Tertiary-educated individuals start with higher cognitive function but also decline faster—though they maintain an advantage at all ages.*

- **What Matters:** Quality of Life (QoL) improves slightly until mid-60s, then declines, but remains high until around age 80.
  - *Women report higher QoL at midlife, but this declines faster, narrowing the sex gap in older age.*
  - *A 15-year disparity in QoL exists between the least and most educated, highlighting significant socio-economic inequality.*

- Ageing is non-linear and multidimensional: while mobility and cognitive function decline, QoL can initially improve before declining in later years.

- There is substantial individual variation in ageing; most differences are between people, not within individuals over time.

- Evidence supports the male–female health–survival paradox: women live longer but experience more health-related decline.

5.1 Introduction

We are living through a period of unprecedented demographic change. The so-called demographic transition refers to the historical shift from high birth rates and high death rates to low birth rates and lower death rates at earlier ages as societies transition through different stages of technological and economic development (1). Figure 5.1 shows the changing composition of the Irish population structure between 1950-2023 broken into broad age cohorts with the data underlying this figure presented in Table 5.1. There has been a steady decrease in the proportion of the population aged less than 5 years which declined from 11% in 1950 to 5.7% by 2023. Conversely, the proportion aged 65 years and older increased from 11.0% to 16.5% during the same period.

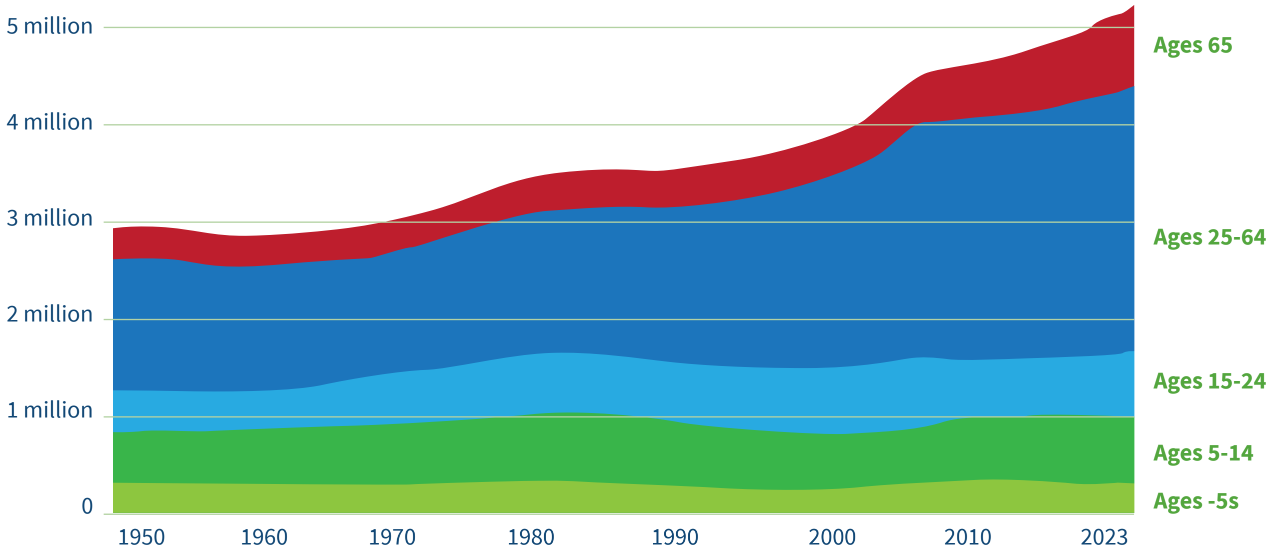

Figure 5.1: Irish population structure from 1950-2023 (https://ourworldindata.org/age-structure)

Table 5.1: Irish population by age group from 1950-2023

	1950	1980	2010	2023
	n (%)	**n (%)**	**n (%)**	**n (%)**
Under 5 years	309,889 (11.0%)	348,519 (10.2%)	348,52 (7.6%)	7293,493 (5.7%)
5-14 years	523,714 (18.0%)	689,070 (20.2%)	612,903 (13.4%)	694,751 (13.4%)
15-24 years	425,218 (14.6%)	595,290 (17.5%)	607,635 (13.3%)	677,695 (13.1%)
25-64 years	1,333,000 (45.8%)	1,410,000 (41.3%)	2,470,000 (54.2%)	2,720,000 (52.4%)
65+ years	319,215 (11.0%)	367,269 (10.8%)	518,456 (11.4%)	806,826 (15.5%)
Total Population	**2,911,036**	**3,410,148**	**4,557,521**	**5,192,765**

Current life expectancy for men and women in Ireland is 81 years and 84 years respectively (2) and we are close to being the best in class in the European region. Current demographic trends indicate that by the year 2030, almost one in six of the European population will be aged 60 years or older, and the number of older people will grow to 247 million by 2050; representing a 35% increase from 2017, with one in four older adults aged over 85 years by 2040 (3). We can see this demographic bulge making its way upwards if we consider the proportion of the population aged 25-64 years (Figure 5.1) which increased from 45.8% in 1950 to 52.4% in 2023.

The healthcare, social and economic impacts of this demographic transition have yet to be fully realised, but there is a concern that national governments are not sufficiently prepared for the challenges global ageing will pose. These demographic changes present enormous challenges to the sustainability of our welfare, healthcare and social care systems. Given that living into later old age is going to be the normative experience for the majority of the population, there is growing recognition of the need to reorient and redesign our primary care and acute care systems to respond to this demographic 'greying' of the population.

The Age-Friendly Health Systems 4Ms framework (4) is a model designed to address the complex and multi-faceted needs of older persons by focusing on 4 key areas that influence their health and wellbeing. The goal is to ensure every older adult receives the best care possible, is not harmed by care, and is satisfied with the care they receive. It has recently been adopted by Ireland's Health Service Executive (HSE) as a guiding heuristic to inform how the healthcare system should prioritise and structure interactions with older adults. The 4Ms stand for **M**obility, **M**edications, **M**ind, and What **M**atters, which we describe briefly below.

1. The **Mobility** component focuses on maintaining physical capacity and functioning so that older persons can maintain functional independence into late old age. It also focuses on falls prevention, which is a significant concern for older adults (5), as falls can lead to serious injuries and loss of independence. However, many individuals experience a decline in mobility and a loss of function at older ages due to chronic conditions such as arthritis or osteoporosis (6) which can impact their overall quality of life and wellbeing. Loss of function is not inevitable and can be maintained or improved through exercise and rehabilitation or remediated through the use of assistive technologies (e.g. strollers). It is recommended that older adults ambulate three times a day irrespective of setting.

2. The **Medications** component recognises the central role that medications play in the management and treatment of older adults' health conditions (4). With increasing age, older adults are often prescribed multiple medications to manage multiple chronic conditions (7), and polypharmacy is common with one in five adults aged 50 and older taking five or more medications in Ireland (8). Overprescribing is also a common problem (9) and can lead to adverse side effects and non-adherence. TILDA has previously shown that 76% of people approaching end-of-life had potentially inadequate medications and 56% had questionable medications underscoring the need to regularly review and optimise medications to minimise risk (9).

3. The **Mind** component focuses on optimising mood and cognitive wellbeing of older persons. As people age, they are at higher risk of experiencing dementia, low mood, and social isolation (10). Moreover, low mood is a risk factor for developing cognitive impairment (11) and vice versa (12) so these two facets of mind are intimately interconnected which is why they constitute one of the core pillars of the 4Ms framework. It recognises the importance of maintaining cognitive function and wellbeing into late old age. This can be achieved through the use of screening tools for early risk stratification and identification and utilising appropriate interventions (e.g. social engagement, psychological therapies) to support and nurture brain health.

4. **What Matters.** People have different views and opinions about what matters to them as they age. This component seeks to establish the core values of each older adult and align care to ensure that it reflects their specific health outcome goals (e.g. continued independence) and preferences (e.g. ageing in place). This type of personalised care planning is a collaborative process and used to guide and inform all aspects of the older person's care. Indeed, studies have shown that collaborative goal setting between care providers and older adults can lead to improvements in health outcomes (16), emphasising the importance of understanding and acting upon what matters most to the individual.

The 4Ms framework encourages healthcare providers to consider all aspects of an older individual's health and well-being, providing more effective, integrated care that improves quality of life, reduces the risk of adverse health outcomes, and supports ageing in place. Through this model, the HSE aims to improve the overall health and care experiences of older people while promoting their dignity, independence, and well-being. In this chapter, we use longitudinal data from the first 6 waves of TILDA to provide information regarding trajectories of change in the 4Ms over a 14-year time period across a number of important demographic characteristics including age, sex and education. This allows us to understand the normative and expected pattern of change in important aspects of older lives from mid-life into late old age using data for 8,171 participants aged 50-97 at the baseline interviews and for whom we have repeated observations for up to 6 waves of follow-up. We operationalised the 4Ms in TILDA using the Timed-Up-and-Go (TUG) test for **mobility** and a measure of verbal fluency for **mind** in order to assess cognitive competency. We used a psychometrically well-validated quality of life measure (CASP-12) to quantify **what matters**, and the number of doctor prescribed medications for that component as shown in Figure 5.2. The measures are described in more detail in the relevant sections below.

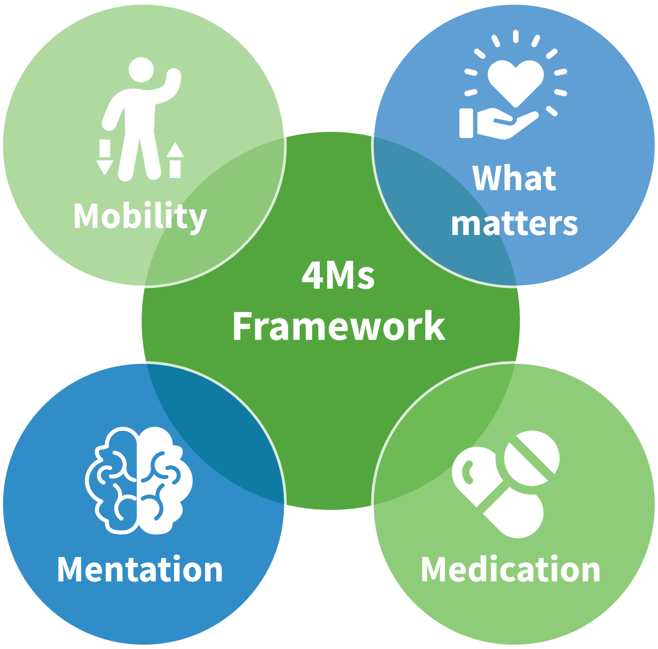

Figure 5.2: Schematic illustration of the 4Ms Framework as operationalised within TILDA across the six measurement occasions

5.2 Analytical approach

Given repeated observations of our four primary outcome variables—TUG, Medications, Verbal Fluency, and Quality of Life—across six waves of data collection, we employed latent growth curve models to examine change over time by age (in years), sex (male vs. female), and educational attainment, represented as a three-level variable (primary, secondary, tertiary education). The analysis is primarily descriptive and aims to identify patterns of change rather than infer causal relationships, with the intent of informing and motivating further investigation. We treated age at each measurement occasion as the time metric in our models, as this approach offers greater flexibility and precision than using a wave indicator alone. It enables us to quantify changes in outcomes per additional year of age and to model potential non-linear effects of age. To account for cohort effects, we included a wave indicator as a time invariant fixed effect, recognising the broad age range (50–90+ years) at baseline. Age was centred at 50 to provide a meaningful reference point—midlife and the minimum age of study eligibility—facilitating more interpretable intercepts and interaction terms within the growth curve framework.

Longitudinal data are often affected by missingness due to non-response, attrition (e.g., mortality), or loss to follow-up. To address this, we used maximum likelihood estimation (MLE) in our multilevel growth models, which estimates parameters based on all available data for each participant under the assumption that data are missing at random. We fit random coefficient models that include both random intercepts and slopes, allowing individuals to vary in their baseline outcome levels and in their rate of change with age. The inclusion of random slopes captures individual differences in trajectories over time. Likelihood ratio tests confirmed that, in all cases, the random coefficient models provided a significantly better fit than models with random intercepts only. The one exception was for medications which was modelled using a random intercepts model as the mixed effects Poisson model failed to converge when a random slope for age was included. This is not unexpected when modelling count variables.

The analysis proceeded in three stages. First, we modelled trajectories of change in each outcome with age by fitting a linear term and sequentially adding higher-order polynomial terms (quadratic, cubic, quartic), using likelihood ratio tests to evaluate model fit. Interaction terms that did not significantly improve model fit were dropped. Second, we introduced a main effect for sex and tested age-by-sex interactions to assess whether age-related trajectories varied by sex. Third, we added a main effect for education and examined models incorporating higher-order age-by-education interactions to explore differences across educational levels. We used predicted marginal effects from the fixed component of each growth curve model to estimate and compare expected outcome levels across age, sex, and education, with male sex and tertiary education as reference categories. These margins represent model-derived predictions at specified covariate values and are particularly useful for visualising group differences and age-related trends. For clarity, we report predicted means in 10-year age intervals from 50 to 90 years, providing a structured summary of differences across the ageing trajectory.

5.3 Mobility

Mobility is a function that is essential for maintaining functional independence at older ages. In TILDA, mobility was assessed using TUG which is a commonly used clinical tool for profiling functional performances. It measures the time in seconds required to rise from a standard chair (approximate seat height of 46 cm, arm height of 65 cm) walk 3 metres at their usual pace, turn, walk back to the chair, and sit back down again as depicted in Figure 5.3. An available chair that matched these dimensions as closely as possible (seat height 40–50 cm) was used in the home assessment. If a participant uses an assistive device to walk such as a cane or walker, they were permitted to use it during the test, but no physical assistance was given during the task. TUG is considered a good indicator of mobility and function in older adults as it indexes proximal muscle strength (standing up from chair), balance (turning), and executive function (following the five-stage command) in addition to gait speed (cardio-pulmonary functioning) (17). Slower TUG time has been shown to predict a range of hard clinical endpoints including falls, disability, hospitalisation, institutionalisation, and mortality (18).

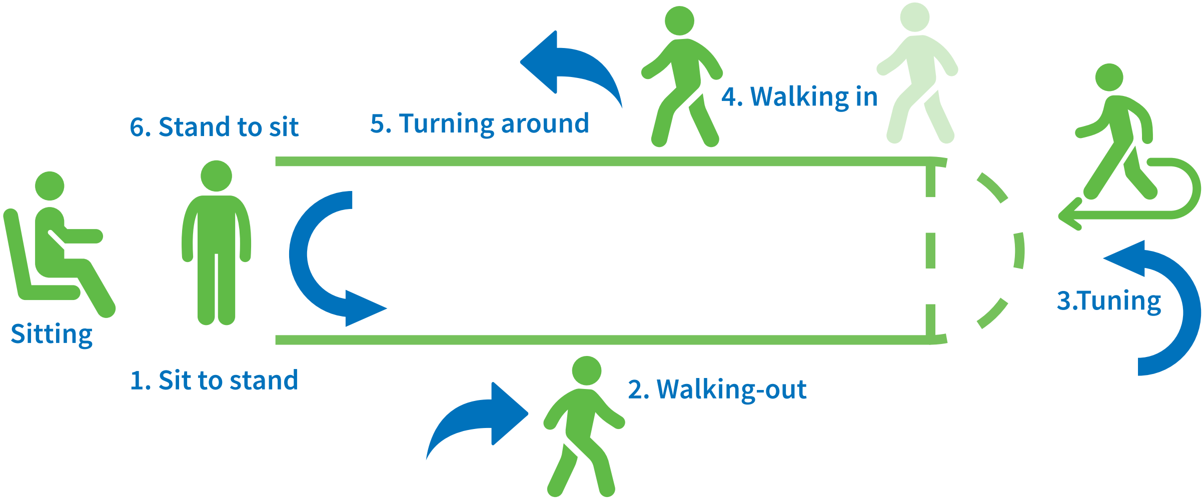

Figure 5.3: Graphical illustration depicting the performance demands of the TUG tasK

Eligible participants were those who were aged 50 years an older at the baseline data collection and completed the TUG assessment during the Wave 1 clinical health assessment (n=5,826). Listwise exclusion resulted in a final case base (n=2,011) who provided valid measurements at all six timepoints. We trimmed the data by excluding participants with implausible TUG times (i.e. ≥ 3 standard deviations above or below the mean) at each timepoint.

TUG was measured in the clinic-based assessment in Waves 1, 3 and 6 of the study and by trained interviewers at home in the non-health assessment Waves, 2, 4 and 5. Table 5.2 describes the number of valid measurements at each wave of the study and provides summary statistics for performance on the TUG task. From the table and Figure 5.4, we can see that TUG time tends to increase across the waves, but that performance tends to be faster and less variable when assessed in the health assessment as opposed to the home environment. We therefore included a binary variable in the multi-level regression models to take account of the differences in test settings across measurement occasions.

Table 5.2: Population weighted distribution of TUG performance from Waves 1-6

Panel A	n	Mean	Std. Error	SD	95% CIs
*Wave 1	5,751	8.91	0.04	2.17	8.84, 8.99
Wave 2	5,219	9.91	0.06	3.48	9.79, 10.0
*Wave 3	4,220	9.44	0.06	2.46	9.33, 9.55
Wave 4	4,049	10.15	0.06	2.61	10.04, 10.26
Wave 5	3,679	10.68	0.08	3.86	10.51, 10.84
*Wave 6	2,436	10.15	0.10	2.52	9.95, 10.36

Complete Case Base (n=2,011)

Panel B	n	Mean	Std. Error	SD	95% CIs
Wave 1	2,011	8.21	0.04	1.43	8.14, 8.28
Wave 2	2,011	8.93	0.05	1.99	8.83, 9.03
Wave 3	2,011	8.77	0.04	1.59	8.70, 8.85
Wave 4	2,011	9.55	0.05	1.88	9.45, 9.65
Wave 5	2,011	10.06	0.08	2.96	9.90, 10.21
Wave 6	2,011	10.20	0.11	2.42	9.99, 10.42

*Assessment at Waves 1, 3 and 6 was completed in TILDA's clinical health assessment centre. Panel A is cross-sectionally weighted to the nearest Census date. Panel B is longitudinally weighted to the 2011 Census.

In total, we had 25,348 observations of TUG performance across six measurement occasions nested within 5,782 participants with the average number of measurements equal to 4.4 (min=1, max=6). The mean TUG time across all measurement occasions was 9.82 seconds (standard deviation SD=2.98) (Table 5.3). The between-person SD (2.95) was larger than the within-person variation SD (1.83) indicating that most of the change can be attributed to variation between-individuals but there remained substantial within-person variation. The intra-class correlation coefficient for the TUG across the six measurement occasions was 0.56 which suggests moderate stability in TUG time over measurement occasions. Specifically, it indicates that 56% of the variation in TUG performance can be attributed to differences between individuals while the remainder is due to within-person variation.

Table 5.3: Descriptive statistics for TUG performance (seconds) from Waves 1-6

	Mean	Std. dev.	Min	Max	Observations
overall	9.82	2.98	4.31	61.4	N=25,348
between		2.95	5.06	58.44	n =5,782
within		1.83	-13.35	50.89	4.38

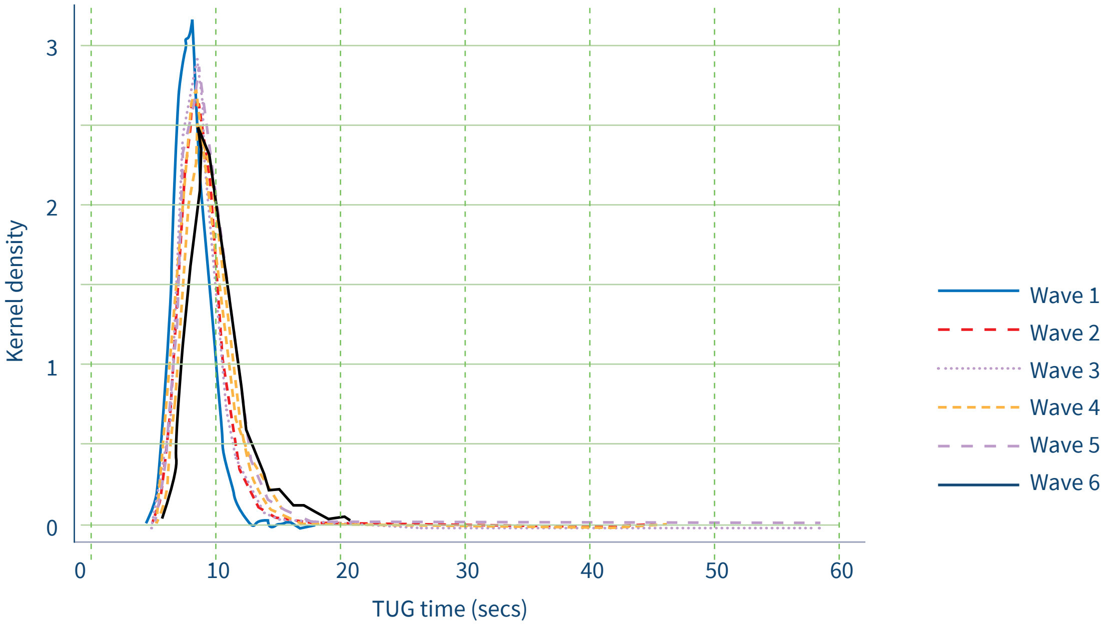

Figure 5.4: Kernel density plot showing shifts in the distribution of TUG performance (seconds) across measurement occasions for individuals who participated in all 6 waves of data collection (n=2,011)

5.3.1 Change in TUG across the age span

We began by modelling the predicted trajectory of change in TUG performance with age while holding mode and wave constant. The coefficient for mode was statistically significant with individuals taking 0.33 seconds longer (95% confidence interval (CI) = 0.21, 0.45; $p < .001$) to complete the TUG task when assessed at home compared with the clinic-based environment. This most likely reflects poorer health among those who opt for a home-based assessment, but could also be due to differences in standardisation of testing in the home environment such as non-standard chair height, walking on carpet vs solid flooring etc. Nevertheless, it was important to account for it as a covariate in the analyses.

The predicted TUG time for a participant aged 50 was 8.37 seconds (95% CI = 8.24, 8.50), with performance worsening in a non-linear fashion as age increased. Specifically, there was a significant positive linear age effect ($b = 0.07$, 95% CI = 0.04, 0.09; $p < .001$), a negative quadratic age term ($b = –0.002$, 95% CI = –0.005, –0.001; $p = .001$), and a positive cubic age term ($b = 0.0001$, 95% CI = 0.0001, 0.0002; $p < .001$). In practical terms, this means that TUG time increases steadily with age, indicating a general decline in physical function. The quadratic term suggests a temporary slowing in this decline at midlife, but the cubic term indicates that deterioration accelerates again at older ages. This age-related trajectory is illustrated in Figure 5.5.

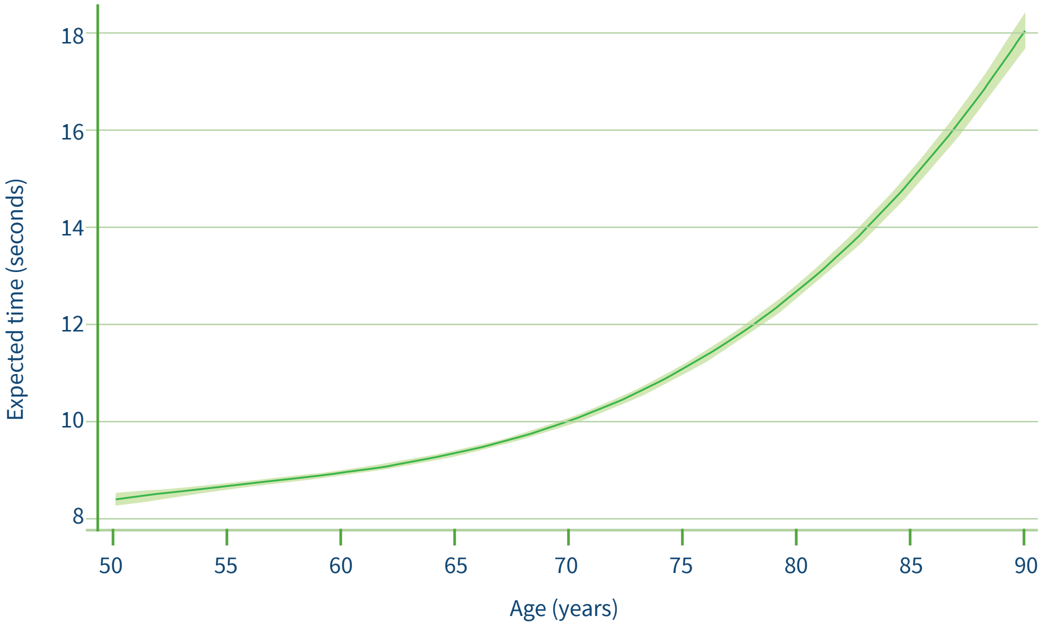

Figure 5.5: Predicted trajectory in TUG performance (seconds) across the age span, estimated from the growth curve model

5.3.2 Sex differences in TUG

We tested for effect modification by sex by fitting linear, quadratic, and cubic age-by-sex interaction terms. Because men and women differ in average height — a known determinant of walking speed — we included measured height at baseline as a covariate in the model. As expected, greater height was associated with faster TUG performance (b = –0.023, 95% CI: –0.030 to –0.016; p < .001). At age 50, women performed slightly better than men on the TUG task, completing it about 0.24 seconds faster on average (b = –0.24, 95% CI: –0.45 to –0.03; p = .02). This indicates that women tend to have marginally better physical function at midlife (Figure 5.6). However, a significant interaction between sex and age (b = 0.03, 95% CI: 0.00 to 0.05; p = .03) indicates that TUG performance worsens more rapidly with age among women. In other words, while women begin with a slight advantage, their physical function declines more steeply over time compared with men. The positive quadratic interaction term (b = 0.001, 95% CI: 0.000 to 0.001; p < .001) further suggests that the rate of decline in women accelerates in later life. As a result, the initial performance advantage is lost by around age 80, at which point women perform significantly worse than men (see Figure 5.7 and Table 5.4).

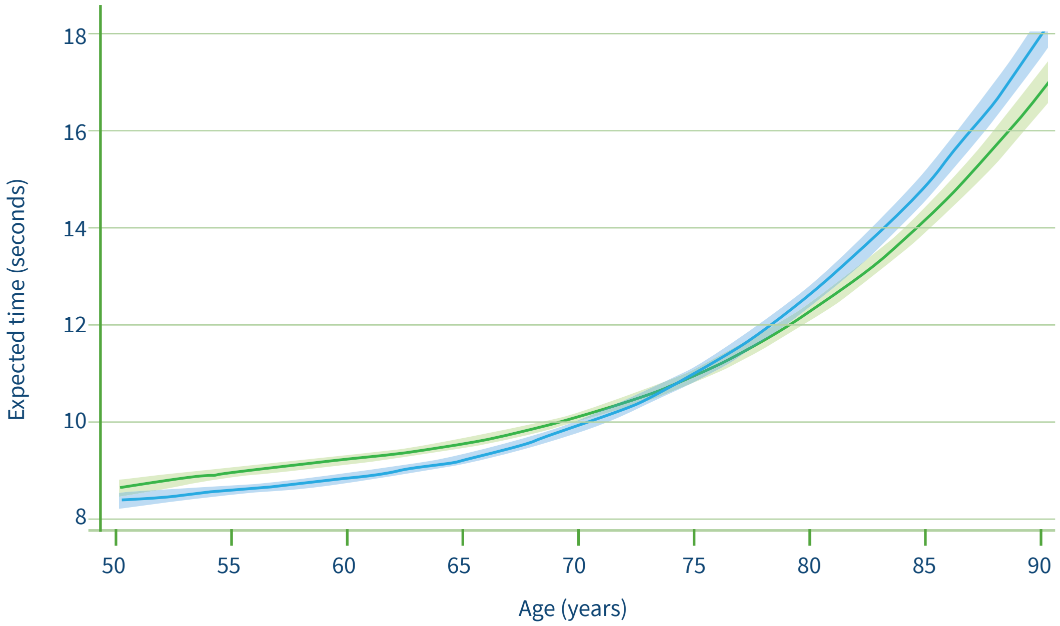

Figure 5.6: Expected TUG performance (seconds) across the age span, by sex

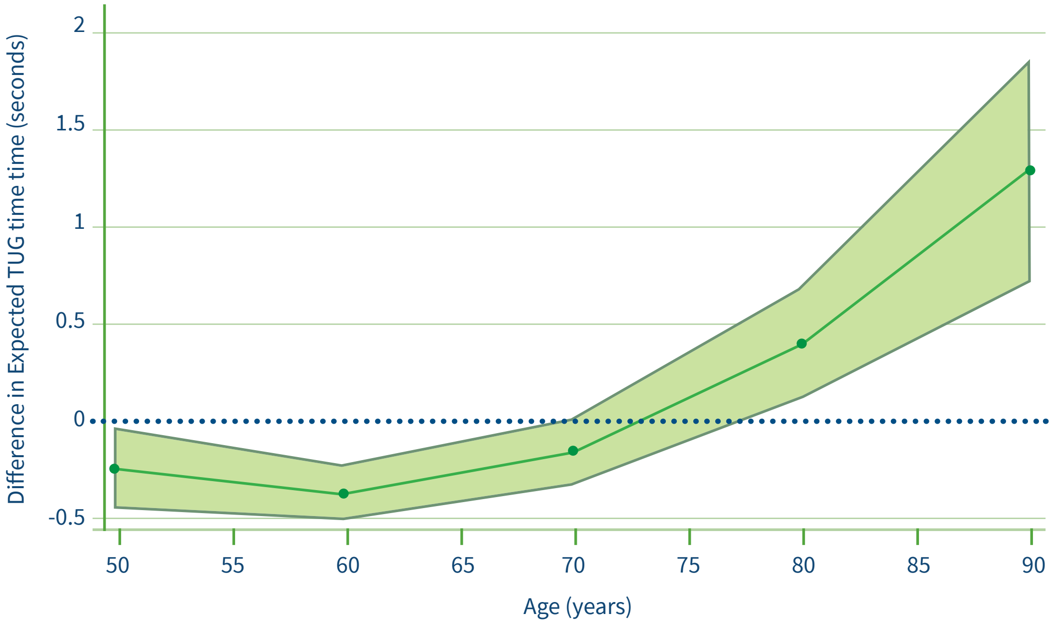

Figure 5.7: Difference in expected TUG performance (seconds) across the age span, by sex

Table 5.4: Expected TUG performance (seconds) in 10-year age intervals, by sex (n=5,780, observations=25,335)

	50 years	60 years	70 years	80 years	90 years
	b (95% CI)	*b (95% CI)*	*b (95% CI)*	*b (95% CI)*	*b (95% CI)*
Male	8. 56 (8.38, 8.74)	9.15 (9.05, 9.24)	10.05 (9.94, 10.17)	12.37 (12.16, 12.58)	17.19 (16.72, 17.66)
Female	8.32 (8.16, 8.47)	8.78 (8.70, 8.86)	9.90 (9.79.10.01)	12.76 (12.56, 12.97)	18.46 (18.00, 18.93)
Male	*REF*	*REF*	*REF*	*REF*	*REF*
Female	-0.24* (-0.45, -0.03)	-0.36*** (-0.50 -0.29)	-0.15 (-0.32, 0.02)	0.39*** (0.11, 0.68)	1.27*** (0.70, 1.84)

5.3.3 Educational differentials in TUG performance

Table 5.5 presents the expected TUG times and 95% CI in 10-year age bands from age 50 to 90 years, stratified by highest level of educational attainment. A clear educational gradient in physical performance was observed across the age span (Figure 5.8). At age 50 years, individuals with a primary-level education completed the TUG task 0.28 seconds slower on average than those with tertiary education (95% CI: 0.07 to 0.49; p = 0.010), while those with secondary education took 0.11 seconds longer on average, although this difference was not statistically significant (95% CI: –0.04 to 0.26; p = 0.147). A significant positive linear interaction between age and primary education (b = 0.03, 95% CI: 0.02 to 0.05; p <0.001) indicates that educational disparities in TUG performance widen with age. As shown in Figure 5.9, the gap between the primary and tertiary educated grows from 0.28 seconds at age 50 to 0.43, 0.60, 1.25, and 1.57 seconds at ages 60, 70, 80, and 90, respectively. A similar, but less pronounced, pattern was observed for the secondary vs. tertiary comparison; however, the age-by-secondary education interaction was not statistically significant.

Table 5.5: Expected TUG time (seconds) in 10-year age intervals according to highest level of educational attainment (n=5,782, observations=25,344)

	50 years	**60 years**	**70 years**	**80 years**	**90 years**
	b (95% CI)	*b (95% CI)*	*b (95% CI)*	*b (95% CI)*	*b (95% CI)*
Panel A					
Primary	8.66 (8.44, 8.89)	9.36 (9.25, 9.48)	10.52 (10.39, 10.66)	13.23 (13.00, 13.46)	18.58 (18.15, 19.02)
Secondary	8.49 (8.35, 8.64)	8.96 (8.88, 9.03)	9.88 (9.76, 9.99)	12.35 (12.13, 12.57)	17.47 (17.03, 17.91)
Tertiary	8.38 (8.23, 8.54)	8.76 (8.68, 8.84)	9.60 (9.47, 9.72)	11.98 (11.74, 12.22)	17.02 (16.55, 17.48)
Panel B					
Primary	0.28*** (0.07, 0.49)	0.60*** (0.47, 0.74)	0.92*** (0.74, 1.11)	1.25*** (0.94, 1.55)	1.57*** (1.13, 2.01)
Secondary	0.11 (-0.04, 0.26)	0.20*** (0.10, 0.29)	0.28*** (0.12, 0.45)	0.37** (0.09, 0.64)	0.45* (0.06, 0.84)
Tertiary	*REF*	*REF*	*REF*	*REF*	*REF*

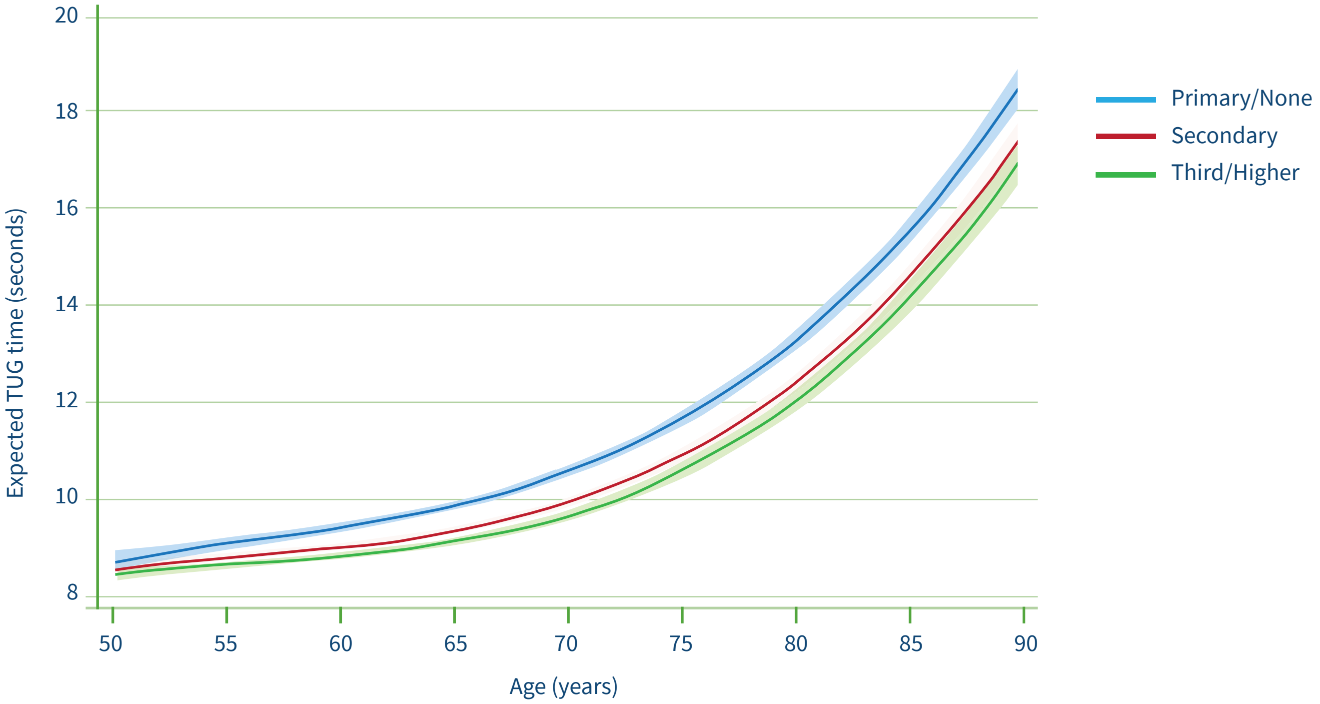

Figure 5.8: Expected TUG performance (seconds) across the age span according to highest level of educational attainment

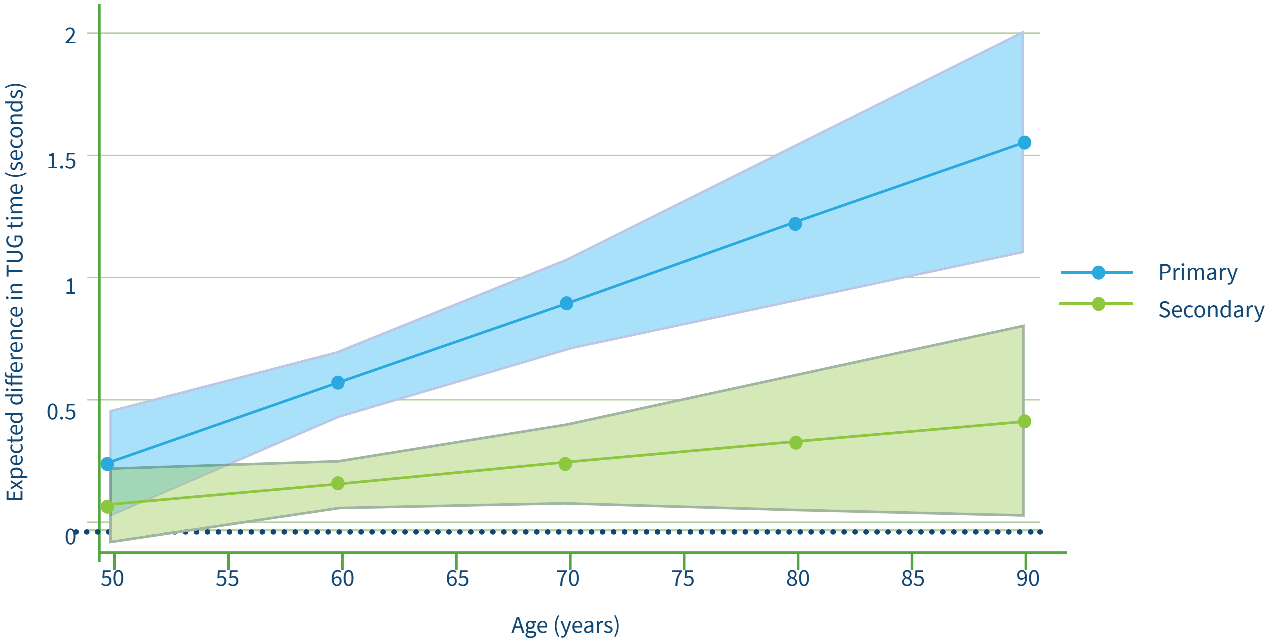

Figure 5.9: Expected differences in TUG performance (seconds) across the age span (reference group = tertiary educated)

5.4 Medications

The total number of doctor prescribed medications taken by a participant serves as a proxy for overall health and may also signify the chronicity and severity of diagnosed conditions. Medication use was recorded during the course of the household interview and confirmed by cross-checking the labels on the medicinal packaging. The international non-proprietary name (INN) for any regularly taken medications was assigned and coded using Anatomic Therapeutic Classification (ATC) codes. The total number of doctor prescribed medications (excluding supplements) was summed with the maximum number of recorded medications per wave set at 20.

Table 5.6 describes the number of valid observations at each wave of the study and provides summary statistics for the number of doctor prescribed medications for the eligible sample at each wave and for the complete case base (n=3,637). The mean number of medications increases across waves in a monotonic fashion as participants age. This pattern can be discerned from Figure 5.10 which shows the frequency distribution for medication usage across the 6 waves of data collection for the sample who participated in all waves (n=3,637). In total, 37.6% of the sample were not taking any doctor prescribed medications at Wave 1, but with the passage of time and as we move across waves, we see a subtle shift to the right in the percentage of the population taking one or more medications such that only 15.8% of the sample do not use medications by Wave 6 of the survey. In total, we had 35,766 observations across the six waves nested within 8,151 individuals with the mean number of measurement occasions = 4.39 as shown in Table 5.7. The average number of medications prescribed across all time points was 2.92 (SD=2.87) with substantial between-person variation (SD=2.63) and moderate within-person variation (SD=1.31).

Table 5.6: Population weighted distribution of medications count from Waves 1- 6

Panel A	n	Mean	Median	SD	IQR	Min	Max
Wave 1	8,089	2.35	2.0	2.54	0, 4	0	20
Wave 2	6,986	2.84	2.0	2.84	1, 4	0	19
Wave 3	6,246	2.91	2.0	2.88	1, 4	0	20
Wave 4	5,571	3.08	2.0	2.94	1, 5	0	19
Wave 5	4,872	3.35	3.0	3.07	1, 5	0	19
Wave 6	4,002	3.49	3.0	2.99	1, 5	0	19

Complete Case, Base (n=3637)

Panel B	n	Mean	Median	SD	IQR	Min	Max
Wave 1	3,637	1.88	1.0	2.20	0, 3	0	13
Wave 2	3,637	2.27	2.0	2.44	0, 4	0	19
Wave 3	3,637	2.43	2.0	2.52	0, 4	0	19
Wave 4	3,637	2.69	2.0	2.65	1, 4	0	19
Wave 5	3,637	3.06	2.0	2.85	1, 5	0	19
Wave 6	3,637	3.50	3.0	2.97	1, 5	0	19

Note: Panel A is cross-sectionally weighted to the nearest Census date. Panel B is longitudinally weighted to the 2011 Census.

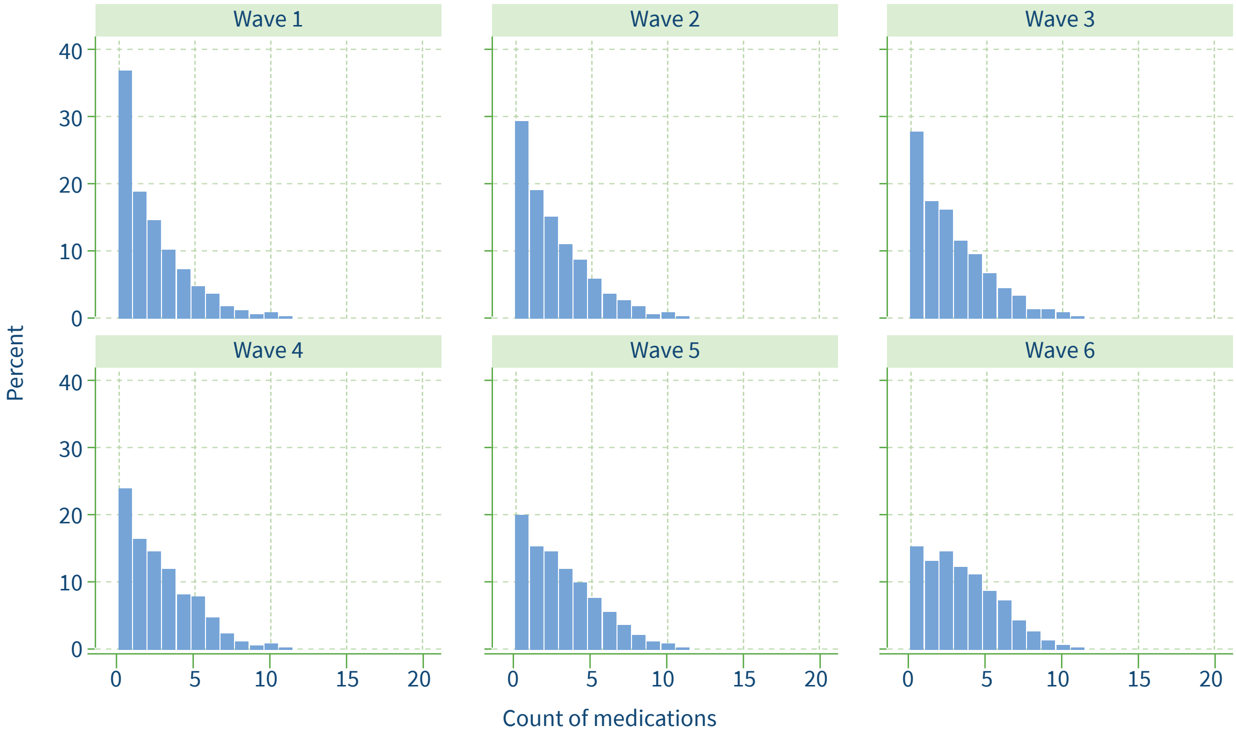

Figure 5.10: Distribution of medication count, by wave for those who participated in all six waves

Table 5.7: Descriptive statistics for number of medications prescribed across waves

	Mean	Std. dev.	Min	Max	Observations
overall	2.92	2.87	0	20	N=35,766
between		2.63	0	17	n =8151
within		1.31	-8.68	14.25	4.39

5.4.1 Change in medication usage across the age span

Given the skewed distribution of the data, we modelled change across waves using a mixed effects Poisson model. We specified a random-intercepts only model as Poisson models can sometimes face convergence issues when fitting random slopes. We modelled the predicted trajectory of medication use (excluding supplements) with age and found a strong and consistent increase from midlife through older age. The predicted number of medications rises from an average of 1.02 at age 50 to 7.10 by age 90, indicating a steady accumulation of medication burden with age. The cubic age term was statistically significant reflecting a subtle acceleration in the rate of increase over time. In practical terms, medication use grows modestly in the earlier decades, but the rate of increase becomes steeper from around age 70 onwards as visualised in Figure 5.11.

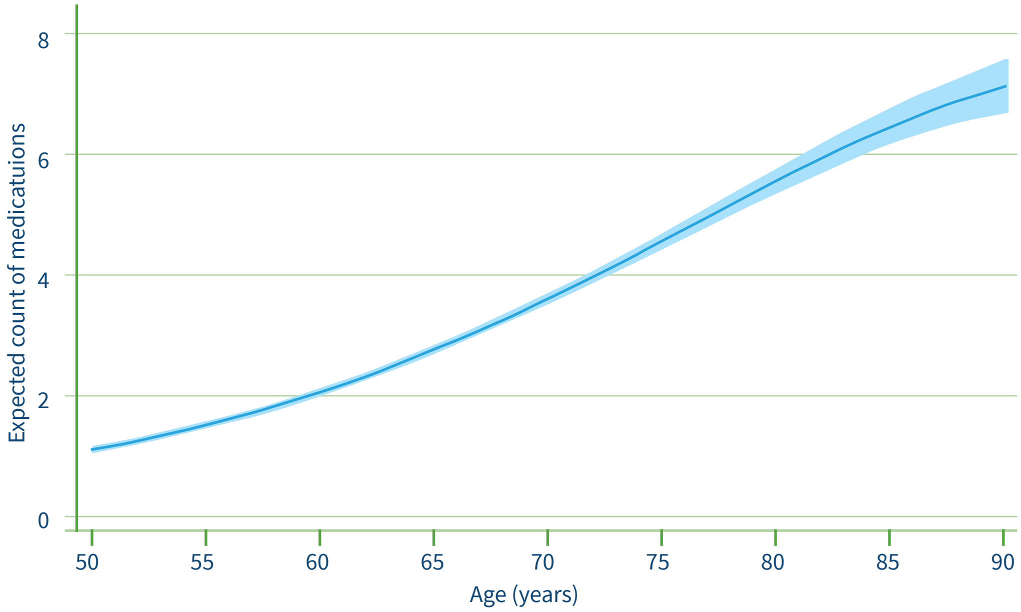

Figure 5.11: Predicted trajectory of change in medication count across the age span from the multi-level model

5.4.2 Sex differences in medication usage

Figure 5.12 illustrates the expected change in medication usage across the age span for both men and women. At age 50, women have a higher expected medication burden than men (b = 0.22, CI = 0.15, 0.29; p < .001). Both men and women experience a steady increase in the number of prescribed medications with age. However, the significant negative interaction between age and sex (b = -0.009, CI = -0.011, -0.006; p < .001) suggests that men experience a faster rate of increase in medication use as they age. The two groups converge around 74 years of age, with women using fewer medications on average by age 80. In late old age, this trend is reversed, and men tend to use more medications on average than women, if they survive into late old age as shown in Figure 5.13 and Table 5.8.

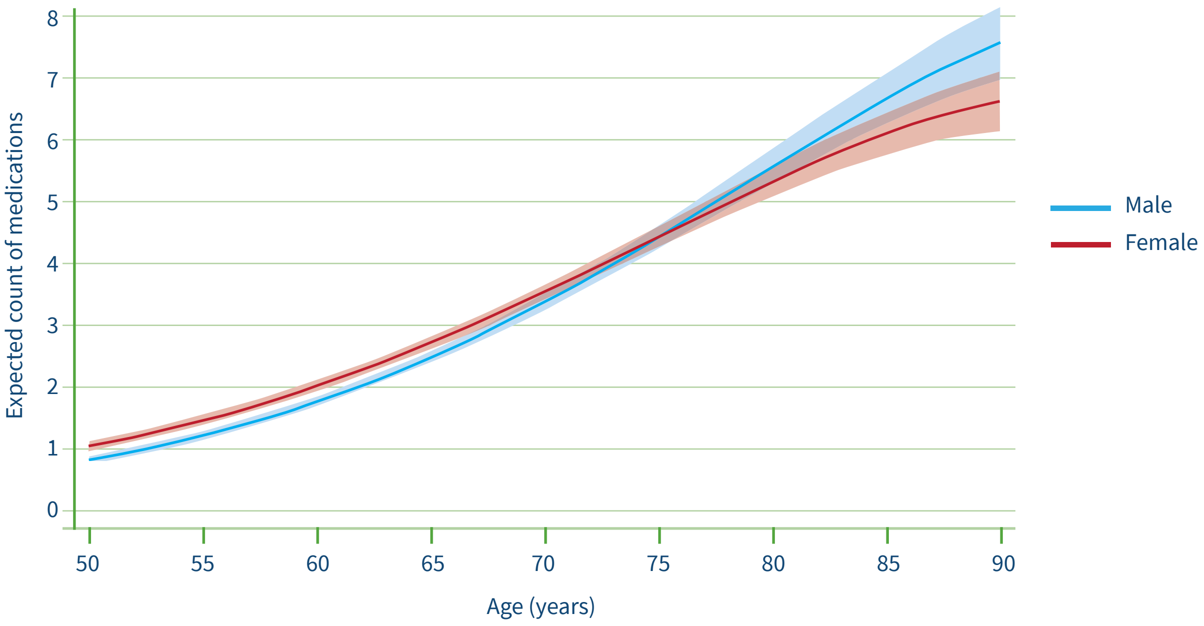

Figure 5.12: Expected medication count across the age span, by sex

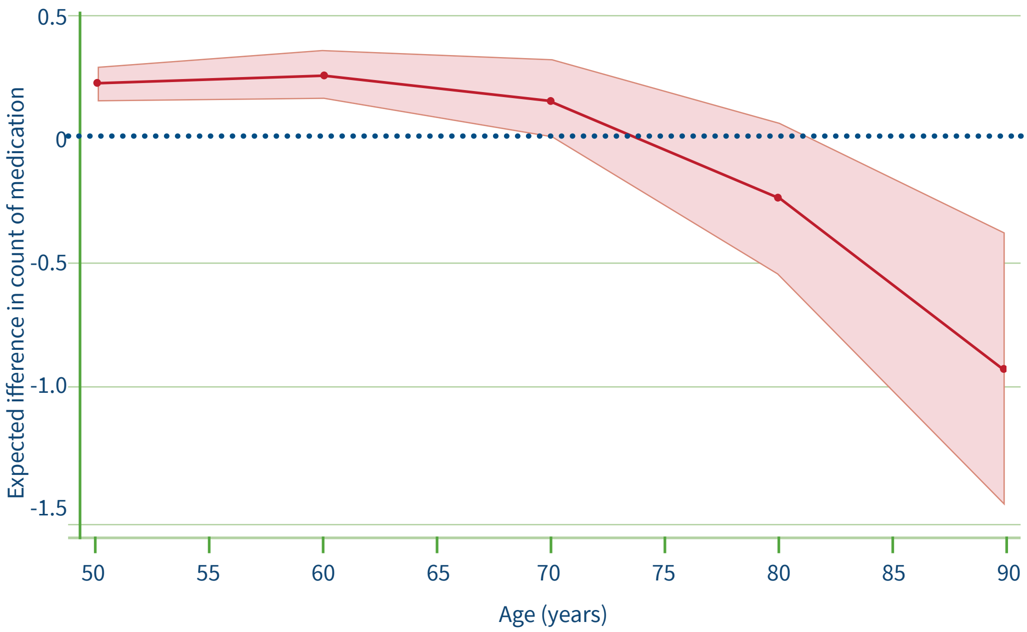

Figure 5.13: Expected difference in count of medications across the age span (reference category = men)

Table 5.8: Expected medication count in 10-year age intervals, by sex (n=8,150, obs=35,760)

	50 years	60 years	70 years	80 years	90 years
	b (95% CI)	*b (95% CI)*	*b (95% CI)*	*b (95% CI)*	*b (95% CI)*
Male	0.90 (0.83, 0.97)	1.84 (1.76, 1.92)	3.46 (3.33, 3.59)	5.66 (5.39, 5.94)	7.66 (7.06, 8.25)
Female	1.12 (1.04, 1.20)	2.10 (2.01, 2.19)	3.62 (3.49, 3.74)	5.42 (5.17, 5.67)	6.72 (6.22, 7.21)
Male	REF	REF	REF	REF	REF
Female	0.22*** (0.15, 0.29)	-0.26*** (0.16, 0.36)	0.15 (-0.01, 0.32)	-0.24*** (-0.55, 0.07)	-0.94*** (-1.50, -0.38)

5.4.3 Educational differentials in medication usage

Table 5.9 and Figure 5.14 provide an overview of the educational differentials in medication use across the age span. At age 50, individuals with primary or no education have a higher medication burden compared to those with secondary or tertiary education (Figure 5.14). Specifically, those with primary or no education use an additional 0.52 medications on average (b = 0.52, CI = 0.47, 0.73; p < .001) compared to their tertiary-educated counterparts. Similarly, individuals with secondary education also use more medications than those with tertiary education, with a difference of 0.16 medications on average (b = 0.16, CI = 0.08, 0.24; p < .001). As individuals age, the rate of increase in medication use is slower for those with primary or no education compared to their more highly educated peers, as indicated by the significant negative interaction between age and primary education (b = -0.008, CI = -0.012, -0.004; p < .001). This suggests that while the educational gap in medication use remains throughout adulthood, it slightly narrows with age for individuals with primary education. However, the interaction between age and secondary education was not significant indicating that the educational differential in medication use for individuals with secondary education does not change significantly with age. This pattern of educational differentials is illustrated in Figure 5.15, showing that the gap in medication use persists across the lifespan, particularly for those with lower levels of education.

Table 5.9: Expected medication count in 10-year age intervals according to highest level of educational attainment (n=8,150, obs=37,342)

	50 years	**60 years**	**70 years**	**80 years**	**90 years**
Primary	1.49 (1.34, 1.64)	2.59 (2.44, 2.75)	4.22 (4.04, 4.41)	6.06 (5.76, 6.36)	7.23 (6.68, 7.78)
Secondary	1.05 (0.97, 1.13)	1.97 (1.88, 2.06)	3.46 (3.32, 3.60)	5.35 (5.05, 5.64)	6.88 (6.29, 7.47)
Tertiary	0.89 (0.82, 0.97)	1.67 (1.59, 1.76)	2.94 (2.81, 3.08)	4.57 (4.28, 4.85)	5.89 (5.32, 6.46)
Primary	0.60*** (0.47, 0.73)	0.92*** (0.76, 1.08)	1.28*** (1.06, 1.50)	1.49*** (1.12, 1.87)	1.34*** (0.70, 1.97)
Secondary	0.16*** (0.08, 0.24)	0.30*** (0.19, 0.41)	0.51*** (0.34, 0.69)	0.78*** (0.43, 1.13)	0.98** (0.37, 1.60)
Tertiary	*REF*	*REF*	*REF*	*REF*	*REF*

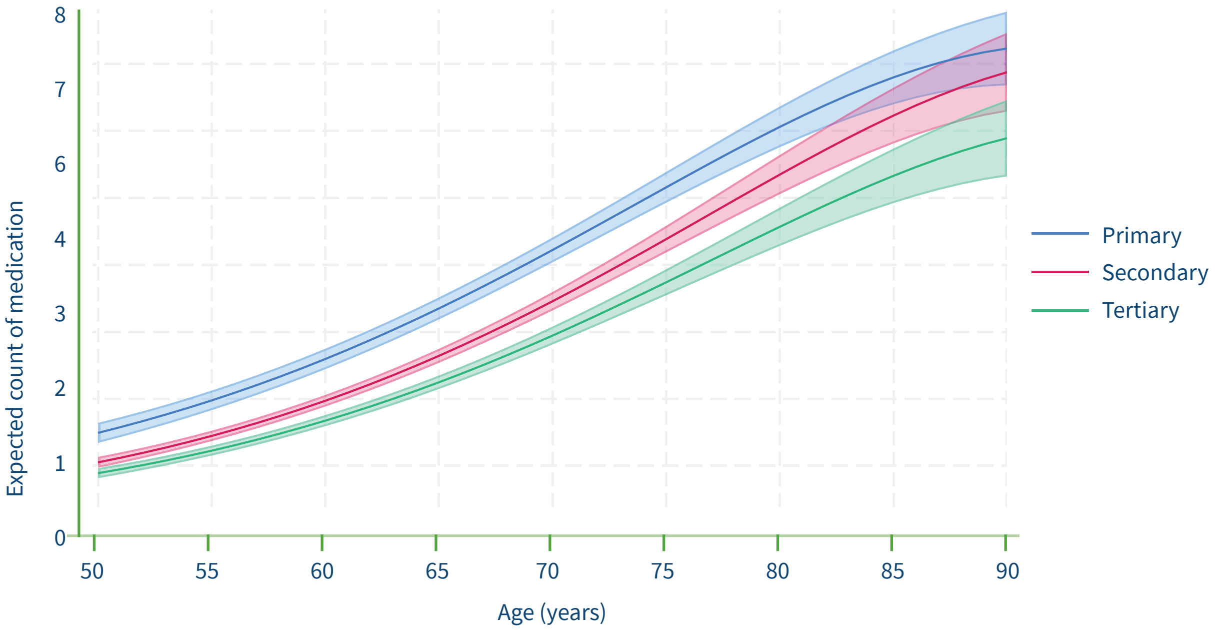

Figure 5.14: Expected count of medications across the age span, according to highest level of educational attainment

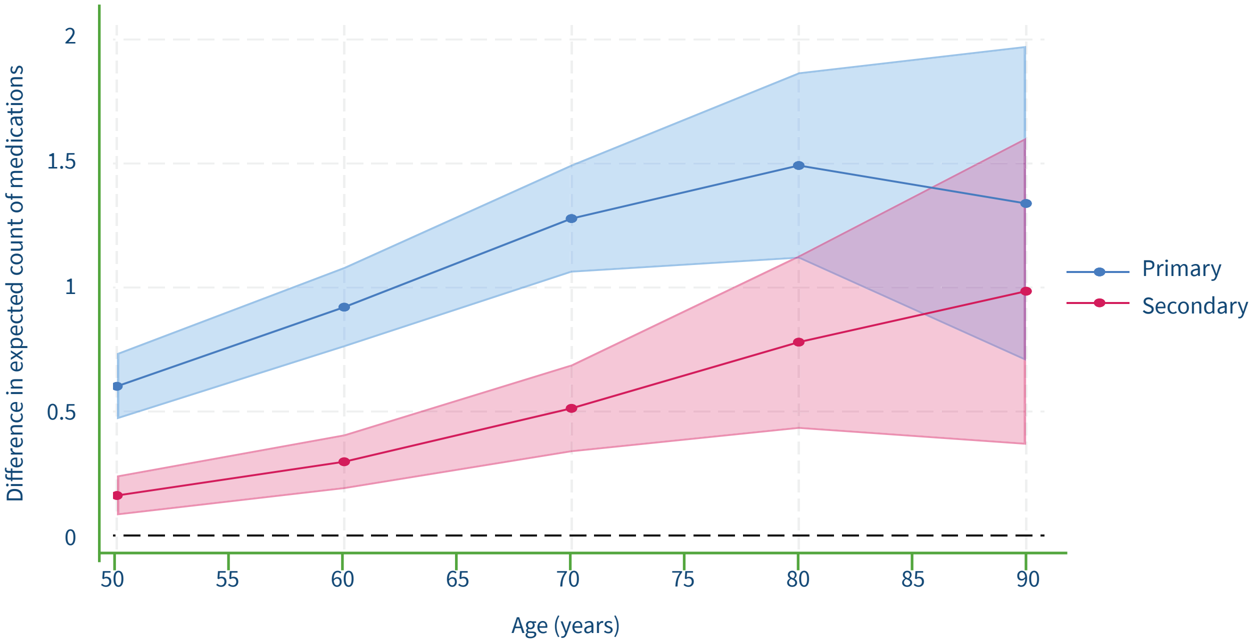

Figure 5.15: Difference in expected medication count across the age span (reference catrgory = tertiary educated)

5.5 Mind

Language and language fluency are important facets of human cognition that evidence divergent trajectories with age. While vocabulary remains stable or even improves with age, verbal fluency is more sensitive to age-related decline and different types of neuropathology (13). Animal naming is a widely used language fluency task. It does not require literacy, and as such, is easily transferable to different cultures/languages (14). The task draws on word knowledge, semantic memory, and executive processes such as set shifting and inhibition (or the ability to suppress inappropriate / incorrect items). In TILDA, it was assessed by asking participants to name as many animals as possible within 60 seconds.

Table 5.10 describes the number of valid observations at each wave of the study and provides summary statistics for the verbal fluency measure for the eligible sample at each wave and for the complete case base (n=3,536). In general, we see that verbal fluency tends to decline across waves with participants recalling approximately two animals less on average between waves 1-6. In total, we had 35,148 observations of verbal fluency across 6 measurement occasions nested within 8,129 individuals with the average number of measurements equal to 4.32 (min=1, max=6). The average verbal fluency score across all measurement occasions was 19.05 (SD = 6.24) indicating generally high levels of cognitive functioning among the older population in Ireland (Table 5.11). The between-person SD was 5.29 and the within-person SD was 3.76 which indicates that while most of the variation was due to differences between individuals, there is still substantial within-person variation in verbal fluency scores. The intra-class correlation coefficient was 0.53.

Table 5.10: Population weighted distribution of Verbal Fluency scores from Waves 1-6

Panel A	n	Mean	Std. Error	SD	95% CIs
Wave 1	8,129	20.0	0.16	7.06	19.7, 20.3
Wave 2	6,893	18.9	0.12	6.09	18.7, 19.2
Wave 3	6,097	18.8	0.14	5.90	18.5, 19.1
Wave 4	5,423	18.3	0.11	5.76	18.1, 18.5
Wave 5	4,725	18.5	0.14	5.87	18.2, 18.7
Wave 6	3,881	17.8	0.12	5.70	17.6, 18.1

Complete Case Base (n=3,536)

Panel A	n	Mean	Std. Error	SD	95% CIs
Wave 1	3,536	21.9	0.18	6.86	21.6, 22.3
Wave 2	3,536	20.2	0.14	5.92	19.9, 20.5
Wave 3	3,536	19.6	0.13	5.63	19.4, 19.9
Wave 4	3,536	19.1	0.12	5.51	18.8, 19.3
Wave 5	3,536	18.7	0.12	5.58	18.5, 19.0
Wave 6	3,536	17.4	0.12	5.61	17.2, 17.6

Panel A is cross-sectionally weighted to the nearest Census date. Panel B is longitudinally weighted to the 2011 Census.

Table 5.11: Descriptive statistics for QoL

	Mean	Std. dev.	Min	Max	Observations
Overall	19.05	6.24	0	99	N=35,148
Between		5.29	0	61.5	N =8,129
Within		3.76	-5.28	45.5	4.32

5.5.1 Change in Verbal Fluency across the age span

Figure 5.16 displays the trajectory of change in verbal fluency across the age span over six waves of TILDA from the multi-level growth curve model. The predicted verbal fluency score for a participant aged 50 was 21.45 (21.12, 21.78), declining in a non-linear manner from the age of 50 onwards. Specifically, our analysis predicts a drop of -0.08 words (CI = -0.004, -0.002; $p < .001$) per year beyond the age of 50, with the negative quadratic term ($b = -0.004$, CI=-0.004, -0.002; $p < .001$) indicating that the rate of decline becomes steeper over time.

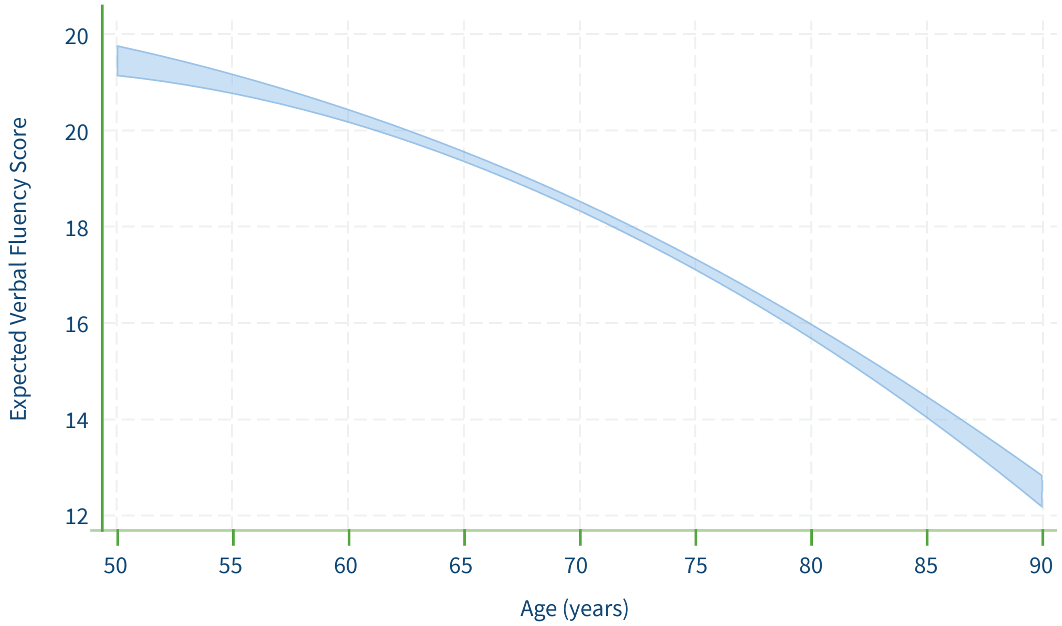

Figure: 5.16: Functional form of change in Verbal Fluency scores across the age span

5.5.2 Sex differentials in Verbal Fluency scores

Figure 5.17 summarises the change in scores across the age span for both men and women. Although both groups experience steady decline in verbal fluency with ageing, the significant age*sex interaction term (b = - 0.018, CI = -0.04, -0.000; p = 0.05) indicates that women decline at a faster rate. Although, there is no statistically significant differences between men and women in their verbal fluency scores at 50 years of age, the differential widens thereafter and by the age of 60 years, women score significantly lower (b = -0.39, CI =-0.65, 0.12; p = 0.05) and the differential continues to widen into late old age where the deficit in recall amounts to -0.94 words (CI = -1.38, -0.50; p < .001) compared with men (Table 5.12) as depicted graphically in Figure 5.18.

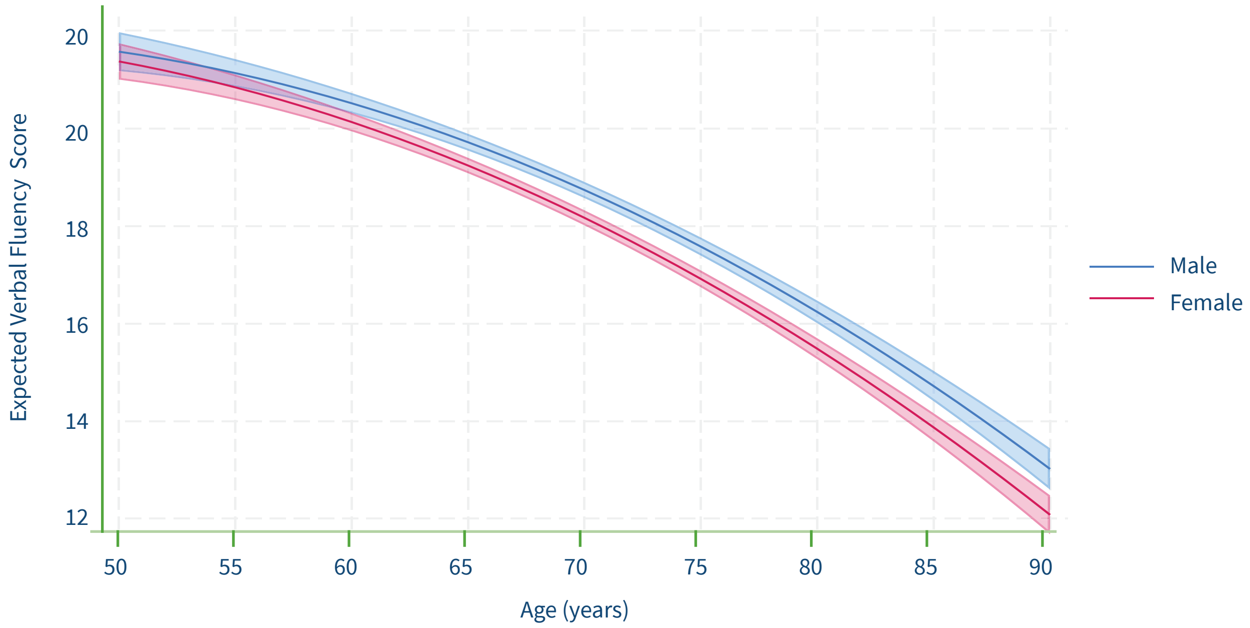

Figure: 5.17: Expected Verbal Fluency scores across the age span, by sex

Table 5.12: Expected Verbal Fluency scores in 10-year age intervals, by sex (n=8,129, obs=35,148)

	50-59 years	60-69 years	70-79 years	80-89 years	90-99 years
	b (95% CI)	*b (95% CI)*	*b (95% CI)*	*b (95% CI)*	*b (95% CI)*
Male	21.57 (21.17, 21.97)	20.51 (20.30, 20.72)	18.74 (18.57, 18.90)	16.24 (16.01, 16.47)	13.01 (12.59, 13.44)
Female	21.37 (21.00, 21.74)	20.13 (19.94, 20.32)	18.17 (18.01, 18.32)	15.48 (18.01, 15.70)	12.08 (11.68, 12.48)
Male	REF	REF	REF	REF	REF
Female	-0.20 (-0.61, 0.21)	-0.39** (-0.65, -0.12)	-0.57*** (-0.78, -0.36)	-0.75*** (-1.05, 0.46)	-0.94*** (-1.38, -0.50)

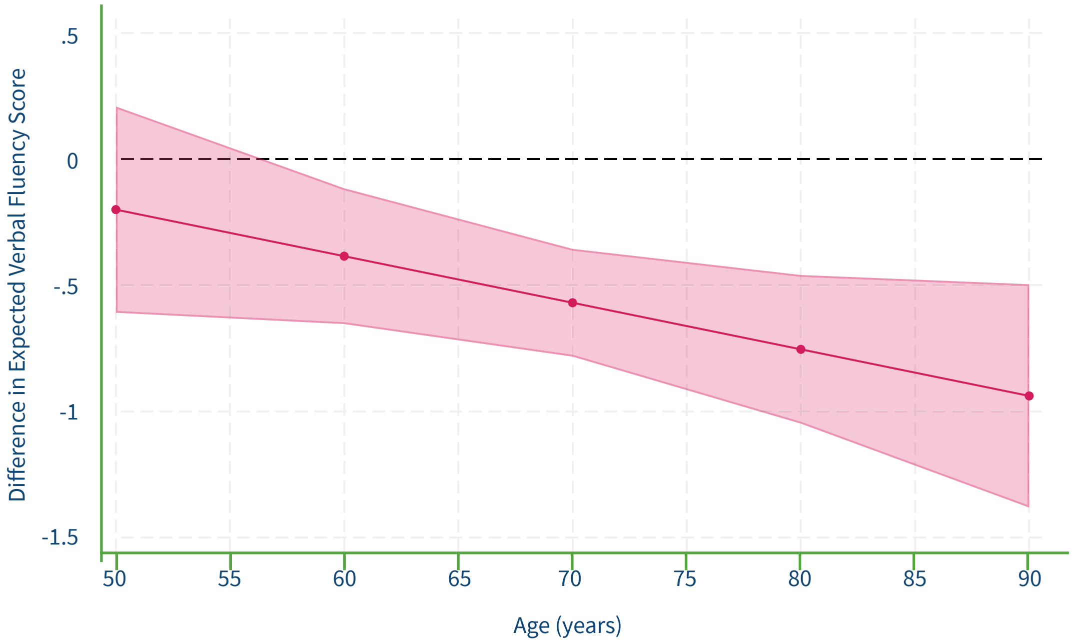

Figure: 5.18: Expected Verbal Fluency scores across the age span, by sex (reference group = men)

5.5.3 Educational differentials in Verbal Fluency

A stark socio-economic gradient in verbal fluency was apparent across the age span with the tertiary educated having significantly higher scores compared with the primary or secondary educated groups (Figure 5.19). For instance, the predicted verbal fluency score of a 50-year-old participant with a tertiary-level education was 23.47 (CI = 23.07, 23.88) compared with 20.33 (CI = 19.96, 20.69) and 17.69 (CI =17.15, 18.22) for the secondary and primary educated groups respectively (Table 5.13).

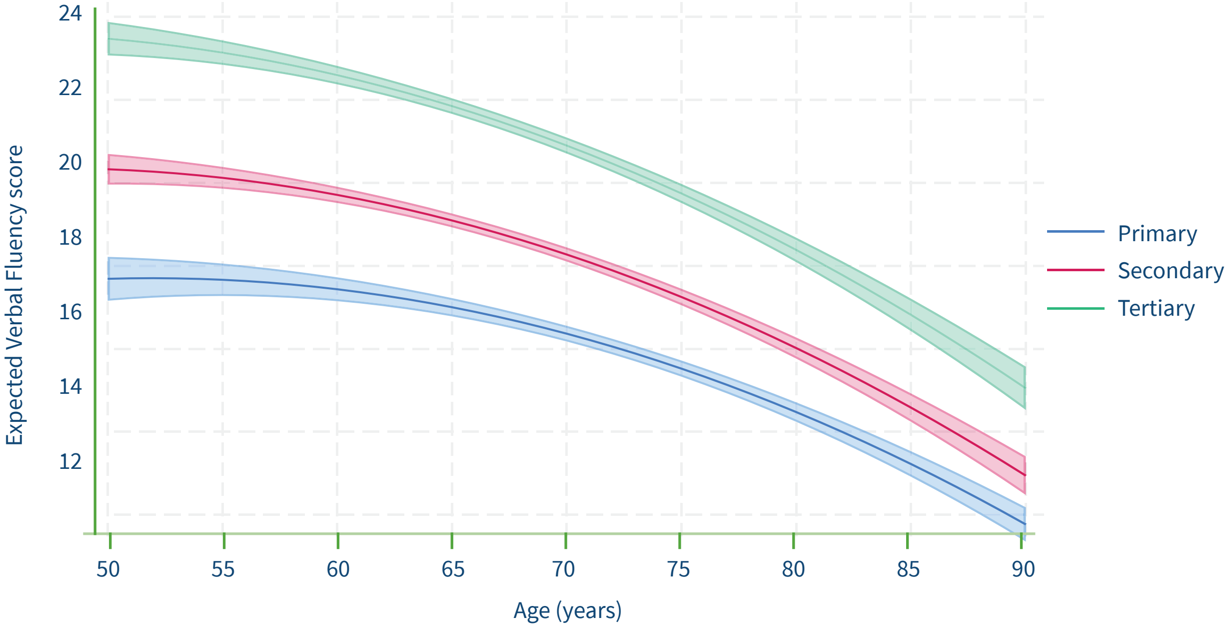

Figure: 5.19: Expected Verbal Fluency scores across the age span, according to highest level of educational attainment

Table 5.13: Expected Verbal Fluency scores in 10-year age intervals according, to highest level of educational attainment (n= 8,124, obs=35,139)

	50-59 years	60-69 years	70-79 years	80-89 years	90-99 years
	b (95% CI)	*b (95% CI)*	*b (95% CI)*	*b (95% CI)*	*b (95% CI)*
Primary	25.1 (24.4, 25.8)	26.3 (25.9, 26.6)	26.5 (26.2, 26.8)	25.8 (25.5, 26.1)	24.2 (23.6, 24.9)
Secondary	25.8 (25.5, 26.2)	27.6 (27.4, 27.9)	27.9 (27.7, 28.1)	26.6 (26.3, 26.9)	23.7 (23.1, 24.4)
Tertiary	26.9 (26.5, 27.3)	28.4 (28.2, 28.6)	28.5 (28.3, 28.7)	27.3 (26.9, 27.6)	24.6 (23.9, 25.3)
Primary	-1.82*** (-2.57, -1.06)	-2.14*** (-2.52, -1.76)	-2.01*** (-2.35, -1.66)	-1.42*** (-1.88, -0.96)	-0.38 (0.25, 1.62)
Secondary	-1.06* (-1.56, -0.55)	-0.75*** (-1.04, -0.45)	-0.61*** (-0.91, -0.31)	-0.66 (-1.10, -0.22)	-0.88 (-1.81, 0.05)
Tertiary	*REF*	*REF*	*REF*	*REF*	*REF*

There was a significant interaction between age and education on verbal fluency. Although individuals with lower education (primary or secondary) have significantly lower baseline scores compared with their tertiary-educated counterparts, the rate of cognitive decline with age is slower for the primary (b = 0.06, CI = 0.04, 0.09; p < .001) and secondary educated groups (b = 0.03, CI = 0.04, 0.09; p = .017). This suggests that while the more educated start with a cognitive advantage, their decline is more pronounced, leading to a narrowing of educational disparities in verbal fluency in older age. Notwithstanding this caveat, it should be acknowledged that the extent of the socio-economic differential remains substantial and statistically significant between 50-90 years as described in Table 5.13 and depicted in Figure 5.20.

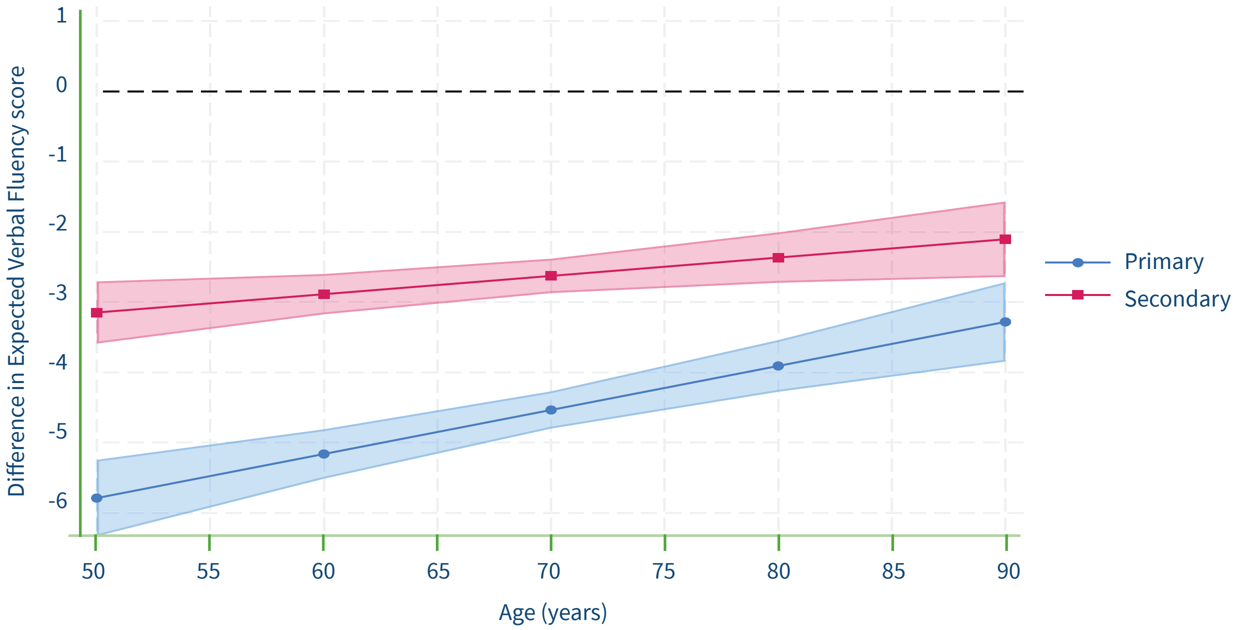

Figure 5.20: Expected difference in Verbal Fluency across the age-span, according to highest level of educational attainment (reference group = tertiary educated)

5.6 What Matters

In TILDA, quality of life (QoL) was assessed using the CASP-12 instrument, which is a brief (12-item) self-report inventory that is designed to measure quality of life independent of the factors that might influence it such as health, social supports and material circumstances (15). Participants indicate the extent to which they agree with each statement on a four-point frequency scale ranging from 'Often' through 'Never' and responses are scored such that the most positive responses are given a score of 3 and the most negative responses are given a score of 0. The instrument produces scores for each of four subscales: control, autonomy, self-realisation, and pleasure. These subscales are considered important dimensions of quality of life among older people. A total quality of life score is calculated by summing scores across the four subscales with a higher score indicating a higher quality of life (range 0-36) The instrument has been used to measure quality of life in other longitudinal ageing studies such as TILDA (19), the English Longitudinal Study of Ageing (ELSA) and the Survey of Health, Ageing and Retirement in Europe (SHARE) (20). It has been shown to be responsive to changes in the participant's circumstances over time that reflect changes in quality of life (18).

Table 5.14 describes the number of valid observations at each wave of the study and provides summary statistics for the CASP-12 QoL measure for the eligible sample at each wave and for the complete case base (n=1,863). The CASP-12 was administered as part of the self-completion questionnaire so tends to have a higher level of missingness compared with the CAPI. Mean QoL is highest at wave 1 and declines by wave 6 of the survey, but the relationship is non-linear. In total, we had 24,343 observations of the CASP-12 QoL score across 6 measurement occasions nested within 6,071 individuals with the average number of measurements equal to 4.01 (min=1, max=6). The average CASP-12 score across all measurement occasions was 27.6 (SD = 5.27) indicating generally high levels of QoL among the older population in Ireland (Table 5.15). The between-person SD was 4.72 and the within-person SD was 2.67 which indicates that most of the variation in CASP-12 QoL is due to differences between individuals. The intra-class correlation coefficient was 0.66.

Table 5.14: Population weighted distribution of CASP-12 QoL scores from Waves 1-6

Panel A	n	Mean	Std. Error	SD	95% CIs
Wave 1	6,071	28.2	0.10	5.09	28.0, 28.4
Wave 2	4,610	27.6	0.12	5.24	27.3, 27.8
Wave 3	4,123	27.2	0.17	5.44	26.8, 27.5
Wave 4	3,685	27.9	0.12	5.26	27.7, 28.1
Wave 5	3,207	27.5	0.13	5.13	27.3, 27.8
Wave 6	2,647	27.3	0.13	5.42	27.1, 27.6

Complete Case Base (n=1,863)

Panel A	n	Mean	Std. Error	SD	95% CIs
Wave 1	1,863	28.7	0.13	4.80	28.4, 28.9
Wave 2	1,863	27.9	0.13	5.11	27.7, 28.2
Wave 3	1,863	27.6	0.15	5.30	27.3, 27.9
Wave 4	1,863	28.4	0.13	5.11	28.1, 28.6
Wave 5	1,863	27.9	0.14	5.03	27.7, 28.2
Wave 6	1,863	27.6	0.14	5.26	27.3, 27.9

Panel A is cross-sectionally weighted to the nearest Census date. Panel B is longitudinally weighted to the 2011 Census.

Table 5.15: Descriptive statistics for CASP-12 QoL

	Mean	Std. dev.	Min	Max	Observations
Overall	27.6	5.27	3	36	n=24,343
Between		4.72	3	36	n =6,071
Within		2.67	8.8	43.8	4.01

5.6.1 Change in QoL across the age span

Figure 5.21 illustrates the predicted trajectory of CASP-12 QoL scores across the age span based on a multi-level growth curve model. At age 50, the predicted CASP-12 score is 26.4 (CI = 26.0, 26.7). The model indicates a modest but statistically significant increase in QoL from age 50 onward, as reflected in the positive linear age coefficient (b = 0.20, CI = 0.17, 0.26; p < .001). This upward trend peaks around 65-66 years of age, after which QoL begins to decline more steeply, as captured by the significant negative quadratic age term (b = -.006, CI = -0.007, -0.005; p > 001). Notably however, predicted QoL does not fall below age-50 levels until approximately 80 years of age. This pattern suggests that most older adults in Ireland can expect to maintain a relatively high level of QoL well into later life.

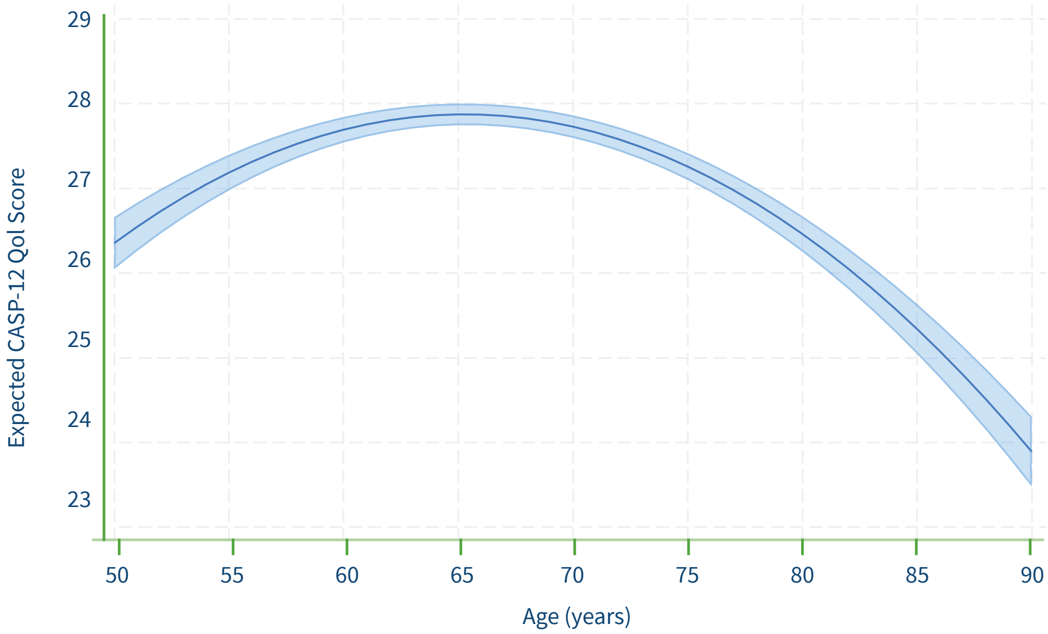

Figure 5.21: Functional form of change in CASP-12 QoL across the age span

5.6.2 Sex differentials in QoL

The curvilinear relationship between age (centred at 50) and QoL was observed for both men and women. Women's QoL peaked slightly earlier (at age 64) than men's (at 66), and at a higher absolute level (Figure 5.22). While the model predicts significantly higher QoL at age 50 for women compared with men (b = 0.77, 95% CI: 0.39 to 1.15; p < .001), a significant negative interaction between age (centred at 50) and sex (b = -0.03, 95% CI: -0.04 to -0.01; p = 0.003) indicates that QoL declines more rapidly with age for women. As a result, women enjoy slightly higher QoL at younger ages, but this advantage diminishes over time (Figure 5.23; Table 5.16). By age 70, sex differences are minimal. In late old age, women's QoL appears to decline more steeply compared with men.

Table 5.16: Expected CASP-12 QoL score in 10-year age intervals, by sex (n=6,071, obs=24,343)

	50-59 years	**60-69 years**	**70-79 years**	**80-89 years**	**90-99 years**
	b (95% CI)	*b (95% CI)*	*b (95% CI)*	*b (95% CI)*	*b (95% CI)*
Male	25.9 (25.5, 26.3)	27.4 (27.2, 27.6)	27.6 (27.4, 27.8)	26.5 (26.2, 26.8)	24.1 (23.6, 24.6)
Female	26.7 (26.3, 27.0)	27.9 (27.7, 28.1)	27.8 (27.7, 28.0)	26.4 (26.2, 26.7)	23.7 (23.3, 24.2)
Male	REF	REF	REF	REF	REF
Female	0.77*** (0.39, 1.15)	0.49*** (0.23, 0.76)	0.21 (-0.03, 0.46)	-0.06 (-0.40, 0.28)	-0.34 (-0.83, 0.15)

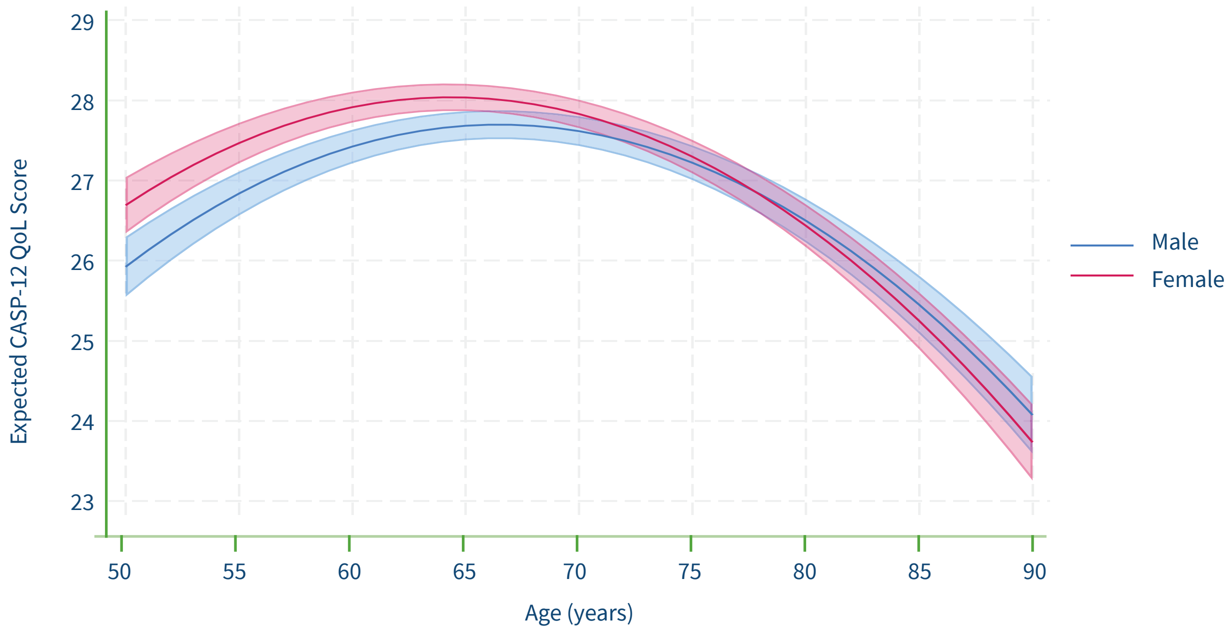

Figure 5.22: Expected CASP-12 QoL score across the age-span, by sex

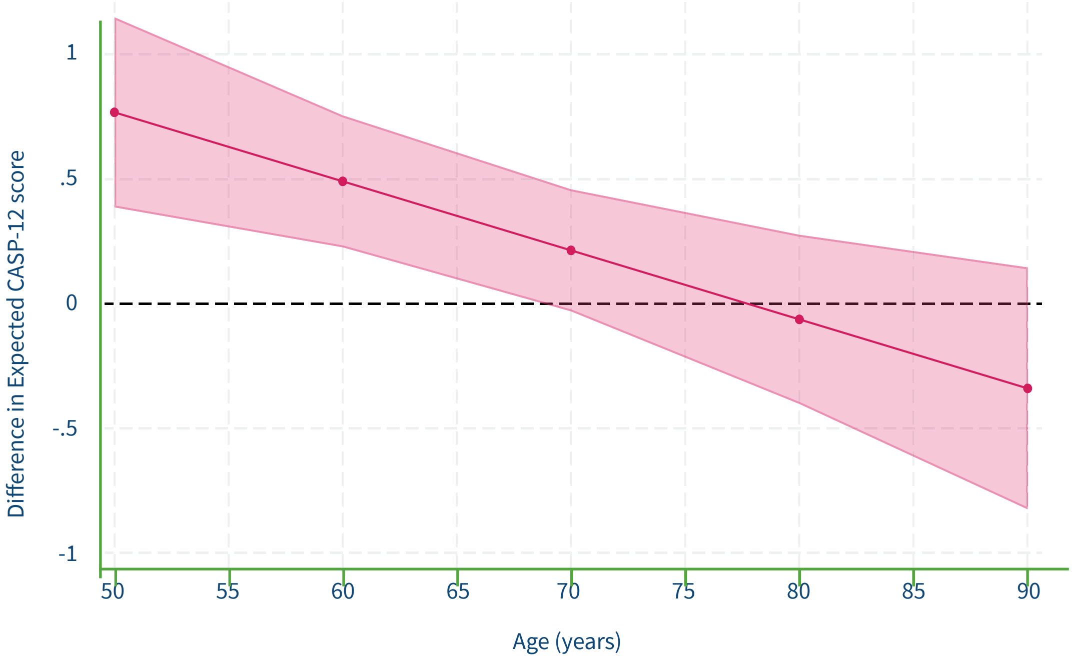

Figure 5.23: Expected differences in CASP-12 QoL score across the age-span, by sex (reference group = men)

5.6.3 Educational differentials in QoL

A pronounced socio-economic gradient in QoL was evident across the age span (Figure 5.24). In general, individuals with tertiary-level education report consistently higher QoL at all ages compared with those with secondary or primary education. While QoL increases from age 50 onwards across all education groups, it peaks slightly later for the primary-educated (at age 68) than for those with secondary (67) or tertiary education (66), although at lower absolute levels. If we extrapolate from the model, a person with a tertiary education at age 83 has similar predicted QoL to a person with primary education at their peak (age 68)—representing an approximate 15-year disparity in QoL between these education extremes.

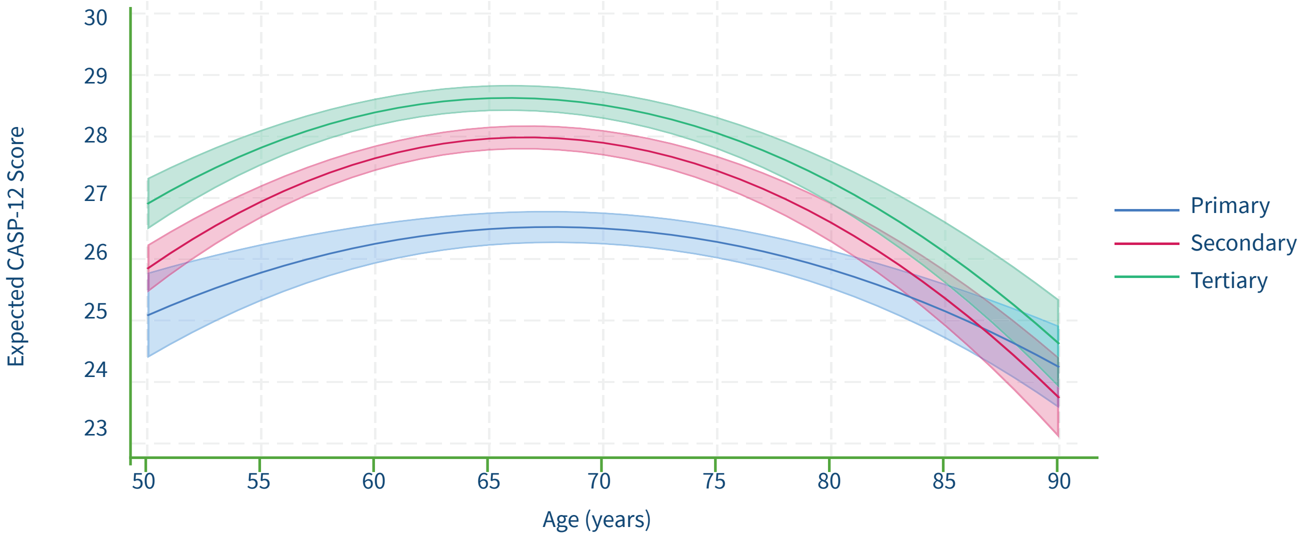

Figure 5.24: Expected CASP-12 QoL score according to highest level of educational attainment

There was a significant linear interaction between age and primary education (b = -0.28, 95% CI: -0.53 to -0.03; p = 0.028), and a positive quadratic age-by-primary education interaction (b = 0.0023, 95% CI: 0.0004 to 0.0041; p = 0.015). In plain terms, this means that people with lower education levels see smaller gains in QoL during midlife (when QoL tends to rise) but experience a slower decline in QoL at older ages. As illustrated in Figure 5.25 and detailed in Table 5.17, the primary-educated score, on average, 1.82 points lower on the CASP-12 at age 50 compared to the tertiary-educated (95% CI: -2.57 to -1.06; p < .001). The gap widens slightly to 2.11 points by age 60 (95% CI: -2.52 to -1.76; p < .001) but begins to narrow again from around age 70 and is effectively closed by age 87.

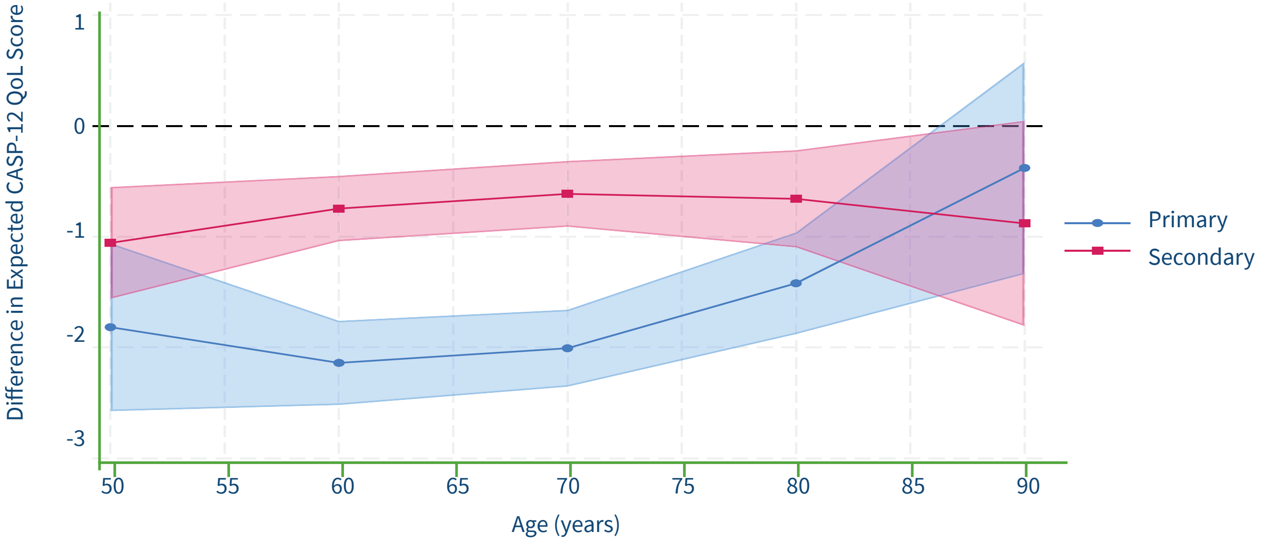

Figure 5.25: Expected difference in CASP-12 QoL score across the age-span, according to highest level of educational attainment (reference group = tertiary educated)

Table 5.17: Expected CASP-12 QoL score in 10-year age intervals according to highest level of educational attainment (n=6,071, obs=23,343)

	50-59 years	60-69 years	70-79 years	80-89 years	90-99 years
	b (95% CI)	*b (95% CI)*	*b (95% CI)*	*b (95% CI)*	*b (95% CI)*
Primary	25.1	26.3	26.5	25.8	24.2
	(24.4, 25.8)	(25.9, 26.6)	(26.2, 26.8)	(25.5, 26.1)	(23.6, 24.9)
Secondary	25.8	27.6	27.9	26.6	23.7
	(25.5, 26.2)	(27.4, 27.9)	(27.7, 28.1)	(26.3, 26.9)	(23.1, 24.4)
Tertiary	26.9	28.4	28.5	27.3	24.6
	(26.5, 27.3)	(28.2, 28.6)	(28.3, 28.7)	(26.9, 27.6)	(23.9, 25.3)
Primary	-1.82***	-2.14***	-2.01***	-1.42***	-0.38
	(-2.57, -1.06)	(-2.52, -1.76)	(-2.35, -1.66)	(-1.88, -0.96)	(0.25, 1.62)
Secondary	-1.06*	-0.75***	-0.61***	-0.66	-0.88
	(-1.56, -0.55)	(-1.04, -0.45)	(-0.91, -0.31)	(-1.10, -0.22)	(-1.81, 0.05)
Tertiary	*REF*	*REF*	*REF*	*REF*	*REF*

5.7 Summary and Conclusions

This chapter examined change in the 4Ms — mobility, medication, mind, and what matters — using data from six waves of TILDA over a 14-year period. Latent growth curve models were employed to investigate how these outcomes change with age, and how patterns of change differ by key demographic characteristics, including sex and educational attainment. In general, the analyses revealed that mobility and cognitive function declined, while medication use increased with age. However, quality of life improved, underscoring the notion that ageing is multidimensional and does not follow a uniform trajectory of decline.

The growth curve models demonstrated that ageing processes are nonlinear, with periods of acceleration and deceleration in the rate of change - particularly notable in outcomes such as TUG. These patterns suggest critical windows for targeted intervention, such as physical activity to maintain functional mobility or cognitive stimulation to support mental acuity. Importantly, the models indicated that most of the variance in outcomes lies between individuals, highlighting the substantial heterogeneity in how people experience ageing.

These findings also help identify vulnerable subgroups. On average, women live longer than men but tend to do so in poorer health and with greater levels of morbidity - a phenomenon often referred to as the male–female health–survival paradox (21). A particularly striking trend in the data is that while women appear healthier than men in midlife across three of the four outcomes (with the exception of medication burden), they exhibit a faster rate of decline thereafter, ultimately experiencing poorer outcomes in older age. Ongoing work within TILDA is investigating how social, economic, behavioural, psychological, and biological factors contribute to these sex differences across the life course.

Finally, the analysis uncovered pronounced educational inequalities in both baseline levels and trajectories of health and wellbeing. Participants with lower educational attainment—used here as a proxy for socio-economic position—fared worse on all outcomes and showed steeper declines for the majority. One of the most concerning findings is the 15-year gap in quality of life between individuals at opposite ends of the educational spectrum. This is concerning and points to the urgent need for life course interventions to address the structural determinants of health across the life course. Without such efforts, we risk widening disparities, increasing late-life morbidity and dependence, with the concomitant increase in healthcare costs; and shorter working lives, especially if gains in lifespan continue to outpace gains in health span.

5.8 Stakeholder perspective

Dr Emer Ahern,

National Clinical Advisor and Group Lead for Older Persons, Health Service Executive

Ireland is experiencing an extraordinary demographic shift: more people are living longer lives, often with complex needs that extend far beyond any single diagnosis. This chapter for the first time provides a timely and essential contribution to understanding those needs through the lens of the 4Ms Framework—What Matters, Medications, Mind, and Mobility.

The 4Ms Framework, adopted by the HSE as part of Ireland's commitment to an Age-Friendly Health System, offers a clear, evidence-based approach to delivering care that is both person-centred and effective across all care settings. For policy makers in the Department of Health and for HSE leadership, the 4Ms provide a unifying structure to translate strategic intent into operational practice, ensuring that the design and delivery of services truly align with what matters most to older adults: maintaining function, supporting cognition, optimising medication safety, and preserving autonomy and quality of life.

This chapter is particularly valuable because it presents normative data derived from robust longitudinal analysis of TILDA, Ireland's most comprehensive study of ageing. These data not only illustrate the trajectories of change in function, cognition, medication use, and quality of life over time, but also show how these domains are shaped by demographic factors such as age, sex, and educational attainment. By quantifying the demand and demonstrating the need for a whole-system approach to ageing well, this evidence supports the strategic case for investment and transformation of services.

Importantly, the findings reinforce that the healthcare needs of older adults are not simply disease based. Rather, they are inherently multidimensional, encompassing the interplay between functional and cognitive abilities, polypharmacy, and personal values that define well-being. For clinicians, health service planners, and decision makers, this chapter offers a compelling argument that adopting the 4Ms as a guiding framework is essential to meeting the growing demand for age-friendly, integrated care—care that is not only clinically effective but meaningful to every older adult, every time.

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Family Caring in Later Life: prevalence, impact, and the need for policy support

6

Christine McGarrigle

Contents

Key Findings 138

6.1 Introduction 139
6.1.1 Family caregiving in the middle aged and older population 139

6.2 Family carers 140
6.2.1 Characteristics and prevalence of family carers 140
6.2.2 Numbers of hours of caring provided 143
6.2.3 Relationship to the care recipient 143

6.3 Mental health and well-being of carers over time 144

6.4 Discussion 149

6.5 Conclusion 150

6.6 Stakeholder perspective 152

6

Family Caring in Later Life: prevalence, impact, and the need for policy support

Key Findings

- The level of care provided by older adults has returned to what it was before the COVID-19 pandemic, indicating a reestablishment of pre-pandemic caregiving patterns.
- In the past month, approximately 3% of men and 5% of women have reported engaging in caregiving activities, highlighting a small but consistent gender difference.
- Most caregivers provide assistance to their spouse or other family members; however, a considerable proportion also provide care to friends or neighbours.
- Carers who provide more than fifty hours of care each week report poorer mental health and reduced overall well-being, highlighting the emotional strain of high-intensity caregiving.
- Among these caregivers, women in particular were more likely to report increased symptoms of depression, pointing to a gendered impact of prolonged caregiving responsibilities.

6.1 Introduction

6.1.1 Family caregiving in the middle aged and older population

The use of social and community care services by the older population in Ireland by frailty and disability status have been documented (1, 2). While community-based care can facilitate ageing in place and has the potential to delay admission to a nursing home and improve quality of life (3), previous research from TILDA has highlighted that a substantial proportion of caring for older adults is unpaid, informal care by a family member (4-6). Caring networks are complex, and transitions into and out of the caring role, in addition to sharing tasks with other, more specialised caregivers, becomes increasingly important, particularly as the care recipient's health declines (7).

TILDA found that during the COVID-19 pandemic, following stay-at-home recommendations from Government, 15% of the older population reported caring for someone (8,9). This had increased three-fold from Wave 5 (2018). There had also been important changes in who was providing care, and while one in four carers report that they had stopped caring since the pandemic, two-thirds of those providing care were new carers. A large proportion of care is provided for the family, and we found that while the availability of both state-provided and informal care for older people was reduced during the COVID-19 pandemic, there was a concomitant increase in caring by older household members (8). This was associated with lower well-being and mental health in an already struggling group (9).

The aim of this chapter is to describe and quantify caring given by the population aged 60 years and older in Ireland post the COVID-19 pandemic. This chapter uses data collected at Wave 6 of TILDA from both the Computer Assisted Telephone Interview (CATI) (n=4,185) and the Self Completion Questionnaire (SCQ) (n=3,385), which contains more sensitive questions. It compares data from Wave 6 (2021) with data between Wave 3 (2014), Wave 4 (2016) and Wave 5 (2018) and the COVID-19 sub-study (2020). It also examines health and well-being in family carers and compares them to the population who are not giving family care.

This chapter is organised as follows. The first section provides a background to the topic, describing the context for the research; it describes the questions used and the characteristics of the community-dwelling adults aged 60 years and older resident in Ireland who were eligible for this analysis. The second section describes and quantifies the types and prevalence of care provided to family and friends by older adults. The third section describes the well-being of middle-aged and older adults providing family caregiving over time, and the final section discusses the results and suggests areas in which these findings could inform policy and practice.

6.2 Family carers

6.2.1 Characteristics and prevalence of family carers

This section describes the patterns of informal family caring and the characteristics of those who provide care. We asked participants *‘Did you look after anyone in the past week (including your partner or other people in your household)?’* By “look after” we mean the active provision of care. We also asked to whom they gave this care. Overall in Wave 6, 3% of men and 5% of women aged 60 years and older report that they provided informal care for a family member or friend in the last month (Figure 6.1). This proportion was higher for women and Figure 6.2 shows that a higher proportion of women aged 65 years and olderreport being carers compared to men at Wave 6: 6% aged 65-74 and 4% aged 75 years and older compared to 3% and 2% respectively for men. The proportions reporting caring are similar to Wave 5, pre-pandemic levels.

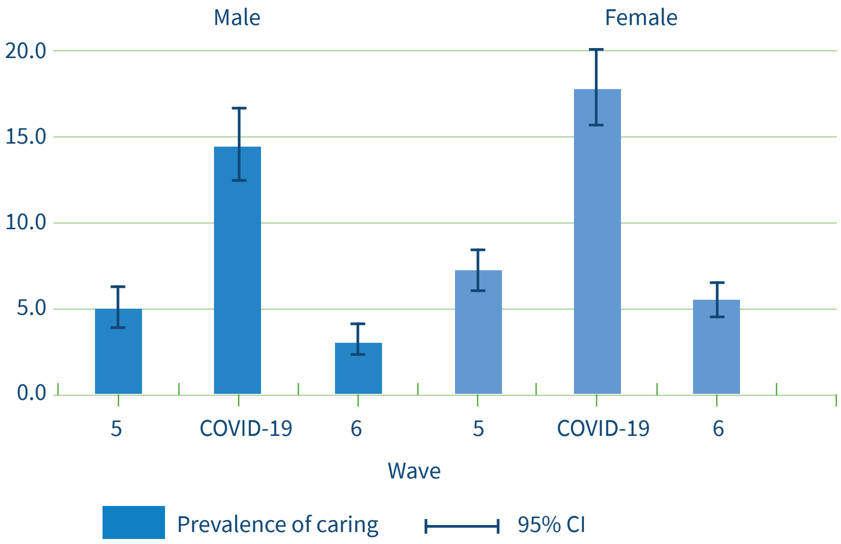

Figure 6.1: Proportion of adults aged 60 years and older who report they cared for someone in the last month by sex: Wave 5 to Wave 6, including the COVID-19 SCQ sub-study

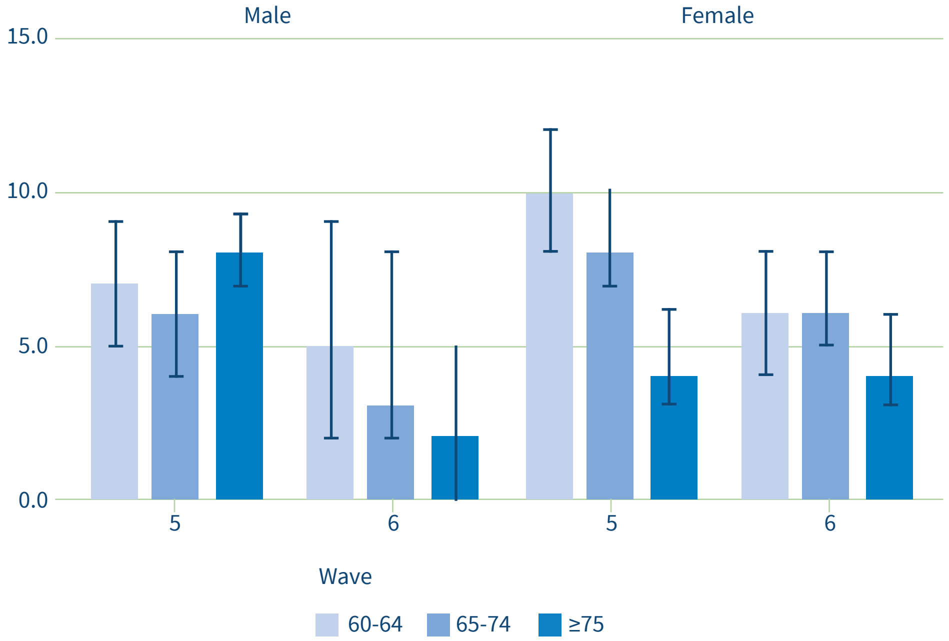

Figure 6.2: Prevalence of the population providing care to family and friends, by age group and sex: Wave 5 to Wave 6

Women who were married were more likely to report caring for someone in Wave 6 than women who were separated, divorced, or widowed (Figure 6.3).

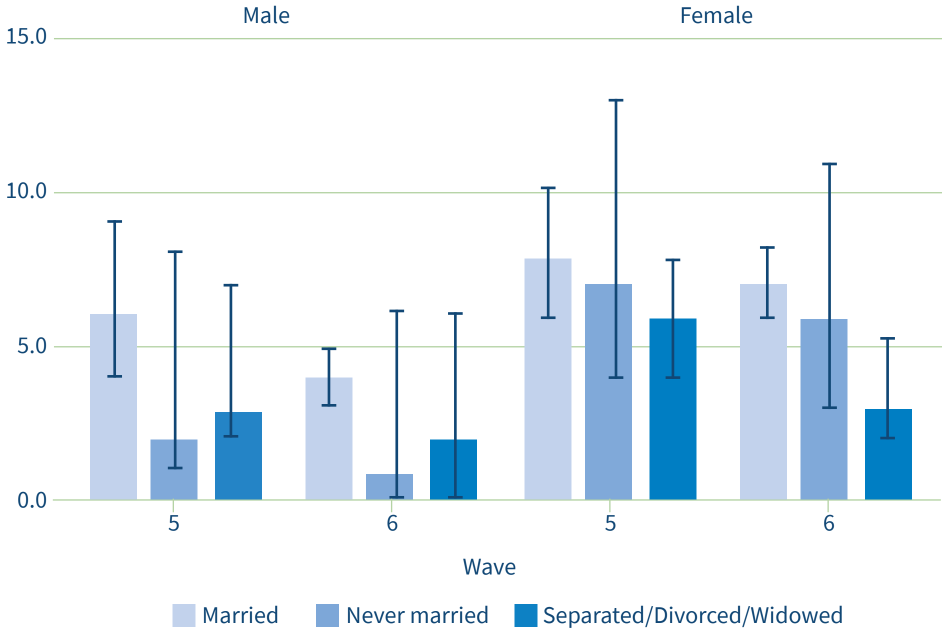

Figure 6.3: Prevalence of the population providing care to family and friends, by marital status and sex: Wave 5 to Wave 6

The proportion of women reporting caring with higher level education in Wave 6 was higher than in women with primary education (8% versus 3%) (Figure 6.4). There was no difference in caring by education attainment for men.

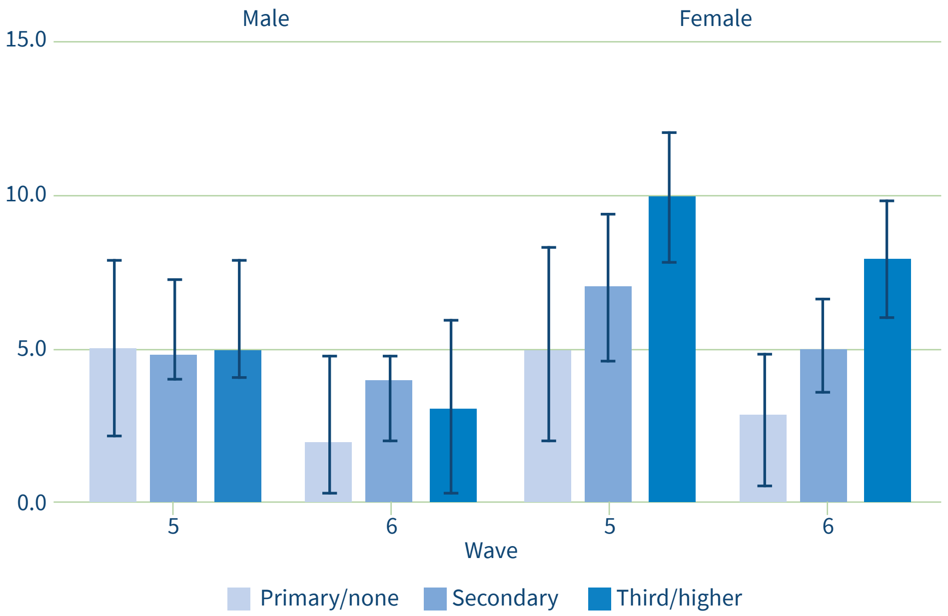

Figure 6.4: Prevalence of the population providing care to family and friends, by educational attainment and sex: Wave 5 to Wave 6

In Wave 6, a higher proportion of men who lived in Dublin reported caring (5%) compared to men who lived in a rural area (2%) (Figure 6.5). These differences were not seen in women by location of residence.

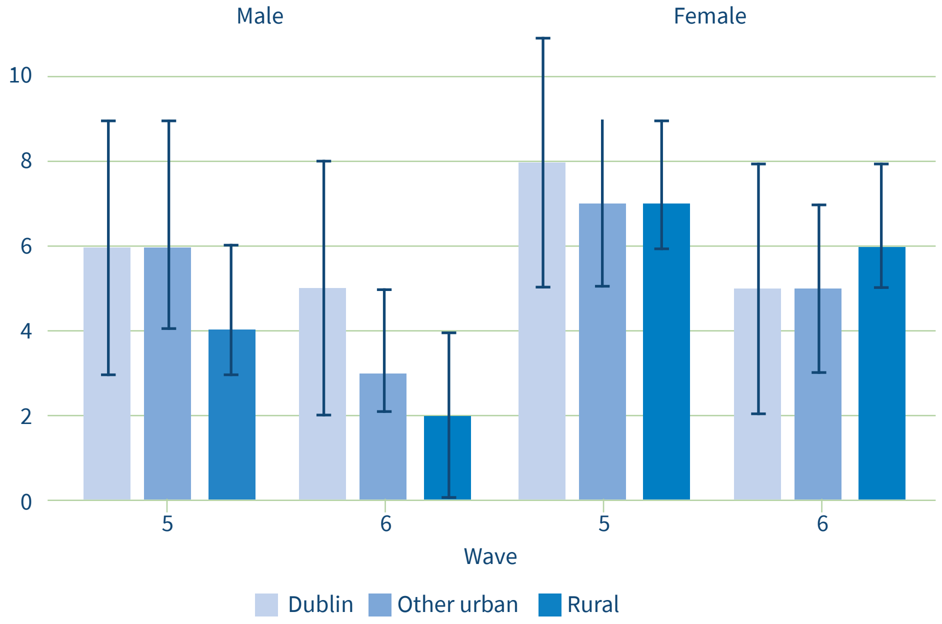

Figure 6.5: Prevalence of the population providing care to family and friends, by area of residence, age group and sex: Wave 5 to Wave 6

6.2.2 Numbers of hours of caring provided

We asked participants who said they had cared for someone in the past week how many hours of care they had provided. The number of hours varies and was mainly low (Wave 5 median 20, range 6-84 and Wave 6 median 24, range 7-168), with a small proportion providing 50 or more hours of caring in the past week. However, while the proportion of women who reported caring in the last week decreased between Wave 5 (7%) and Wave 6 (5%), the proportion who reported caring for 50 or more hours remained the same at 1.7% in Wave 5 and 1.6% in Wave 6 (Figure 6.6). Similarly for men where the proportion reporting caring decreased from 5% to 3% between Wave 5 and Wave 6, the proportion reporting caring for 50 or more hours remained the same at 1%.

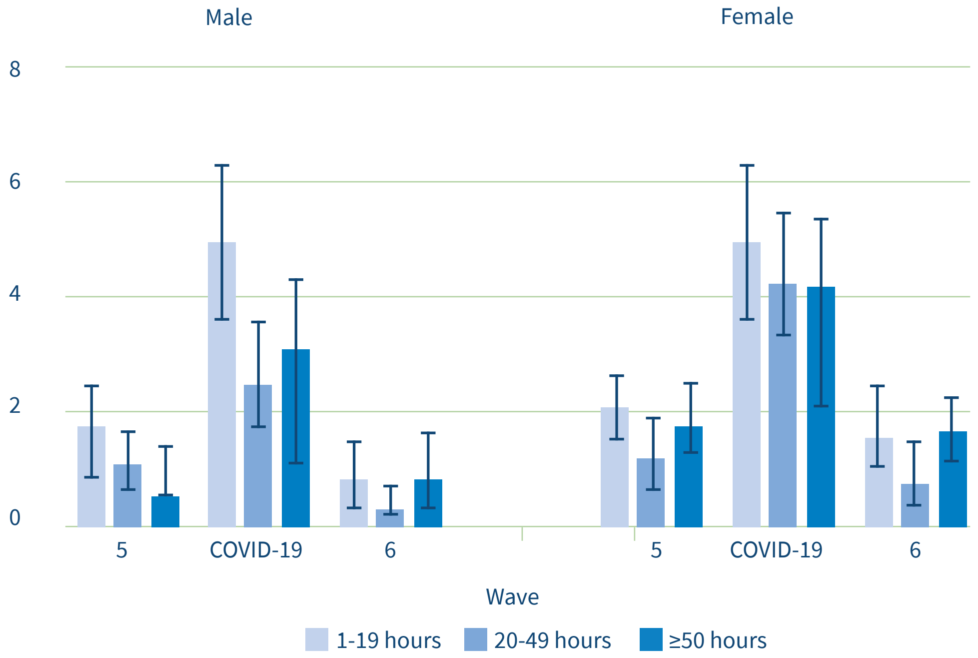

Figure 6.6: Prevalence of hours of caring in the last week for those who provide care: Wave 5 to Wave 6

6.2.3 Relationship to the care recipient

We also asked those who were providing care what their relationship was to the care recipient. In Wave 6, 32% reported that the main recipient for whom they were providing care was another relative; a further 32% reported it was their spouse, while 10% reported giving care to a friend or neighbour (Figure 6.7). In Wave 5, 33% of care was given to another relative, 26% to a spouse and 12% to a friend or neighbour. These proportions were similar for men and women.

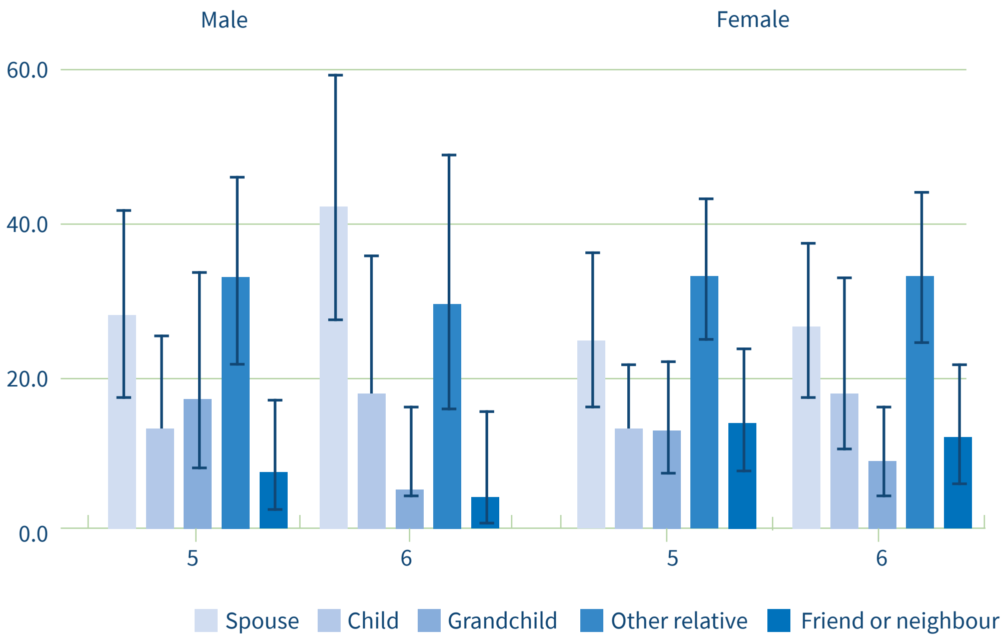

Figure 6.7: The main care recipient for those who reported they cared for someone in the last month: Wave 5 to Wave 6

6.3 Mental health and well-being of carers over time

This section examines the mental health and well-being of carers, compared to those of a similar age who do not provide care. Quality of life was measured using the Control, Autonomy, Self-Realisation and Pleasure (CASP-12) 12-item scale (10). Total scores (range 0-36) were calculated; higher scores indicating better quality of life. Depressive symptoms were measured using the Center for Epidemiological Studies Depression (CES-D8) scale, an 8-item scale (11). This scale measured the frequency that participants had experienced a variety of depressive symptoms in the past week. The responses were summed giving a total score (range 0-24); higher scores indicating more depressive symptoms. Perceived stress was measured using the Perceived Stress Scale (PSS4), a 4-item scale (12). This scale measured frequency that participants appraised situations in their life as stressful in the past month. Responses were summed giving a total score (range 0-16); higher scores indicating more perceived stress.

Covariates

We identified potential confounders that affect caring and well-being/mental health outcomes based on existing literature including demographic and socioeconomic characteristics: age, age-squared, highest educational attainment (primary (8 years), secondary (12 years), tertiary (>13 years); marital status (married, never married, separated/divorced, widowed) and area of residence (Dublin, urban other, rural). Prevalence estimates (95% CI) and means (standard deviation) are presented, weighted using inverse probability weights derived to adjust for attrition and to create estimates that were representative of the general population over time. Multilevel regression analyses examined longitudinal trends in CES-D8, PSS4 and CASP-12 scores by caring status and changing care hours since Wave 3, adjusting for sociodemographic variables to describe the average change in well-being and mental health in a cohort of older adults between Waves 3 and 6. We also assessed the difference in caring over time, and the impact of gender in the caring context.

Figure 6.8 shows the trajectories in QoL, depressive symptoms and perceived stress between Wave 3 and Wave 6, in adults aged 60 years and older categorised by caring status. Overall, carers, both current and those who had previously provided care but were no longer caring, experienced a decline in well-being by Wave 6 compared to earlier waves. Individuals who became new carers in Wave 6, those continuing to care, and former carers all reported lower quality of life, and higher depressive symptoms over time compared to non-carers. However, there was no difference in perceived stress in carers relative to non-carers.

Figure 6.9 shows how mental health and well-being changed over time, depending on how many hours people spent caring for others each week. Those providing 50 hours or more of care each week had worse mental health and overall well-being compared to those who cared for fewer hours or did not provide care at all. By the time of Wave 6, their mental health had declined even further, highlighting the heavy toll that full-time caregiving can take over time.

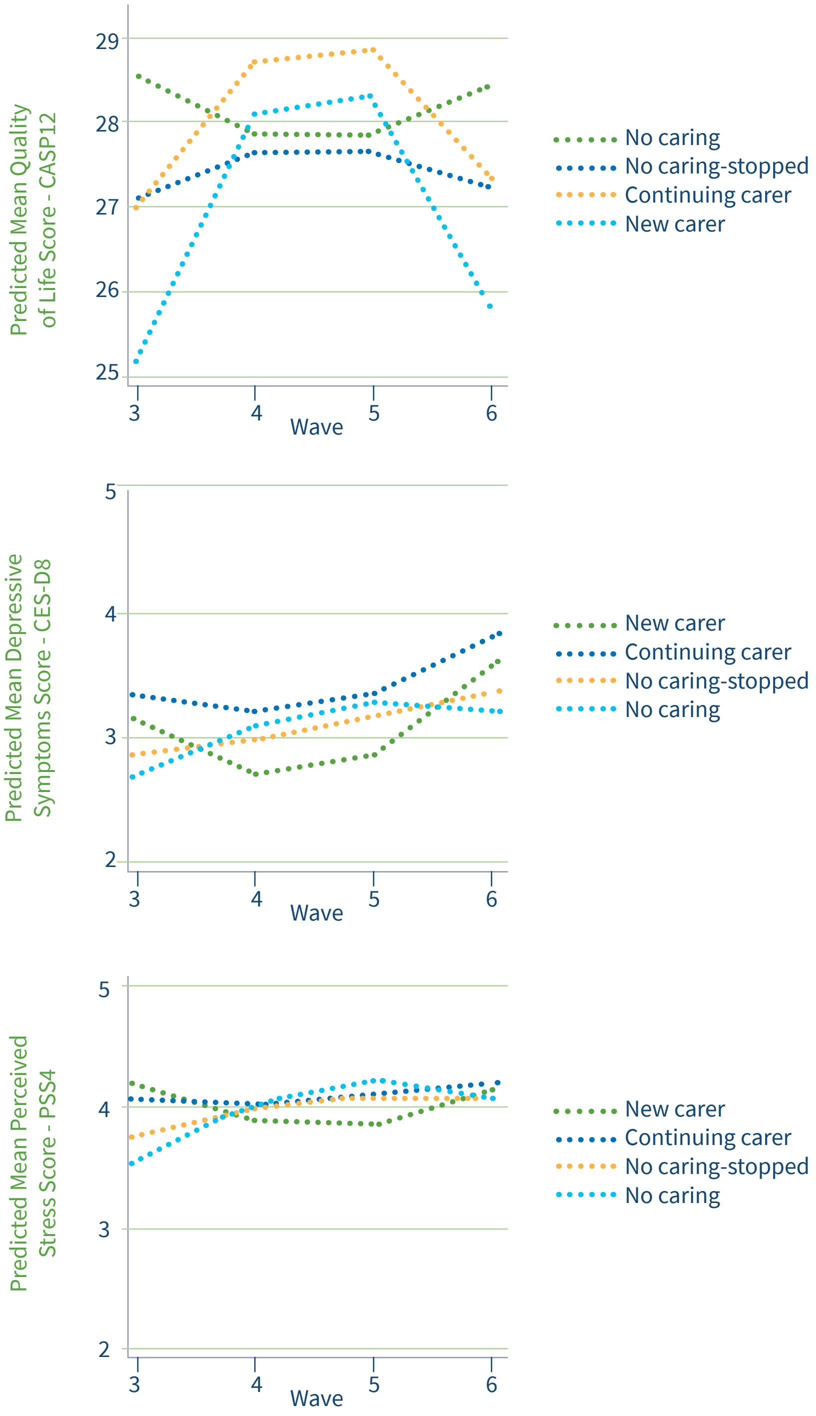

Figure 6.8: Conditional multilevel growth model trajectories of Quality of life (CASP-12), depressive symptoms (CES-D8) and perceived stress (PSS4), by caring status in Wave 6

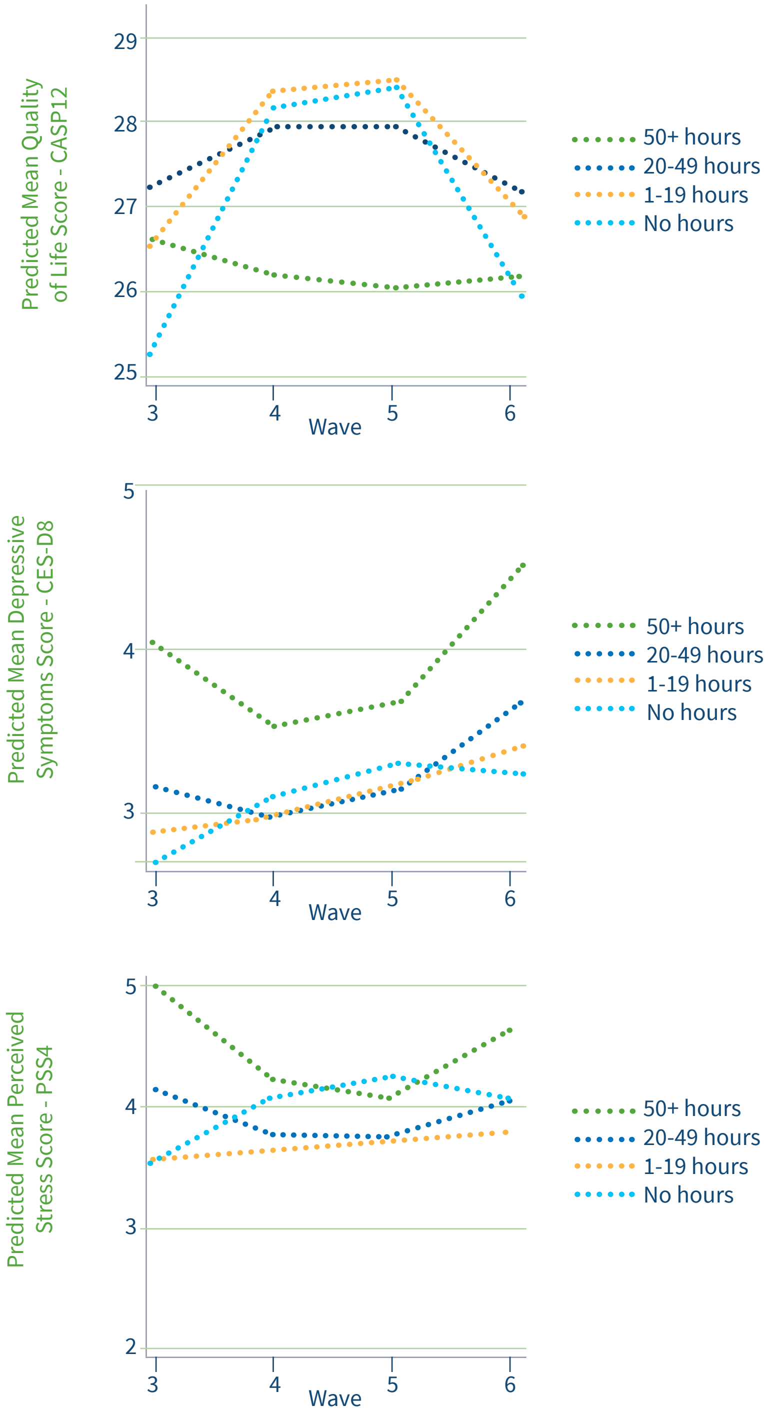

Figure 6.9: Conditional multilevel growth model trajectories of Quality of life (CASP-12), depressive symptoms (CES-D8) and perceived stress (PSS4), by hours of care in Wave 6

Table 6.1 presents findings from the linear mixed effects models examining the relationship between caring status and caring hours, and well-being outcomes, quality of life, depressive symptoms, and perceived stress over time. The analysis looks at how an individual's mental health and well-being changed over time, depending on whether they cared for others and how many of hours of care they provided each week.
The analysis showed that, people who stopped caring or became new carers in the latest wave didn't show any major changes in quality of life, depression or stress compared to non-carers on average over time. Caring status was not associated with quality of life on average over time. Their results were mostly similar to people who weren't providing care.

However, people caring for 50 or more hours a week had worse outcomes. Carers providing 50 hours of care or more a week had lower quality of life, higher depression and higher stress levels than others. These effects were statistically significant, meaning they are very likely to reflect real differences, not just chance.

Compared to not caring, carers providing 50 or more hours of care per week reported quality of life scores that were, on average, 0.79 points lower than those who did not engage in caring. This difference remained consistent over time. They also had average CES-D8 scores that were 0.76 points higher compared to non-caregivers. This effect was more pronounced in women with those providing extensive care (≥50 hours a week) reporting an average 1.15 points higher CES-D8 scores. Overall, perceived stress was generally low, with an average score of 4.5 for men and 4.9 for women. On average, perceived stress did not vary by caring status. However, the number of caregiving hours were significantly associated with perceived stress: carers who provided 1-19 hours of care in the past week had stress scores 0.36 lower on average than non-carers, and those caring for 50 or more hours per week had average stress scores 0.43 points higher than non-carers.

The results also show that light caregiving may be linked to better well-being. Carers who provided between 1 to 19 hours of care per week had lower stress, suggesting that caring for lower numbers of hours might have positive aspects, perhaps linked to feeling useful or connected.

Table 6.1: Mean predicted QoL, depressive symptoms and perceived stress scores over time, by caring status and hours of caring

	Quality of life (CASP12)	Depressive symptoms (CES-D8)	Perceived stress (PSS4)
	Coefficient (95% CI)	Coefficient (95% CI)	Coefficient (95% CI)
Change in caring status			
Previous carer - Stopped caring prior to Wave 6	0.50 (-0.14, 1.13)	-0.21 (-0.58, 0.17)	-0.07 (-0.40, 0.63)
Continued to care	-0.24 (-1.44, 0.96)	-0.03 (-0.76, 0.71)	-0.05 (-0.68, 0.58)
New carer Wave 6	0.18 (-0.60, 0.96)	-0.12 (-0.59, 0.35)	0.01 (-0.40, 0.42)
Hours of caring per week			
1-19 hours	0.35 (-0.02, 0.72)	-0.04 (-0.34, 0.25)	-0.36 (-0.63, 0.-09)**
20-49 hours	0.20 (-0.36, 0.76)	0.12 (-0.33, 0.57)	-0.08 (-0.48, 0.33)
50+ hours	-0.79 (-1.33, -0.25)**	0.76 (0.33, 1.19)***	0.43 (0.05, 0.82)*

Note: Maximum likelihood estimates from linear mixed effects models: fixed effects models, p-values * <0.05; ** <0.01; *** <0.001, reference no caregiving

6.4 Discussion

This chapter highlights the continued reliance on the older population to contribute to the informal care of their family and friends. In Wave 6, 5% of women and 3% of men aged 60 years and older report they are a carer to family and friends, reflecting a slight decline compared to levels observed before the COVID-19 pandemic. When we examine caregiving in Wave 6 (2021) the percentage of the population aged 60 years and older reporting informal caring reduced to 5%, returning to pre-COVID-19 pandemic levels. However, we also find that the proportion of carers who provide 50 or more hours of care per week has remained unchanged.

Family carers who provided 50 or more hours of care per week reported lower levels of mental health and well-being. Increased caregiving hours were linked to poorer quality of life, greater depressive symptoms, and higher perceived stress compared to non-carers. These negative associations between caring and well-being were evident as early as Wave 3 of TILDA and have been sustained over time. Notably, the increased depressive symptoms were observed only among women, suggesting that women may be particularly vulnerable to the reduced social interactions that often accompanies intensive time spent caregiving. While social engagement with friends and family is known to be beneficial for mental health across genders, some evidence suggests that caring for grandchildren and participation in social interactions outside the home are more advantageous for women (4, 5, 13).

Family carers contribute significantly by reducing the demand for publicly funded home and institutional care services for older people, while also promoting better health outcomes for care recipients who remain at home with loved ones. To support family carers in sustaining their role, formal assistance is essential. While caring can be rewarding, people providing high levels of care may need extra support. This includes state-provided homecare hours, respite services to allow carers time for themselves, and financial support to ease the burden of caregiving.

Informal care provision is more common in societies where family care is considered a norm, although a combination of both personal beliefs, family and social networks in addition to social policy within countries are likely to determine who becomes a carer (14). With growing pressure on formal state-provided services, families, and often older family members, may face increased expectations to provide care. As state-provided care should allow more leisure time for informal carers, it is important to understand what factors determine how these services are allocated. Effective policy responses to an ageing population must consider the differences between the use of formal care and reliance on family carers, particularly where these differences are shaped by socioeconomic factors.

6.5 Conclusion

To support and encourage family caring, access to state-provided home support is crucial. This support helps carers to balance work, leisure and caregiving responsibilities, ultimately contributing to a more positive caregiving experience. Ensuring such support allows both the carer and the care recipient to remain in the home for as long as is possible, benefiting individuals, families and the broader healthcare system. Currently, availability of formal home support is limited which forces many family carers to fill the gap often at the expense of their own well-being.
As demand for care grows and formal services remain insufficient, family carers bear more strain, which negatively impacts their health and ultimately, the quality of care.

6.6 Stakeholder perspective

Family Carers Ireland

Family Carers Ireland congratulates Dr Christine McGarrigle and her colleagues at Trinity College Dublin on the publication of this important research which uses TILDA data to gain insight into the characteristics and challenges of family carers aged 60 years and older. The study offers a timely exploration into the health and wellbeing of older family carers, who are often navigating the challenges of ageing themselves, and highlights the negative health outcomes and gendered impact associated with prolonged periods of caregiving. The research serves as a call to action for policymakers and will be a valuable resource for Family Carers Ireland in our efforts to advocate for greater recognition, enhanced support, and improved services for older carers, ensuring they have access to the supports they need, when, how and where they are needed.

The research findings lend further support to many of the policy changes advocated for by Family Carers Ireland. For example, Family Carers Ireland believes that all full-time family carers should have the right to regular, appropriate and flexible respite, enabling them to rest, recharge, and maintain their own health and wellbeing. Carers and the people they care for should also have the right to independent living supports and access to quality home care services. However, despite repeated commitments to support people to be cared for at home, the State continues to allocate nearly twice as much funding to long-term residential care, as it does to home support services. This imbalance undermines the principle of person-centred care and limits real choice for families. A rebalancing of investment and the introduction of the long-awaited statutory home support scheme is urgently needed to align public spending with public preference, ensuring that people are genuinely supported to live and be cared for at home, where most want to be.

The consistent gender imbalance in the provision of informal care, as highlighted in the research, remains a persistent and pervasive issue, reflecting deep-rooted societal expectations and contributing to unequal health and economic outcomes for women. While progress has been made in addressing the pension disadvantage faced by long-term carers, the Irish welfare system continues to reinforce the entrenched stereotype of women as the primary caregiver. Means-testing Carer's Allowance based on the household income rather than on the individual income of the family carer forces carers, the majority women, to be financially reliant on their partner. Additionally, imposing a strict limit on the number of hours a carer can work or study, while in receipt of a carer payment, disproportionately affects women, locking them into long-term welfare dependency, contributing to pension disadvantage and reinforcing the gender pay gap. Family Carers Ireland believes that a first step towards addressing the gender care gap is for a transformative shift away from the outdated, means-tested Carer's Allowance scheme towards a new, inclusive, and equitable Family Carer Payment.

This proposed payment would not be subject to a means test and would be set at a level that properly acknowledges the immense social and economic contribution of family carers. Such a reform would acknowledge the State's deep reliance on unpaid caregiving and promote greater gender equity. By implementing a Family Carer Payment, the Government would recognise care work as the essential public good it is and ensure that all carers, regardless of income or family circumstances, receive the support, autonomy, and recognition they rightfully deserve.

One of the greatest challenges facing many older carers is the constant worry about what will happen to their loved one when they are no longer able to provide care. To address this, we must invest in independent living and future planning supports that give carers peace of mind by offering services, resources, and guidance to help carers and those in need of care to make contingency arrangements in the event the carer is unable to provide care themselves due to age, illness, or death.

In bringing to light the realities of older family carers, this research provides a foundation for more compassionate and informed responses to caregiving in later life. It underscores the urgent need for tailored policies and support systems that not only recognise older carers invaluable contribution but that also safeguards their health and quality of life. The research and its findings are a valuable resource for anyone seeking to understand, and ultimately improve, the caregiving landscape for older adults.

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