The costs of long-term care for those with cognitive impairments in England

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1. Introduction

This paper examines the nature of long-term care for older adults with cognitive impairments in England[1]. Long-term care (LTC), which in England is commonly referred to as adult social care, is care that supports daily activities of living for older and disabled individuals to enhance their quality of life. This includes care services ranging from nursing home stays to home-based assistance with tasks like washing, dressing, and eating. For older people with cognitive impairment, such as dementia for example, additional specialized care and support might be necessary. This paper shows that much of the high care needs of older individuals is attributable to those with cognitive impairments: approximately half of the total care costs of the age 65+ population in England are attributable to the 8.5% of individuals with cognitive limitations.

As in many countries around the world, England's LTC system faces increasing pressure due to population aging. Increasing lifespans and decreasing fertility rates have led to a growing proportion of the population that is aged 65 and older. The share of the population aged 65+ has roughly doubled over the past 60 years, and currently represents about 20% of the total population. Whilst this share is forecast to continue rising over time, perhaps more important for the LTC care debate is the increasing share of the oldest old (80 and over), as the baby boom generations move deeper into their retirement. Costs of providing care for these people are forecast to rise rapidly over time (Collins et al., 2022).

Increasing numbers of older retirees, with higher prevalence of physical disabilities and cognitive impairments, will place increasing demands on the LTC system. These demands include both formal paid care as well as informal care provided by family, friends and voluntary care organisations. The value of informal care is at least as large as the value of formal care. For example, Banks et al. (2024) estimate the annual value of informal care provided to the age 65+ population in England to be between 0.7%-2.5% of GDP, depending on the method used to value the time of informal carers, which compares to a cost of formal LTC of 0.9% of GDP per year.[2]

[1] Where possible in this paper we present all statistics and analysis for the English population, since that is the jurisdiction that corresponds most closely to our microdata. In certain instances, however, we use UK statistics and explicitly label them as such. The English population makes up the large majority of the UK population and the demographics across England and the other UK nations are similar; the English population is slightly richer and healthier on average but enjoys a slightly less generous LTC care system. So one might expect English statistics to be similar to the UK statistic were they available.

[2] LTC spending was 1.8% of GDP in 2018 according to the UK Health Accounts (ONS, 2020). This spending measure is different than the one in Banks et al. (2024), for multiple reasons. The key difference is that the UK Health Accounts data includes spending for all age groups, whereas the Banks et al. (2024) data include only the age 65+ population, who are responsible for approximately 60% of all LTC spending.

In this paper, we follow up on our previous analysis in Banks et al. (2024) by measuring the care needs and care utilization of individuals with cognitive impairment among the English population aged 65 and over. This is in recognition of the particularly high potential costs associated with supporting this population and the fact that the proportion of individuals with cognitive impairment is forecast to rise rapidly in the next twenty years. We use data from the English Longitudinal Study of Ageing (ELSA), which is the English data that is best suited to measuring cognitive and physical impairments at the individual level as well as the amount of care (of all different types) received. Due to small sample size, we pool two recent waves of pre-pandemic ELSA data, covering the years 2016/17 and 2018/2019 in order to increase sample sizes which is particularly important for our multivariate analyses.

Our first key finding, which underlies many of the relationships that follow, is that over half of those meeting our definition of cognitive impairment also have multiple physical limitations. Rates of physical impairment rise rapidly with cognitive impairment. Thus, the cognitively impaired are a high-care cost group due to both their physical as well as their cognitive impairment. However, due to small sample size and the high correlation of physical as well as cognitive impairments, it is difficult to separate whether these high costs are due to physical or cognitive impairments.

Secondly, almost all nursing (and residential) home care in England goes to cognitively impaired. Nursing home costs for the cognitively unimpaired population (even with many ADLs) are small. This reflects (i) the relatively small share of the population in nursing homes and (ii) that the mostly publicly funded system targets nursing home resources to the most impaired in England.

Third, the cost of care for those with cognitive impairments is significant. Assuming that informal care hours are valued at the estimated market wage that the carer could have earned had they engaged in market activity, we estimate total cost of LTC to be £41.9 billion per annum over the period 2016-2019, approximately 2.2% of GDP, and of this £23.6bn (1.2% of GDP) is informal care costs.[3] The total care cost translates to an average cost of £3,982 per person aged 65 and over in England, but is unequally distributed. Most of the older population have zero or one physical limitations and no cognitive limitation; they incur annual care costs of less than £1,000 per person. The 9.2% of the older population with two or more physical limitations but no cognitive impairment incur annual care costs of £13,745 per person, of which £9,617 is informal care and most of the remainder is formal care at home. In contrast, the 8.5% of the older population with cognitive impairment, regardless of their level of physical disabilities, incur annual care costs of £22,609 per person. The level of informal care

[3]This corresponds to the 'central' estimate of informal care costs in Banks et al (2024). That paper used the same methodology as in this paper but only data from 2018-19; estimated informal care costs in that paper were 1.4% of GDP.

costs for this group is comparable in size to that of the physically (but not cognitively) impaired group; the huge difference is accounted for by nursing home costs instead of formal at home care. Put in different terms, almost half of the total care costs of the older adult population in England is accounted for by those with cognitive limitations, considerably greater than the 32% that is accounted for by cognitively unimpaired individuals with multiple physical limitations.

This paper combines microeconomic data with aggregate statistics to provide a comprehensive overview of LTC demand and supply in England, facilitating comparisons with other countries. We also discuss current LTC policies and recent reforms, highlighting the implications for individuals with cognitive impairment and their families. The paper is intended to serve as a valuable resource for researchers and policymakers interested in understanding the complexities of LTC in England, particularly the challenges and opportunities related to caring for individuals with cognitive impairment. We also acknowledge the need for more systematically harmonized data on local authority LTC provision to enable more in-depth microeconomic analysis of this critical issue.

The remainder of the paper is structured as follows. Section 2 briefly describes the institutional and policy environment for LTC in England for those with cognitive impairments. Section 3 briefly describes our data sources and documents the distribution of cognitive impairments in the 65+ population. It also shows how these impairments co-vary with physical impairments. Section 4 carries out descriptive analyses, both at the univariate and multivariate level to measure the determinants of receipt of different types of care. In Section 5 we discuss the aggregate costs of these care needs, before turning to some brief discussion and final concluding thoughts in Section 6.

2. Policy Environment

While the National Health Service (NHS) provides free public medical care, it does not cover long-term care (LTC) services. Instead, local authorities in England fund and organize most public LTC, and have considerable flexibility in how they provide care. To receive LTC support, individuals must undergo a needs test to assess their care requirements and a means test to assess their financial capacity to contribute towards the cost of care. Eligibility for LTC services for those with cognitive impairment follows the same needs-based assessment process as for those with physical limitations. However, the type and intensity of care provided may differ across recipients to address the specific challenges associated with cognitive and physical decline. Those with higher income or assets are expected to contribute, while those with limited means may receive fully funded public care. Approximately 65% of formal LTC costs are financed by local authorities and other public sources.

While most public expenditure for LTC is for formal nursing home or at home care, informal carers also receive significant assistance. England offers various forms of assistance for informal caregivers. These include Carer's Allowance, which is a financial payment for eligible caregivers who spend a certain number of hours per week caring for someone with substantial care needs; pension credits, which provide caregivers a top up to their State Pension if they have a low income; and training and support programs offered by local authorities to equip caregivers with the skills and knowledge to provide effective care. In addition, there may be specific respite care stipulations as part of the care recipient's care package. These can include short amounts of in home care provided by volunteers either during the day or overnight, short stays in a care home (respite care centre), support for the care recipient to take part in activities without the carer, or holidays for the care recipient and carer. As with all aspects of the care package, respite care entitlements and arrangements will differ by local authority.

England's LTC policies have undergone numerous reforms in recent years, providing families with more choice and control over care arrangements. One focus has been on supporting older adults who receive care in their own homes, allowing individuals to age in place. Currently, 60% of public social care recipients receive care at home (although most of the costs of care go to those in a nursing home). Another key reform involves the implementation of "personal budgets" and "direct payments," empowering care recipients to make informed decisions about how their allocated funds are spent, including the option to choose their own care providers.

The issue of large out-of-pocket costs for LTC has been a central focus of recent policy discussions. Plans set forth by the prior Conservative government, drawing from the 2011 Dilnot Commission's recommendations, aimed to alleviate this by introducing a lifetime out-of-pocket cap of £86,000 on LTC charges and a more generous means test, due to take effect in October 2025. These plans were scrapped by the incoming Labour government in 2024. This reversal means individuals will continue to face potentially unlimited out-of-pocket spending on care costs and continue to face significant financial insecurity in later life. Given that individuals with cognitive impairment often face higher care costs, this policy reversal will have a particularly profound impact on them and their families. Recently a new independent commission into adult social care, led by Baroness Casey, was announced. The commission will report back by late 2027.

3. Data and Definitions

Sample and Weighting:

Our primary data source is the English Longitudinal Study of Ageing (ELSA), a panel survey of individuals approximately ages 50 or older and their spouses or partners. The survey collects biennial

measurements of health, functional capabilities, demographics, employment, wealth, and information on long-term care needs. Importantly for our study, it measures both physical and cognitive health. If a sample member was unable to respond in person, a proxy respondent was asked questions in their place.

ELSA is part of a series of related surveys around the world, including the Health and Retirement Study (HRS) in the US and the Survey of Health Ageing and Retirement in Europe (SHARE). Wherever possible, for direct comparability, we chose measures that had equivalents in the other surveys.

We use data from the 2016/17 (wave 8) and 2018/19 surveys (wave 9) and focus on those aged 65 and older, for which there is a sample size of 5,759 individuals and 9,895 person-year observations. We use cross-sectional survey weights throughout to correct for systematic non-response to the ELSA survey. Such cross-sectional weights are designed to make the ELSA sample representative of the English non-institutionalised population aged 50 and over in the survey year, but not the total population which includes those in nursing homes and other (communal) institutions. While ELSA attempts to track sample members if they become institutionalised, ELSA sample members face high rates of attrition when entering nursing homes.[4] To account for this problem we use the reweighting procedure described in appendix of Banks et al. (2024). The reweighted ELSA sample matches the share of the age 65+ population that is institutionalized in nursing and/or residential homes.

Cognitive Impairment:

We assess the cognitive abilities of respondents using a series of questions from the ELSA. These questions evaluate memory, attention, and orientation by asking respondents: for immediate and delayed recall of a list of 10 words, counting backwards from 100 by 7, and stating the current date (month, day, year, and day of the week). Responses are combined into a cognitive score ranging from 0-29, with lower scores indicating poorer cognitive function. While ELSA includes additional cognitive measures, we focus on these specific questions because they are also available in HRS and SHARE surveys, allowing for cross-country comparisons. In line with the other papers in this volume, we select a score of 6 or lower as indicating cognitive impairment.

Cognitive Impairment of Proxy respondents:

[4] In our sample, individuals in nursing homes represented 1.1% of the over 65 sample, whereas recent estimates (for early 2020) from the Office of National Statistics put this fraction at 3.3%. This estimate was calculated by combining information from the 2011 census and the 2016-based population projections for communal establishments. See ONS (2020a) for more details.

Cognitive or health impairments can cause individuals to be unable to participate in the ELSA survey. If respondents are unwilling or unable to participate, ELSA attempts to obtain a proxy (such as a family member or friend) to provide responses on their behalf. This accounts for 465 of our 9,895 observations (6.7% with population weights).

Proxy respondents are asked whether the individual for whom they are reporting is unable to answer the survey due to cognitive limitations. This accounts for 48% of our population weighted proxy responses, who we classify as cognitively impaired. For the remaining 52% of proxy responses, the most common reported reason is simply that the survey member refused to be interviewed. In these cases, we cannot be sure whether they have cognitive impairment. While proxy respondents do not answer the standard cognitive questions, they are asked to complete the short form of the Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE). This questionnaire helps assess changes in cognition over time. The IQCODE uses a scoring scale from 1 to 5, with scores of 3.38 and above indicating potential cognitive decline (Almeida-Meza et al., 2021). We classify proxy respondents as cognitively impaired if their IQCODE score is 3.38 or greater. However, only around half of our proxy respondents completed the IQCODE. For those who did not complete it, we use two approaches:

1. **Predict cognitive impairment:** For individuals with missing IQCODE score, we impute their score, and assume the individual is cognitively impaired if their predicted IQCODE is 3.38 or greater. We impute missing IQCODE scores using linear regression and the reason for the proxy interview, age and age squared, marital status, gender, and education as covariates. Appendix Table A1.a shows a cross-tabulation of cognitive status generated by actual and predicted IQCODE scores. For the set of individuals for whom we have both the actual and predicted IQCODE, 82% have the same measured cognitive status.
2. **Assume no cognitive impairment:** We classify individuals with missing IQCODE scores as not cognitively impaired.

In both approaches we classify the individual as cognitively impaired if the proxy says they are unable to answer the survey due to cognitive limitations, regardless of the IQCODE score. The first approach classifies 81.8% of our proxy responses as cognitively impaired, whereas the second approach only classifies 53.5% as cognitively impaired.

Figure 1a presents the distribution of cognitive scores for both proxy and non-proxy respondents, illustrating the impact of different approaches to classifying proxy respondents. The left-hand panel shows the distribution when using predicted IQCODE scores for proxy respondents with missing data, while the right-hand panel displays the distribution assuming no cognitive impairment for proxy respondents with missing IQCODE scores. In both panels, the bold dotted line represents the cut-off

score for our definition of cognitive impairment, and dashed lines indicate the quintiles of the distribution. We assume those who were deemed cognitively impaired using proxy respondents fall within the lowest quintile when determining these quintiles. The figure highlights the importance of how we classify proxy respondents. When using predicted IQCODE scores, 8.5% (3.05% non-proxy + 5.47% proxy) of the population over 65 is classified as cognitively impaired. However, this figure drops to 6.6% (3.05% non-proxy + 3.55% proxy) assuming those with missing IQCODE scores are not cognitively impaired. These differences are important. For example, when comparing England with the U.S. estimates in McGarry et al. (this volume), the distribution of cognition scores is similar when assuming those with missing IQCODE scores are not cognitively impaired. However, when using predicted IQCODE scores, England shows a higher percentage of individuals with cognitive impairment, particularly among proxy respondents. This difference may stem from differences between our approach and the U.S. approach, which does not utilize IQCODE scores and relies solely on the "reason for proxy interview" variable.

Recognizing the strong association between cognitive impairment and age, we analyze the data by age group. Figure 1b compares the distribution of cognitive scores for individuals aged 65-84 with those aged 85 or older. As before, the left-hand panel utilizes predicted IQCODE scores for proxy respondents, while the right-hand panel relies solely on observed scores. The figures clearly demonstrate that cognitive impairment rises with age. This is evident not only in the distribution of scores among respondents, but also in the significant difference in the percentage of interviews performed by proxies between the two age groups.

Physical Limitations:

Our analyses also focuses on measures of physical limitations, so that we can compare, and separate, care needs arising from physical limitations versus cognitive limitations. ELSA asks the respondent (or proxy) whether the respondent has difficulty with activities of daily living (ADLs). These include dressing, bathing, walking across the room, getting in and out of bed, or toileting. We classify the respondent as having a physical limitation if they have difficulty performing two or more ADLs.

Figure 2a shows the distribution of ADL limitations in our sample, and Figure 2b repeats it separately for our two age groups. As with cognitive impairments, physical impairments increase with age, yet for both groups, 65-84 and 85 or older, most have no limitations (75.9 percent overall, 80.1 percent for those ages 65-84, and 49.2 percent of those 85 or older).

Although they do not affect our classification of cognitive or physical limitations, we also examined limitations with respect to instrumental activities of daily living (IADLs). These activities include preparing meals, shopping for groceries, making phone calls, taking medication, and managing

money. With IADLs, we find similar patterns of increasing limitations with age: 86.7 percent of those ages 65-84 have no limitations with respect to IADLs, compared with 49.5 percent of those 85 or older.

Care Utilization and Outcomes:

Our focus is on how care, and the cost of that care, varies with cognitive and physical impairments. Our care measures consist of the type of LTC the individual uses (if any) and the amount of care used. Specifically, we define three categories of care: any formal (i.e., paid) care at home, any informal (i.e., unpaid) care at home, or staying in a nursing or care home. We also measure the hours of home care received, as reported over the last month, for both formal and informal care.

Figure 3 shows the proportion of the population receiving different types of care, categorized by cognitive limitation quintile, with individuals classified as "Proxy not cognitively impaired" shown separately. The left-hand panel displays the results when predicted IQCODE scores are used for those with missing data, while the right-hand panel shows the results when those with missing IQCODE scores are assumed to not be cognitively impaired.

The figure reveals a clear trend: as cognitive ability declines (moving from quintile 5 to 1), the proportion of the population receiving each type of care increases. This is particularly evident for nursing home care, which is most prevalent in the lowest cognitive quintile and negligible in the higher quintiles.

In the left panel of Figure 3, individuals in the lowest cognitive quintile (quintile 1) are most likely to receive any form of care, with 34% receiving informal care, 6.9% receiving formal care, and 13.7% residing in nursing homes. Conversely, those in the highest quintile (quintile 5) have the lowest care utilization rates (8.1%, 2.6%, and 0%, respectively). The right panel of Figure 3 shows very similar trends across cognitive quintiles. When using predicted IQCODE scores for proxy respondents with missing data (left panel), individuals classified as "Proxy not cognitively impaired" show care utilization patterns closer to the middle cognitive quintiles. However, when assuming no cognitive impairment for those with missing IQCODE scores are used (right panel), the reclassification shifts them closer to the most impaired group. This highlights the variability within the "Proxy not cognitively impaired" group and suggests that the predicted IQCODE scores effectively capture individuals with higher care needs. Therefore, for the rest of this paper, we will focus on the approach using predicted IQCODE scores for proxy respondents with missing data.

4. Descriptive Statistics

The previous section shows the distribution of cognitive impairment in the population, and its association with both care needs and physical impairment. This section uncovers the determinants of receipt of different types of care based on cognitive and physical impairment. It shows that those with physical and cognitive impairment use considerable amounts of care. However, it is the cognitively impaired that use the most nursing home care. Due to the high cost of nursing homes, this makes the cognitively impaired the most expensive group.

Table 1 shows the relationship between cognitive and physical impairment within the sample. Estimates are weighted to represent the population aged 65 and over, and to match the proportion of individuals in nursing homes. The majority of individuals (64.91% + 6.95% + 0.88% = 72.75%) exhibit neither cognitive impairment nor any limitations in Activities of Daily Living (ADL). Additionally, those with only one ADL limitation and no cognitive impairment account for 9.58% of the sample (1.75% + 7.78% + 0.05% = 9.58%). Given that we define individuals with zero or one ADL limitations as not physically impaired, this means a total of 82.33% of the sample (72.75% + 9.58% = 82.33%) are classified as having neither cognitive nor physical impairments. Among those with any impairment, 9.16% present with physical impairment but no cognitive impairment (2.04% + 6.84% + 0.28% = 9.16%), while 8.51% exhibit cognitive impairment (1.56% + 0.54% + 0.94% + 1.62% + 0.38% + 3.47% = 8.51%). Approximately half of those with cognitive impairment also have physical impairment. It is important to carefully interpret the measurement of ADL limitations in individuals with cognitive impairments. The survey questions specify that difficulty with ADLs should be attributed to "a health or memory problem." Consequently, some individuals might be physically capable but require assistance due to cognitive impairment; for example, a person with dementia may be unable to bathe independently. In other words, reported ADL limitations may stem from cognitive rather than physical impairments. Therefore, all individuals with cognitive impairments are categorized together, irrespective of the number of physical limitations.

Table 2a presents sample means of demographic and economic variables for our three health impairment groups: those with no impairments, those with only physical impairments, and those with cognitive impairments. Those with no impairments are significantly younger than the other groups, with those having cognitive impairments being approximately 10 years older than those without impairments. This aligns with the increased risk of dementia after age 80. Consistent with their younger age, the non-impaired group is more likely to be married. Additionally, the non-impaired group has the most schooling, with only around 44% having less than a high school education, compared to 62% in the cognitively impaired group. This aligns with research linking cognitive decline and/or dementia to lower education levels (Arapakis et al., 2021). Racial differences are also

apparent, with almost 5% of the cognitively impaired group being non-white, compared to less than 3% of the non-impaired group. Financially, the non-impaired group has only moderately higher income than the cognitively impaired group, but their wealth is around 50% higher.

Table 2b examines the needs and care usage of those with physical and cognitive impairments. While those without either physical or cognitive impairment score the highest on the cognitive assessment (with an average score of 18.1), those with physical but not cognitive impairment score only modestly lower (with an average score of 15.8). In contrast, the average cognition score for the cognitively impaired is 3.7, significantly lower than the other groups. These gaps in cognitive scores remain consistent even when using an expanded cognitive score that includes the following additional tests: counting backward from 20, naming the Monarch and the Prime Minister, and naming objects from descriptions.

The physically impaired group averages just over 3 ADL limitations, while the cognitively impaired group averages slightly fewer at 2.4. Put differently, the cognitively impaired group have almost as many ADL limitations as the physically (but not cognitively) impaired group. This highlights the fact that care provided to the cognitively impaired is to care for physical as well as cognitive limitations of this group. While this analysis primarily focuses on ADL limitations, it is worth noting that the cognitively impaired group has the largest number of limitations when considering other measures of functional status, particularly limitations with instrumental activities of daily living (IADLs). This is unsurprising, as many IADLs (e.g., managing money) can be done with physical but not cognitive limitations.

Interestingly, not everyone with cognitive or physical impairments receives care; in both groups, only about 70% do, with the figure slightly higher for those with only physical impairments. The small fraction (14%) of the non-impaired group receiving care is likely due to the inclusion of individuals with a single limitation in this category. Formal (paid) home care is less common than informal (unpaid) care in both groups. The table reveals differences in the type of care received between the physically and cognitively impaired groups. Those with only physical impairments are almost twice as likely to receive paid home care (15% versus 7%) and informal care (68% versus 35%) as those with cognitive impairments.

While the probability of receiving care is greater for the physically impaired, the intensity of care (when received) is greater for the cognitively impaired, averaging 96 hours of formal home care (versus 79 hours for the physically impaired) and 198 hours of informal care (versus 110 hours for the physically impaired). Moreover, the difference in nursing home use, in particular, is striking: only 2.7% of the only physically impaired group uses nursing homes, compared to over 34% of the

cognitively impaired group. While the cognitively impaired comprise only a small share of the age 65+ population, they are responsible for the vast majority of all nursing home cared received.

5. Regression Analyses

There are many factors that influence the type of care received, including the severity of need, the ability to pay, and the availability of family or informal caregivers. To analyze the importance of impairments and the difference between cognitive and physical impairments in determining care usage, we therefore turn to multivariate regression analysis. We first examine the use of any care, then the use of specific types of care any formal home care, any informal care, and residence in a nursing home. To assess the correlates of intensity of care, we also consider the number of hours of formal care received in the past month, conditional on receiving any formal care, and similarly the number of hours of informal care received in the past month, conditional on care. In the regressions we control for whether the respondent has a physical or cognitive impairment, the age and age squared, marital status, gender, the interaction of marital status and gender, race, the existence of any children and the number of children, education, and income and wealth.[5]

In Table 3 we examine the probability of receiving any care using a linear probability model. Column (1) includes only indicators for physical (but not cognitive) impairment and cognitive impairment. As noted in the discussion of Table 2b, the likelihood of care is slightly larger among the only physically impaired than the cognitively impaired with no controls. However, when we add age and age squared as regressors in the second column, the difference between the physically and cognitively impaired groups becomes somewhat larger. Age is an important predictor of care: a 10-year increase in age increases the probability of care by approximately 6 percent points. Column (3) adds more controls. Adding these additional controls modestly reduces the effect of cognitive and physical impairments on care use, but the key take-aways from the simple cross-tabulations remains: impairments significantly increase care use. It shows that the likelihood of care increases with income and being female, but it decreases with wealth and educational attainment.

In Tables 4 through 6, we look in more detail at the types of care, examining the use of formal (paid) and informal (unpaid) home care on both the extensive and intensive margins in addition to nursing home care.

[5] We use the inverse hyperbolic sine of both income and wealth in place of logs because of the existence of zeros and negative values.

With respect to informal care, Table 4a shows that those with physical impairments are significantly more likely to receive care than the cognitively impaired. Relative to those with no impairment, those with physical impairments are 51 percentage points more likely to receive care, whereas those with cognitive impairments are 15 percentage points more likely to receive care. The probability of help also increases with age and is higher for those with children, and those with less than high school education. The likelihood of informal care also decreases with income. As with the estimates for any care, including more control variables modestly reduces the estimated coefficients on physical and cognitive impairments.

While Table 4a shows that the physically impaired are more likely to receive care, Table 4b shows that the cognitively impaired receive more than twice as many hours of care when they receive it. Even with a full set of controls, there is a difference of around 85 hours of care per month between the cognitively and physically impaired groups. This is a dramatic difference in the use of care and the burden on the care providers.

Table 5a examines the probability of receiving formal (paid) home care. The coefficient on cognitive impairment is positive but small and becomes statistically insignificant once additional controls are added. This indicates that those with cognitive impairments are not significantly more or less likely to receive formal home care than the unimpaired group. The same is not true for the physically impaired group, who are 11 percentage points more likely to use formal home care than the unimpaired, holding other factors constant. Age again is an important factor, with 10 years of age associated with a 3-percentage point increase in the probability of use. Those who are married are less likely to use formal care. This result, combined with the higher use of informal care among married people, reflects the substitution of formal for informal care among married people. Conditional on receiving formal care, Table 5b shows that there is little that predicts the number of hours other than the large effect of being either physically or cognitively impaired.

Table 6 repeats the exercise for the probability of nursing home use. The existence of a cognitive impairment swamps any other explanatory variable in terms of importance. Those with cognitive impairments are almost 30 percentage points more likely to receive care in a nursing home than the non-impaired and the only physically impaired. The likelihood of receiving care in a nursing home decreases with the presence and number of children. Women are more likely to be receiving care in a nursing home if they are unmarried.

6. Costs

Next, we investigate the cost of care at both the individual and aggregate levels. Understanding how these costs vary by impairment type is crucial for policymakers as they plan for future care needs. This is particularly important as the population ages and the relative prevalence of physical and cognitive impairments shifts, with projections indicating a greater increase in cognitive impairments. Our approach borrows heavily from Banks et al. (2024).

We begin with formal care costs, which are relatively straightforward to estimate.[6] We calculate nursing home care costs for different groups by multiplying the average annual cost of a stay by the estimated population size of that group.[7] For formal home care costs, we multiply the hours of care each individual receives by the average hourly rate of £22.78 (in 2019 £s) for a home care worker.

While formal home care costs can be estimated using the hours of care received and the average hourly cost of a home care worker, estimating the value of informal home care is more challenging. To address this, we follow the method used by Banks et al. (2024). We multiply hours of care provided by the predicted wage of those carers. To start, we estimate the wage that the carer could have earned had they engaged in market activity. This requires that we have information on hourly wages of all caregivers, yet many caregivers are not employed. Additionally, the set of care-givers who are also in paid work is a non-random set of the population. Furthermore, their jobs and wages will presumably be affected, either directly or indirectly, by the constraints associated with, and consequences of, their caregiving. To address these problems, we construct an imputed measure of wages for all informal caregivers. We use employment data from the 2018 Annual Survey of Household Earnings (ASHE) to calculate the probability that an individual is working and, if they are working, the expected wage, conditional on an individual's age (band) and sex. Thus, we estimate the probability that a person works and their wage were they to work for each age-sex cell. We can use these probabilities and predicted wages to impute the (typical) labour market earnings that are being forgone when a carer chooses to supply an hour of informal care. This method accounts for the likelihood that the carer would have been working had they not been caring, as well as the earnings that they might have accrued if they had worked. For the hours of care where the carer is not

[6] Notwithstanding issues in the accuracy of the underlying ELSA data, which may underestimate true costs if the most severely cognitively impaired are underrepresented. While the ELSA data significantly understate the share of the population that is in a nursing home, we reweight the data to match the share in a nursing home.

[7] In particular, we use the weighted ELSA data to uncover population shares, then multiply these shares by the age 65+ population of England of 10.5 million to estimate the population of different groups. To estimate nursing home costs, we calculate an average annual cost, based on a weekly cost of £661 in 2019 £s (NHS Digital, 2019), and then multiply this cost by the number of people in a nursing home. We include all in residential care (including those without nursing facilities).

predicted to be working, we value the informal care at the average formal homecare market wage. In our sample period the average care worker hourly pay is £8.62 (in 2019 £s), which is only half of the expected pay of the carers who would otherwise have been working (£15.83 per hour).

Banks et al. (2024) use alternative methods to value carer's time. One alternative is to value hours of care at 0 for carers who are predicted to be not working. This results in a value of informal care that is approximately half of our baseline estimate. Another alternative is to assume that care hours are valued at the hourly cost of a paid carer. This approach results in costs that are almost double our baseline estimate.

Table 7 presents the total and per capita costs of long-term care. The total cost of long-term care is estimated at £41.9 billion (in 2019 £s), or £3,982 per person aged 65 and over. This represents around 2.2% of GDP.[8] Examining the costs by impairment category—no impairment, physical impairment, and cognitive impairment—reveals that although more individuals have physical rather than cognitive impairments, the cost of care for the cognitively impaired group is substantially higher: £20.2 billion compared to £13.3 billion for the only physically impaired group.

This disparity is even more pronounced on a per capita basis (bottom row of the table), with costs of £13,745 for the physically impaired and £22,609 for those with cognitive impairments. This is consistent with dementia cost estimates in Bassoli et al. (2024). The most significant difference in cost components lies in nursing home utilization, totalling £0.9 billion for the physically impaired and a striking £10.6 billion for the cognitively impaired (or 88% of the total).

The cost borne by informal caregivers is also considerable, at £9.3 billion for those caring for individuals with only physical impairments and £8 billion for those caring for individuals with cognitive impairments. This translates to £9,617 and £8,941 per impaired person, respectively. These figures represent a substantial burden for many caregivers, potentially impacting their own well-being, especially if sustained over multiple years.

7. Conclusion

This paper provides new evidence on the extent of formal and informal care usage by the older population with cognitive impairments in England. It compares care needs of those with cognitive

[8] GDP in England in 2018 is estimated to be £1.9 trillion (in 2019 £s), see Banks et al. (2024)

impairments to those with either no (or minimal) impairments or physical but no cognitive impairments.

The formal LTC system in England, comprising nursing home and formal paid home care, is funded by a mix of public and private sources. Furthermore, unpaid informal care, largely provided by families, also comprises a substantial portion of care provided. We show how these three pillars of the care system are differentially important for older adults with different combinations of physical and cognitive limitations. In particular, the great majority of nursing home care goes to those with cognitive impairments.

Due to a greater reliance on nursing home care, total LTC costs for individuals with cognitive impairment exceed those for individuals with only physical limitations. This disparity is substantial. Our estimates for England (2016-2019) indicate that formal care expenditures combined with the imputed value of informal care represented 2.2% of GDP for the population aged 65 and over. Critically, nearly half of this expenditure (1.04% of GDP) supported the 8.5% of this demographic with cognitive impairment. In contrast, costs associated with formal home-based care and the imputed value of informal care show less variation between the two groups.

These cost differences are projected to gain prominence as the baby boomers age. The trajectory of total long-term care costs will hinge on future trends in the prevalence of physical versus cognitive limitations. An increase in physical limitations will primarily burden the informal care sector (families, friends, community groups), while rising rates of cognitive limitations will intensify demands on the formal care system. Therefore, increasing prevalence of cognitive impairment necessitates either a massive rise in formal care expenditure or risks a considerable reduction in service quality and availability, consequently increasing the load on informal caregivers.

These rising costs will place an ever greater strain on public funding for LTC in England. Recent policy proposals to reduce the share of formal LTC paid by families (such as the proposals of the Dilnot Commission (Dilnot, 2011)) will be increasingly difficult to fund over time. Yet not funding these proposals will place increasing strain on families.

Important next steps for research involve not only improving our understanding of the aggregate funding prospects for the care system but also examining the distributional issues linked to different funding schemes. To achieve this, better data is essential for providing more comprehensive and nuanced evidence on care usage than currently possible. We require surveys or administrative databases with larger samples and improved linkage to nursing home entry data. This would allow for

a more detailed breakdown of different combinations of conditions and care needs, and analysis across various subgroups of the older population.

Alongside better information on care usage, forecasting future care needs also demands improved demographic and health projections. As in most countries around the world we have good forecasts of longevity. But whilst we have some predictions of disability free life expectancy and some projections for the rise in physical disability and dementia, what is crucially missing is the covariance of these factors, or put differently, projections of physical and cognitive co-morbidities. Furthermore, we need a better grasp of how the distribution of this disability burden will change over time, including the proportion of the population likely to live with cognitive limitations for extended periods

References

Almeida-Meza, P., Steptoe, A., & Cadar, D. (2021). Markers of cognitive reserve and dementia incidence in the English Longitudinal Study of Ageing. *The British Journal of Psychiatry*, *218*(5), 243-251.

Arapakis, K., Brunner, E., French, E., & McCauley, J. (2021). Dementia and disadvantage in the USA and England: population-based comparative study. *BMJ open*, *11*(10), e045186.

Banks, J., French, E., & McCauley, J. (2024). *Long-term care in England* (No. w31826). Forthcoming in Long-Term Care around the World, Gruber and McGarry.

Bassoli, Elena and Brugiavini, Agar and Carrino, Ludovico, What are the Costs of Dementia in Europe? (October 01, 2024). Ca' Foscari University of Venice, Department of Economics Research Paper Series No. 13/2024, Available at SSRN: https://ssrn.com/abstract=4974121 or http://dx.doi.org/10.2139/ssrn.4974121

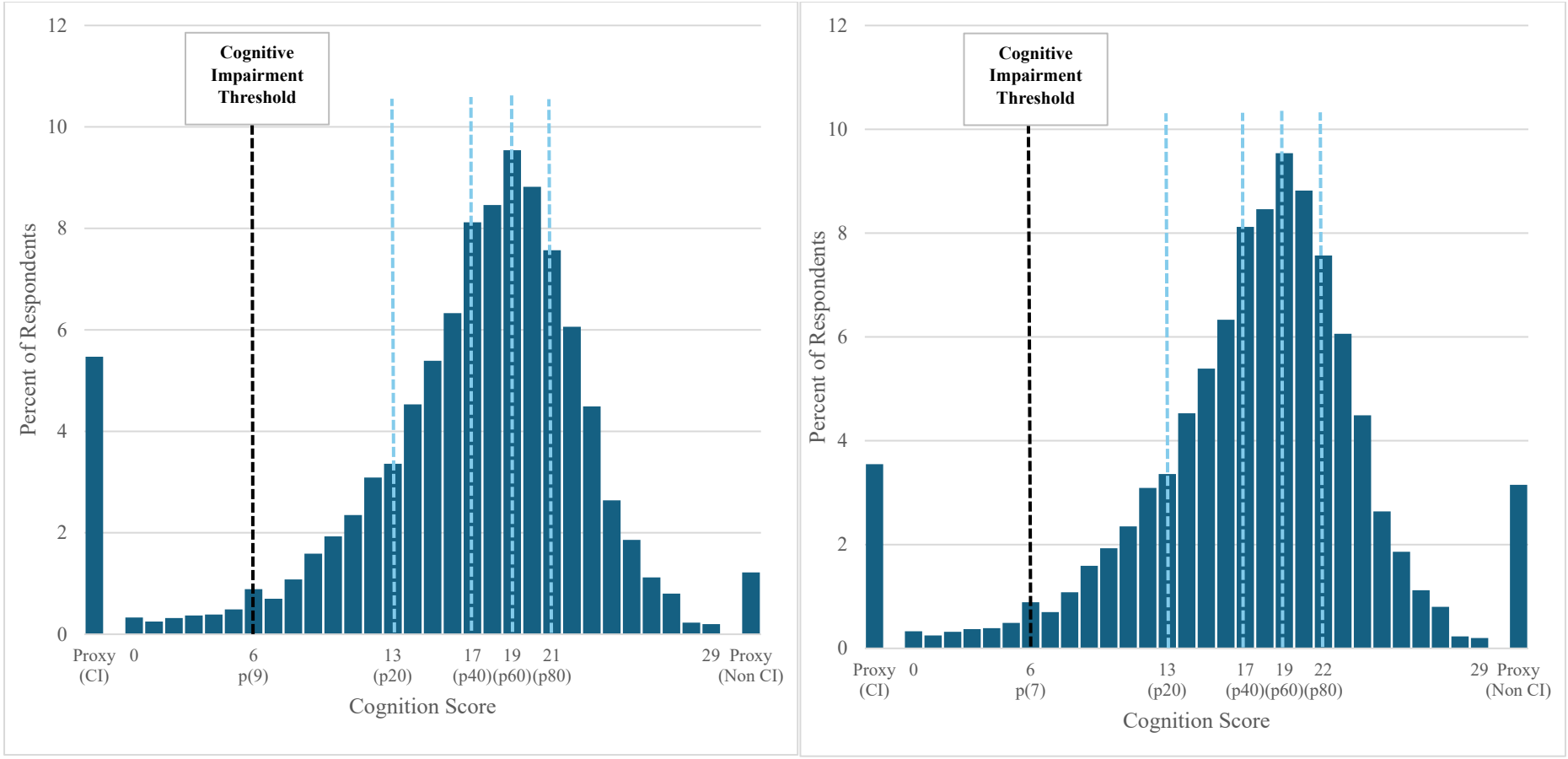
Collins, Brendan, et al. "What will the cardiovascular disease slowdown cost? Modelling the impact of CVD trends on dementia, disability, and economic costs in England and Wales from 2020–2029." *PLoS One* 17.6 (2022): e0268766.

Dilnot, A. (2011). *Fairer care funding: The report of the Commission on Funding of Care and Support* (Vol. 1). The Stationery Office.

NHS Digital, 2019. Adult Social Care Activity and Finance Report, England-2018-19. Table 50. https://digital.nhs.uk/data-and-information/publications/statistical/adult-social-care-activity-and-finance-report/2018-19, accessed 15 April 2024

Office for National Statistics (ONS), 2020b 'UK Health Accounts: 2018.' *Statistical Bulletin.* https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthcaresystem/bulletins/ukhealthaccounts/2018/pdf accessed 28 September 2022

Figure 1a: Histogram of Cognition Score, Including Proxies

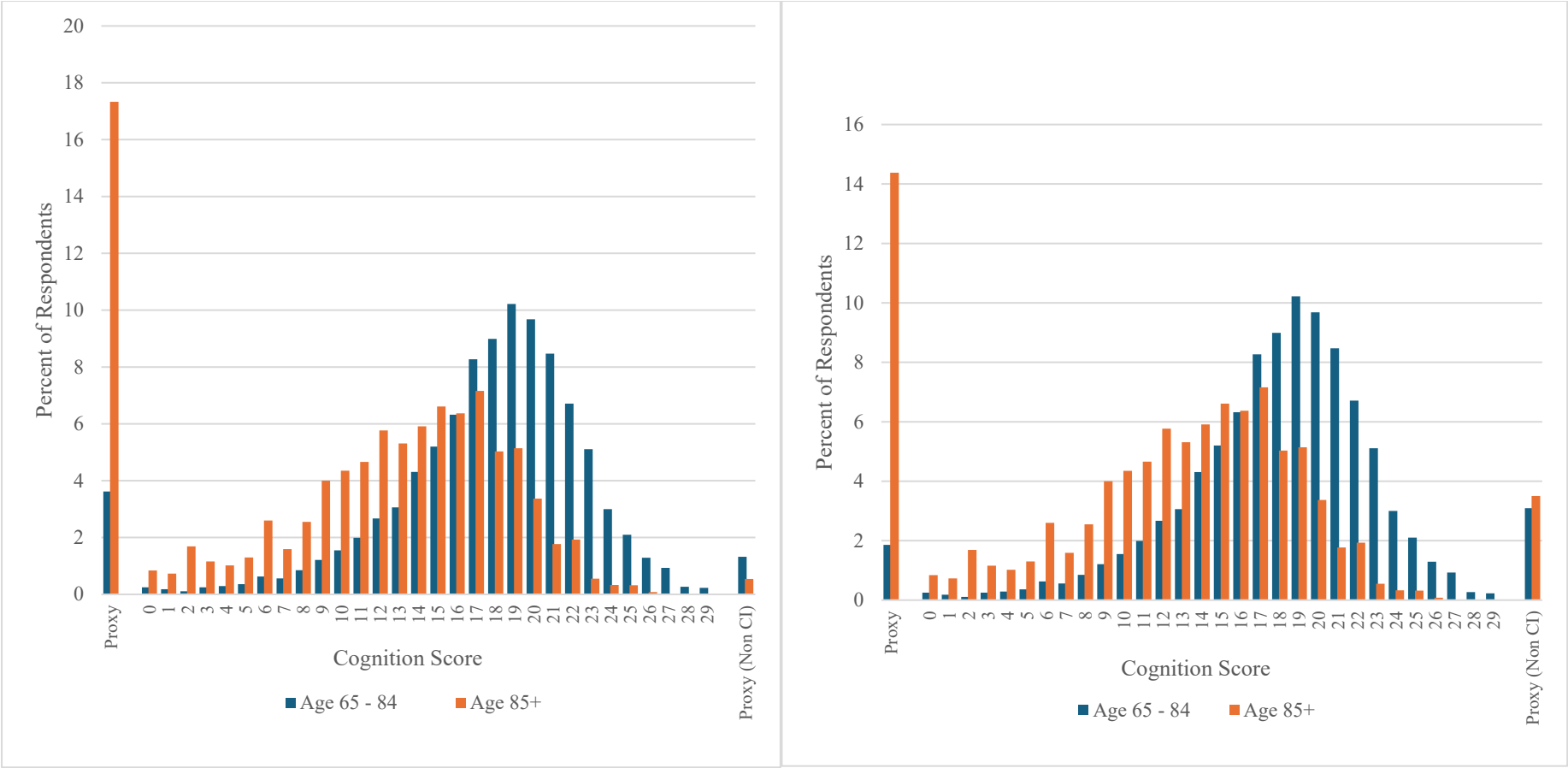


Source: Data are from ELSA Waves 8 and 9 (2016-2019).

Left-hand panel: Displays the distribution using predicted IQCODE scores for proxy respondents with missing data. In this panel, 8.5% of individuals aged 65+ are classified as cognitively impaired (3.05% non-proxy, 5.47% proxy).

Right-hand panel: Displays the distribution assuming no cognitive impairment for proxy respondents with missing IQCODE scores. In this panel, 6.6% of individuals aged 65+ are classified as cognitively impaired (3.05% non-proxy, 3.55% proxy).

Figure 1b: Histogram of Cognition Scores, by Age Categories

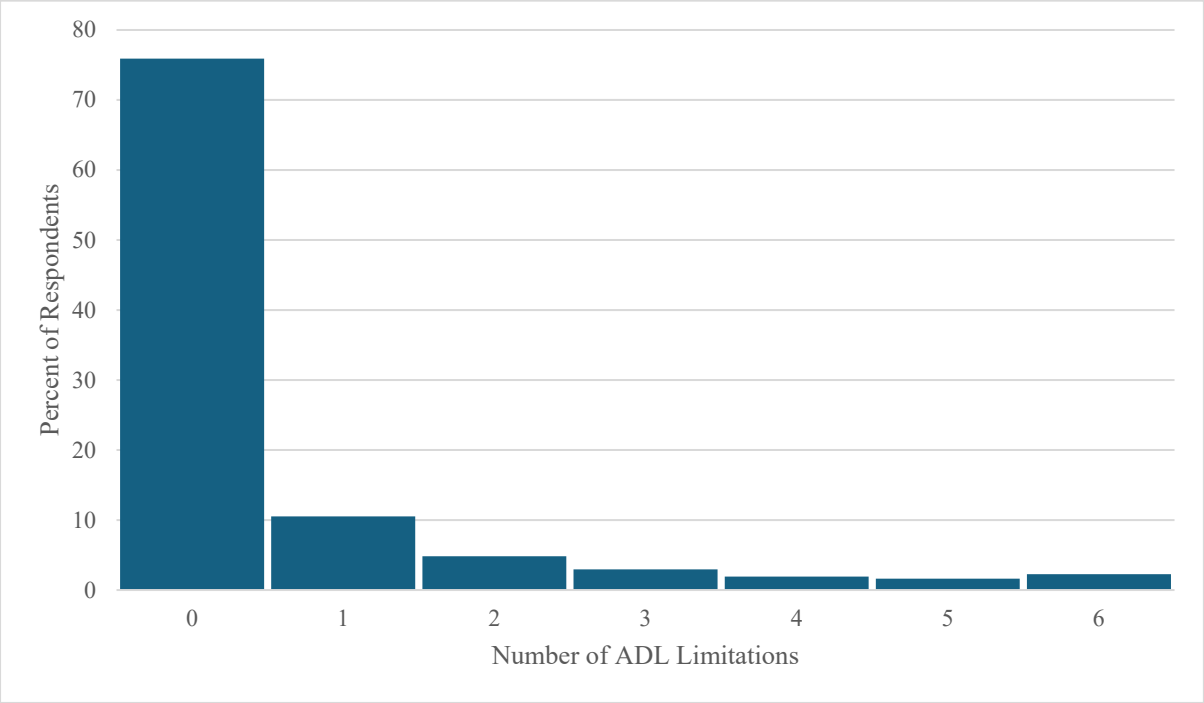


Source: Data are from ELSA Waves 8 and 9 (2016-2019).

Left-hand panel: Displays the distribution using predicted IQCODE scores for proxy respondents with missing data. In this panel, 5.7% of individuals aged 65-84 (2.1% non-proxy, 3.6% proxy) and 26.7% of those aged 85+ (9.3% non-proxy, 17.3% proxy) are classified as cognitively impaired.

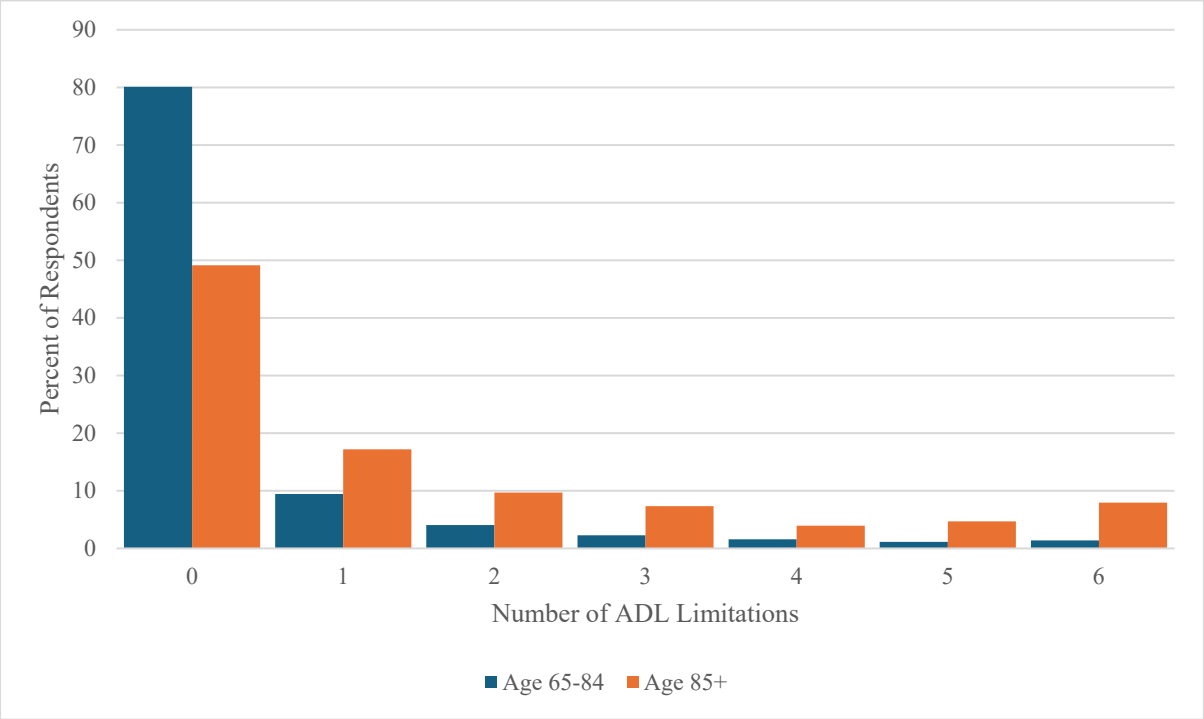
Right-hand panel: Displays the distribution assuming no cognitive impairment for proxy respondents with missing IQCODE scores. In this panel, 3.9% of individuals aged 65-84 (2.1% non-proxy, 1.9% proxy) and 23.7% of those aged 85+ (9.3% non-proxy, 14.4% proxy) are classified as cognitively impaired.

Figure 2a: Histogram of ADL Limitations



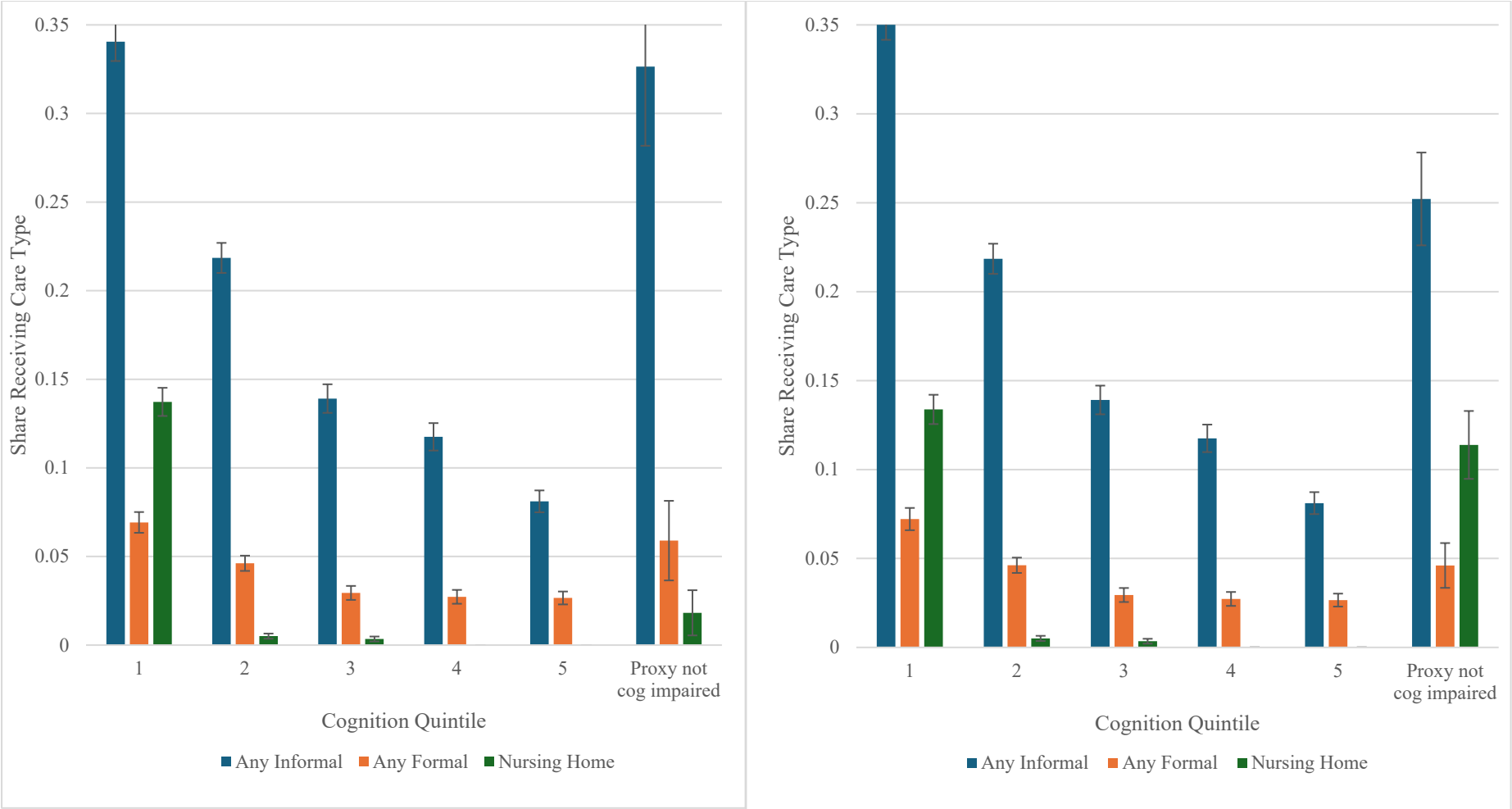
Source: Data are from ELSA Waves 8 and 9 (2016-2019).

Figure 2b: Histogram of ADL Limitations, by Age Categories



Source: Data are from ELSA Waves 8 and 9 (2016-2019).

Figure 3: Share Receiving Care Type by Cognition Quintile



Source: Data are from ELSA Waves 8 and 9 (2016-2019). The left-hand panel presents the distribution using predicted IQCODE scores for proxy respondents with missing data. The right-hand panel displays the distribution assuming no cognitive impairment for proxy respondents with missing IQCODE scores

Table 1: Joint Distribution of Cognition Score and ADL Limitations

	Non-Proxy Respondents Cognition score			Proxy Respondents		
Weighted percent	0 – 6 (cognitively impaired)	7 - 12	13+	Proxy cognitively impaired	Proxy not cognitively impaired	Total
0 ADLs	1.56%	6.95%	64.91%	1.62%	0.88%	75.92%
1 ADL	0.54%	1.75%	7.78%	0.38%	0.05%	10.51%
2+ ADLs (physically impaired)	0.94%	2.04%	6.84%	3.47%	0.28%	13.57%
Total	3.05%	10.73%	79.53%	5.47%	1.22%	100.00%

Source: Data are from ELSA Waves 8 and 9 (2016-2019). For proxy respondents, we use predicted IQCODE scores for those with missing data. Weights are used so that the proportion of individuals in nursing homes match national aggregates.

Table 2a: Sample Means, by Cognitive and Physical Impairment

Means	0 - 1 ADLs & Score 7+ (*no impairment)*	2+ ADLs & Score 7+ (*physical, but not cognitive impairment)*	Score 0 - 6 (All ADLs) (*cognitive impairment)*	Total
Age	74.283 (0.117)	78.144 (0.421) **	84.204 (0.571) **	75.482 (0.132) **
Female (0 or 1)	0.532 (0.007)	0.571 (0.021)	0.594 (0.028) *	0.541 (0.007)
Married (0 or 1)	0.676 (0.006)	0.504 (0.021) **	0.505 (0.029) **	0.646 (0.006) **
White (NH) (0 or 1)	0.97 (0.002)	0.971 (0.007)	0.951 (0.010)	0.968 (0.002)
Non-White (0 or 1)	0.029 (0.002)	0.028 (0.007)	0.048 (0.010)	0.031 (0.002)
Any children (0 or 1)	0.876 (0.004)	0.842 (0.016) *	0.706 (0.027) **	0.858 (0.005) *
Number of children	2.2 (0.022)	2.351 (0.074) *	1.81 (0.092) **	2.18 (0.022)
< High school (0 or 1)	0.442 (0.007)	0.597 (0.020) **	0.621 (0.028) **	0.471 (0.007) **
High school (0 or 1)	0.316 (0.007)	0.263 (0.018) **	0.284 (0.027)	0.309 (0.006)
Some college (0 or 1)	0.062 (0.003)	0.039 (0.007) **	0.024 (0.007) **	0.057 (0.003)
College + (0 or 1)	0.178 (0.005)	0.099 (0.011) **	0.069 (0.011) **	0.161 (0.004) *
Work for pay (0 or 1)	0.116 (0.004)	0.034 (0.006) **	0.025 (0.006) **	0.101 (0.003) **
Income per capita (mean, 2019 £)	16,620 (120)	15,247 (269) **	14,557 (475) **	16,318 (112)
Income per capita (median, 2019 £)	14,446	13,670	12,684	14,156
Wealth per capita (mean, 2019 £)	266,476 (3,758)	156,938 (6,874) **	179,902 (10,947) **	249,012 (3,406) **
Wealth per capita (median, 2019 £)	199,583	113,902	131,198	185,701
Observations	8,448	846	601	9,895

Source: Data are from ELSA Waves 8 and 9 (2016-2019). Weights are used so that the proportion of individuals in nursing homes match national aggregates. Standard errors in parentheses are clustered at the individual level. Wealth and income are in 2019 GBPs.

*0 - 1 ADLs & Score 7+ is no limitation, 2+ ADLs & Score 7+ is physical, but not cognitive limitation, Score 0 - 6 (All ADLs) is cognitive limitation. *(**) denotes statistically different from the no impairment group at the 5% (1%) level.*

Table 2b: Sample Means, by Cognitive and Physical Impairment

Means	0 - 1 ADLs & Score 7+ (*no impairment)*	2+ ADLs & Score 7+ (*physical, but not cognitive impairment)*	Score 0 - 6 (All ADLs) (*cognitive impairment)*	Total
Limited score (out of 29)	18.128 (0.058)	15.817 (0.172) **	3.733 (0.148) **	17.439 (0.067) **
Expanded score (out of 35)	23.99 (0.062)	21.586 (0.182) **	7.879 (0.229) **	23.321 (0.071) **
Number of ADLs	0.116 (0.004)	3.075 (0.050) **	2.417 (0.137) **	0.583 (0.021) **
Number of IADLs	0.11 (0.006)	1.3 (0.061) **	2.774 (0.119) **	0.446 (0.020) **
Any care (0 or 1)	0.139 (0.004)	0.734 (0.016) **	0.704 (0.022) **	0.242 (0.006) **
Any Unpaid care (0 or 1)	0.122 (0.004)	0.677 (0.018) **	0.351 (0.023) **	0.192 (0.005) **
Any Paid (home) care (0 or 1)	0.026 (0.001)	0.149 (0.014) **	0.071 (0.010) **	0.042 (0.002) **
Any Nursing home (0 or 1)	0.001 (0.000)	0.027 (0.010) *	0.343 (0.030) **	0.033 (0.003) **
Unpaid care hours per month (conditional on unpaid care)	46.073 (3.154)	110.286 (8.227) **	197.573 (16.372) **	90.296 (4.411) **
Paid care hours per month (conditional on paid care)	25.039 (4.068)	78.515 (12.624) **	95.658 (15.902) **	52.75 (5.598) **
Observations	8,448	846	601	9,895

Source: Data are from ELSA Waves 8 and 9 (2016-2019). Weights are used so that the proportion of individuals in nursing homes match national aggregates. Standard errors in parentheses are clustered at the individual level.
*0 - 1 ADLs & Score 7+ is no limitation, 2+ ADLs & Score 7+ is physical, but not cognitive limitation, Score 0 - 6 (All ADLs) is cognitive limitation. *(**) denotes statistically different from the no impairment group at the 5% (1%) level.*

Table 3: Predictors of any Personal Care Used

	(1) Any Personal Care	(2) Any Personal Care	(3) Any Personal Care
Constant	0.141*** (0.005)	0.051*** (0.008)	-0.168* (0.083)
2+ ADLs and Score 7+	0.593*** (0.017)	0.541*** (0.018)	0.520*** (0.018)
Score 0 – 6	0.560*** (0.023)	0.422*** (0.025)	0.405*** (0.025)
Age - 65		0.006*** (0.002)	0.005*** (0.002)
(Age - 65) Squared		0.000*** (0.000)	0.000*** (0.000)
Female			0.057** (0.018)
Married			-0.005 (0.016)
Female * Married			0.021 (0.021)
Non-white			0.046 (0.028)
Number of children			0.004 (0.004)
Any children			-0.033* (0.015)
Income (£, Inverse Hyperbolic Sine)			0.024** (0.008)
Wealth (£, Inverse Hyperbolic Sine)			-0.006*** (0.002)
Less than high school			0.064*** (0.011)
Some college			-0.001 (0.017)
College or more			-0.002 (0.011)
Observations	9,652	9,652	9,652
Mean dependent variable	0.243	0.243	0.243
R-squared	0.264	0.323	0.339

*Source: Data are from ELSA Waves 8 and 9 (2016-2019). Weights are used so that the proportion of individuals in nursing homes match national aggregates. Linear probability model estimates. Standard errors in parentheses are clustered at the individual level. "Personal care" is receipt of any formal or informal care. *(**)[***] denotes significance at the 10%(5%)[1%] level.*

Table 4a: Predictors of receiving any informal care (unpaid home care)

	(1) Any Informal Care	(2) Any Informal Care	(3) Any Informal Care
Constant	0.123*** (0.005)	0.048*** (0.008)	-0.062 (0.074)
2+ ADLs and Score 7+	0.556*** (0.019)	0.525*** (0.020)	0.509*** (0.019)
Score 0 - 6	0.230*** (0.024)	0.147*** (0.026)	0.146*** (0.025)
Age - 65		0.008*** (0.002)	0.006*** (0.002)
(Age - 65) Squared		0.000 (0.000)	0.000 (0.000)
Female			0.027 (0.018)
Married			0.006 (0.016)
Female * Married			0.041* (0.021)
Non-white			0.060* (0.028)
Number of children			0.009* (0.004)
Any children			0.071*** (0.016)
Income (£, Inverse Hyperbolic Sine)			0.003 (0.007)
Wealth (£, Inverse Hyperbolic Sine)			-0.005*** (0.002)
Less than high school			0.072*** (0.011)
Some college			0.011 (0.017)
College or more			0.000 (0.010)
Observations	9,652	9,652	9,652
Mean dependent variable	0.194	0.194	0.194
R-squared	0.179	0.206	0.232

*Source: Data are from ELSA Waves 8 and 9 (2016-2019). Weights are used so that the proportion of individuals in nursing homes match national aggregates. Linear probability model estimates. Standard errors in parentheses are clustered at the individual level. *(**)[***] denotes significance at the 10%(5%)[1%] level.*

Table 4b: Predictors of informal care hours, conditional on receiving care

	(1) Informal Care Hours	(2) Informal Care Hours	(3) Informal Care Hours
Constant	45.969*** (3.201)	40.169*** (8.858)	-113.859 (107.488)
2+ ADLs and Score 7+	64.320*** (8.857)	64.565*** (8.826)	61.812*** (8.069)
Score 0 - 6	154.447*** (16.944)	155.705*** (16.687)	147.334*** (16.837)
Age - 65		1.662 (1.299)	2.036 (1.276)
(Age - 65) Squared		-0.062 (0.040)	-0.050 (0.038)
Female			-9.373 (15.883)
Married			24.925 (16.189)
Female * Married			5.798 (18.299)
Non-white			98.447* (41.514)
Number of children			7.140 (4.541)
Any children			-7.970 (15.673)
Income (£, Inverse Hyperbolic Sine)			11.772 (10.387)
Wealth (£, Inverse Hyperbolic Sine)			-1.038 (0.879)
Less than high school			20.929* (8.891)
Some college			12.000 (21.724)
College or more			6.811 (13.069)
Observations	1,725	1,725	1,725
Mean dependent variable	90.6	90.6	90.6
R-squared	0.137	0.139	0.174

*Source: Data are from ELSA Waves 8 and 9 (2016-2019). Sample is those with positive informal care hours. Sample weights are used. Linear regression model estimates. Standard errors in parentheses are clustered at the individual level. *(**)[***] denotes significance at the 10%(5%)[1%] level.*

Table 5a: Predictors of any formal (paid) in-home care

	(1) Any Formal Care	(2) Any Formal Care	(3) Any Formal Care
Constant	0.027*** (0.002)	-0.001 (0.004)	-0.130** (0.043)
2+ ADLs and Score 7+	0.124*** (0.014)	0.109*** (0.014)	0.109*** (0.014)
Score 0 - 6	0.044*** (0.011)	0.006 (0.012)	0.011 (0.012)
Age - 65		0.002* (0.001)	0.003* (0.001)
(Age - 65) Squared		0.000 (0.000)	0.000 (0.000)
Female			0.001 (0.011)
Married			-0.039*** (0.009)
Female * Married			0.015 (0.012)
Non-white			0.007 (0.015)
Number of children			0.003 (0.002)
Any children			-0.005 (0.009)
Income (£, Inverse Hyperbolic Sine)			0.014*** (0.004)
Wealth (£, Inverse Hyperbolic Sine)			0.001 (0.001)
Less than high school			-0.010 (0.006)
Some college			0.016 (0.011)
College or more			0.014* (0.007)
Observations	9,652	9,652	9,652
Mean dependent variable	0.043	0.043	0.043
R-squared	0.033	0.054	0.064

*Source: Data are from ELSA Waves 8 and 9 (2016-2019). Weights are used so that the proportion of individuals in nursing homes match national aggregates. Linear probability model estimates. Standard errors in parentheses are clustered at the individual level. *(**)[***] denotes significance at the 10%(5%)[1%] level.*

Table 5b: Predictors of formal (paid) in-home care hours, conditional on receiving formal care

	(1) Formal Care Hours	(2) Formal Care Hours	(3) Formal Care Hours
Constant	24.994*** (4.097)	17.732 (12.821)	8.119 (131.171)
2+ ADLs and Score 7+	53.195*** (13.338)	51.764*** (12.841)	46.012*** (12.094)
Score 0 - 6	72.547*** (16.907)	66.428*** (17.528)	60.536*** (16.857)
Age - 65		-0.465 (1.554)	-1.158 (1.741)
(Age - 65) Squared		0.043 (0.045)	0.063 (0.049)
Female			-21.062 (14.212)
Married			-7.548 (18.497)
Female * Married			4.115 (21.705)
Non-white			34.856 (36.033)
Number of children			7.729 (4.290)
Any children			-28.307 (19.344)
Income (£, Inverse Hyperbolic Sine)			4.340 (12.298)
Wealth (£, Inverse Hyperbolic Sine)			-0.822 (1.574)
Less than high school			11.112 (11.795)
Some college			-7.057 (11.688)
College or more			-15.385 (10.658)
Observations	419	419	419
Mean dependent variable	52.8	52.8	52.8
R-squared	0.103	0.117	0.163

*Source: Data are from ELSA Waves 8 and 9 (2016-2019). Sample is those with positive formal care hours. Sample weights are used. Linear regression model estimates. Standard errors in parentheses are clustered at the individual level. *(**)[***] denotes significance at the 10%(5%)[1%] level.*

Table 6: Predictors of nursing home care use

	(1) Nursing Home	(2) Nursing Home	(3) Nursing Home
Constant	0.002*	0.005	-0.052
	(0.001)	(0.004)	(0.060)
2+ ADLs and Score 7+	0.023*	0.009	0.005
	(0.010)	(0.011)	(0.009)
Score 0 - 6	0.336***	0.299***	0.282***
	(0.031)	(0.030)	(0.027)
Age - 65		-0.004**	-0.003*
		(0.001)	(0.001)
(Age - 65) Squared		0.000***	0.000***
		(0.000)	(0.000)
Female			0.030**
			(0.011)
Married			0.008
			(0.009)
Female * Married			-0.026*
			(0.012)
Non-white			-0.027*
			(0.011)
Number of children			-0.005***
			(0.001)
Any children			-0.098***
			(0.014)
Income (£, Inverse Hyperbolic Sine)			0.015*
			(0.006)
Wealth (£, Inverse Hyperbolic Sine)			-0.001
			(0.001)
Less than high school			-0.004
			(0.007)
Some college			-0.011
			(0.008)
College or more			-0.015**
			(0.005)
Observations	9,652	9,652	9,652
Mean dependent variable	0.032	0.032	0.032
R-squared	0.277	0.309	0.362

*Source: Data are from ELSA Waves 8 and 9 (2016-2019). Weights are used so that the proportion of individuals in nursing homes match national aggregates. For nursing homes, we include those living in residential homes without nursing facilities. Linear probability model estimates. Standard errors in parentheses are clustered at the individual level. *(**)[***] denotes significance at the 10%(5%)[1%] level.*

Table 7: Cost of care

		0 - 1 ADLs & Score 7+ (*no impairment)*	2+ ADLs & Score 7+ (*physical, but not cognitive impairment)*	Score 0 - 6 (All ADLs) (*cognitive impairment)*	Total
	N	8,448	846	601	9,895
	Population (millions)	8.7	1.0	0.9	10.5
Formal Home Care	National total (Billions £)	1.6	3.1	1.7	6.4
	Per capita (£)	184	3,200	1,875	604
	National total (Billions $)	2.0	3.9	2.1	8.1
	Per capita ($)	235	4,085	2,394	772
Informal Care	National total (Billions £)	6.3	9.3	8.0	23.6
	Per capita (£)	725	9,617	8,941	2,240
	National total (Billions $)	8.0	11.8	10.2	30.1
	Per capita ($)	926	12,277	11,414	2,859
Nursing Home	National total (Billions £)	0.5	0.9	10.6	12.0
	Per capita (£)	59	928	11,793	1,138
	National total (Billions $)	0.7	1.1	13.5	15.3
	Per capita ($)	76	1,185	15,055	1,453
Total Cost	National total (Billions £)	8.4	13.3	20.2	41.9
	Per capita (£s)	969	13,745	22,609	3,982
	National total (Billions $)	10.7	16.9	25.8	53.5
	Per capita ($)	1,237	17,547	28,863	5,084

Source: Data are from ELSA Waves 8 and 9 (2016-2019). N refers to ELSA (unweighted) sample size. Population refers to the corresponding population of individuals age 65+ in England using weights so that the proportion of individuals in nursing homes match national aggregates. For nursing homes, we include those living in residential homes without nursing facilities. Amounts are in 2019 GBPs or 2019 USDs. USDs were converted using the exchange rate £1=$1.2766.

Appendix Table A1.a: Crosstab of Actual and Predicted IQCODE scores (Weighted Percent)

		Actual IQCODE score			
		<3.38 (Not Impaired)	>=3.38 (Impaired)	Missing	*Total*
Predicted IQCODE	<3.38 (Not Impaired)	4.3	0.1	9.2	13.6
	>=3.38 (Impaired)	8.1	33.8	44.5	86.4
Total		12.4	33.9	53.7	100.0

Source: Data are from ELSA Waves 8 and 9 (2016-2019). Proxy respondents only. Data shows weighted percentage: weights are used so that the proportion of individuals in nursing homes match national aggregates. Predicted IQCODE scores are computed using linear regression and the reason for the proxy interview, age and age squared, marital status, gender, and education as covariates.

Appendix Table A1.b: Crosstab of Actual and Predicted IQCODE scores (No. of Observations)

		Actual IQCODE score			
		<3.38 (Not Impaired)	>=3.38 (Impaired)	Missing	*Total*
Predicted IQCODE	<3.38 (Not Impaired)	25	1	60	*86*
	>=3.38 (Impaired)	45	128	206	*379*
Total		*70*	*129*	*266*	*465*

Source: Data are from ELSA Waves 8 and 9 (2016-2019). Proxy respondents only. Data shows number of raw observations. Predicted IQCODE scores are computed using linear regression and the reason for the proxy interview, age and age squared, marital status, gender, and education as covariates.