

Cognitive Impairment and Long-Term Care in Denmark¹

Bent Jesper Christensen,^a Nabanita Datta Gupta^b and Mette Gørtz^c

^a) Aarhus Center for Econometrics, Aarhus University

^b) Aarhus University

^c) University of Copenhagen and Center for Economic Behavior and Inequality (CEBI)

March, 2026

1. Introduction

Denmark allocates more than 25 percent of its GDP to social expenditures, compared to an OECD average of 21 percent (the OECD range is 10 to 32 percent).² Within social expenditures, pension outlays for the elderly dominate long-term care expenditures. However, long-term care (LTC) expenditures are growing at the rate of 3 percent per year in constant prices and will increase more than 70 percent between 2020 and 2050 due to the projected trends in population ageing (Forsikring & Pension, 2020). In Denmark, around 12 percent of the 67+ population receive formal home care, while 5 percent are taken care of in long-term care facilities, the majority of which are publicly provided.³

Many factors will affect the growth of LTC expenditures in the future, including the projected dementia burden. As the population ages, the dementia burden will necessarily increase, as the likelihood of dementia increases with age. In Denmark, 96,000 individuals currently live with dementia, the prevalence being 1 percent of the population in the age group 65-69, growing to 11 percent in the age group 85+.⁴ Healthy ageing due to the higher levels of education among successive elderly cohorts exerts downward pressure on the dementia burden. On the other hand, the growing incidence of risk factors such as obesity, diabetes and smoking leads to a greater dementia burden. One study that projects the future dementia burden by country finds for Denmark that the raw number of dementia cases is expected to increase by 68 percent between

¹ Christensen acknowledges research support from Aarhus Center for Econometrics (ACE), funded by the Danish National Research Foundation, grant number DNRF186. Gørtz acknowledges support from the Danish National Research Foundation through its grant to CEBI (grant no. DNRF134) and from the Novo Nordisk Foundation (grant no. NNF17OC0026542).

² [Social spending | OECD](#)

³ [Plejehjemsbeboere](#)

⁴ Sundhedsstyrelsen (National Board of Health), Denmark, 2024. See: [Demens | Borger | Fagperson](#)

2019 and 2050, but that this is largely due to population ageing and not to risk factors (Nichols et al., 2019).

Thus, there will be a growing need to provide care for persons with cognitive impairments in Denmark in the future, and this need is considerably harder to fulfill in a labor market where both males and females are already in the labor force (76 percent of men and 73 percent of women in the age group 16-64 were employed in 2020).⁵ The LTC sector in Denmark is largely publicly financed, meaning that attracting more care workers or to improve the quality of care will require raising general taxes, which are already among the highest in the world. In Gørtz et al. (2025), we found that the cost of formal care in 2019 for the 65+ population amounted to 28.04 billion Danish kroner (DKK) for 40,474 users, while for formal home care it was 11.56 billion DKK distributed over 125,579 users. However, we also found that informal care, which is normally not accounted for, amounted to between 14 and 22 billion DKK.⁶

In the present paper, our focus is on how care varies with cognitive and physical impairments, as well as the cost of such care. Our analysis is based on a sample of individuals who were 65 years or older in 2015, drawn from the Survey of Health, Ageing and Retirement in Europe (SHARE), and linked to information on income and wealth from the tax registers, and information on children from the general population registers. We mainly focus on a survey-based assessment of cognitive impairment, defined in terms of a cognition score from SHARE, and we use the public health registers to partially validate the survey-based measure by comparing the rate of cognitive impairment in SHARE with dementia rates based on medical diagnoses in the registers.

We estimate that 7.5 percent of our sample of individuals aged 65+ is cognitively impaired when we use population weights. The comparable estimates are 8.1 percent for the US, 5.5 percent for the Netherlands, 18.5 percent for Spain, 8.8 percent for Singapore, between 6.6 and 8.5 percent for England, and between 3.9 and 6.0 percent for Germany (see the chapters on the other countries in this volume). As the rate of individuals aged 65+ diagnosed with dementia in the Danish registers is 5.4 percent, there is no indication that the cognitive impairment rate is underestimated due to attrition among the oldest cohorts in the survey. Additional findings from

⁵ [Fakta om arbejdsmarked - Danmarks Statistik](#)

⁶ Using the 2025 exchange rate of 6.5 DKK per US dollar, this is 4.3 billion dollars for formal care, 1.8 billion dollars for formal home care, and between 2.2 and 3.4 billion dollars for informal care.

the register data are that Alzheimer's disease is far more common than vascular dementia, and that dementia rates increase strongly with age. Similarly, we find in our SHARE survey sample that cognitive impairment increases strongly with age. In addition, we consider physical impairment, defined in terms of functional limitations reported in SHARE. We find that physical impairment increases strongly with age, too, and that two thirds of the cognitively impaired are also physically impaired. Those with cognitive or physical impairment are less likely to be married, have less education, and lower income and wealth, compared to the non-impaired group.

We find that 11.6 percent of our sample receive formal home care (provided through public funding), 39.6 percent receive informal home care, and 5.2 percent have a residency of 100 or more days in a nursing home or other type of nursing facility for the elderly. These numbers are high in an international context (e.g., 4, 14, and 2 percent in the US; 4, 19, and 3 percent in England; 16, 32, and 4 percent in Germany; 13, 19, and 1.4 percent in Spain; 6, 15, and 0.6 percent in Singapore; and 11 and 9 percent for formal and informal care in the Netherlands, where nursing home residents are excluded from the analysis), hence underscoring the widespread use of care in Denmark, particularly informal care. Both formal and informal care are less likely for the cognitively impaired than for the physically impaired. Similarly, conditionally on receiving informal care, the intensity (number of hours) of informal care is lower for the cognitively impaired than for the physically impaired. On the other hand, the intensity of formal care and the use of nursing homes or other types of sheltered facilities for the elderly are highest for the cognitively impaired.

There are many factors that influence the type of care received. Besides age and cognitive as well as physical impairment, both gender and marital status matter, as do education and income. In regressions explaining care usage, we find that the probability of receiving informal care is higher for the physically impaired than for the cognitively impaired, even after controlling for the other explanatory variables. This finding carries over to the probability of receiving formal care, hence indicating a disadvantage in obtaining care for the cognitively impaired. Similarly, cognitive impairment does not increase the intensity (number of hours) of informal care, whereas physical impairment does. Part of the reason is that many of the cognitively impaired are in

nursing homes. Indeed, cognitive impairment is the most important explanatory variable for nursing home use.

The interaction between gender and marital status is significantly negative and large in explaining care usage, consistent with the notion of women being the primary caregivers (married women are less likely than married men to receive care from the spouse). This finding extends to the use of informal care, which includes the care of a spouse, hence indicating that informal care drives the overall result. In contrast, both gender and the interaction term are insignificant for the receipt of formal care.

Higher income and education are associated with higher use of care. The result for income extends to the receipt of informal care, suggesting that better-off individuals pay for informal care, hence driving the overall result, whereas income and wealth are insignificant for the use of formal care and nursing homes, consistent with the universal provision of formal care in Denmark. Formal care increases with education, both in terms of probability of receipt and intensity, whereas education is insignificant for informal care. The positive association between education and formal care may reflect either that high-educated people reside in municipalities with better long-term care provision, or perhaps that better education improves the ability to work the system and obtain publicly paid care.

We calculate the cost of care based on usage and average unit cost estimates for formal home care and nursing home care, and imputed values relying on stronger assumptions for informal care. We estimate that the total cost of long-term care amounts to almost 3 percent of GDP in Denmark, with total per capita costs of long-term care among those aged 65 and above at around \$8,803 (2016 level). While the latter is very close to the similar estimate for the US, the splits between impairment groups and care types are different, with 46 percent higher per capita costs for the cognitively impaired than for the physically impaired in Denmark, compared to more than twice the cost for the cognitively impaired in the US (the estimate is about \$5,360 for England, \$8,557 for Spain, and \$5,915 for Germany, with the latter study excluding nursing home residents). Nursing home costs per capita are twice as high for the cognitively impaired as for the physically impaired in Denmark, compared to four times higher in the US. Total imputed costs of informal care amount to about the same as the amount spent on nursing homes, and around 2-3

times the public expenditure on formal home care, or more than 1 percent of GDP in Denmark, comparable to estimates for England and Spain, at 1.2 and 0.9 percent, respectively.

The remainder of the paper is laid out as follows. The policy environment in Denmark is introduced in Section 2. Data and definitions are presented in Section 3, and descriptive statistics in Section 4. Section 5 is devoted to regression analyses, and Section 6 to the assessment of costs. Section 7 concludes.

2. Policy Environment

According to the Service Law (*Lov om social service, Bekendtgørelse om plejehjem og beskyttede boliger*, enacted January 1st, 2007), the 98 municipalities in Denmark are responsible for the provision of LTC for all elderly, who are no longer able to live independently in their own homes. The municipalities decide the content, organization and regulation of LTC, which includes home care, nursing home care and residential care facilities. Municipalities are also responsible for training and rehabilitation after hospital stays. Long-term care in Denmark is thus mainly provided by the public sector. Around 950 municipality nursing homes and 75 approved private nursing homes exist, serving the needs of the elderly requiring institutional care.

LTC in Denmark is financed by general taxes. However, the elderly who reside in a care facility pay a charge (means-tested) for room and board, after subsidization (*boligstøtte*).⁷ Eligibility for a slot in a nursing home or residential care facility is determined based on a needs assessment made by the municipality (visitation) and must be provided within 2 months after an eligibility decision has been made. Cognitive impairment (e.g., diagnosed ADRD) would be given high priority in such an assessment, but is not a necessary condition for being granted a slot. The municipality's needs assessment considers both physical and cognitive capabilities. Therefore, difficulties with performing either ADLs or IADLs would often be sufficient reason for

⁷ All individuals in Denmark are eligible for old-age pension from a certain age on, irrespective of work history or private pension savings. Health care is also universal and free of charge, except for prescription medicine (where there is a partial out-of-pocket payment by the patient), dentistry fees (partly subsidized), and psychotherapy.

eligibility. Eligibility for a slot in a specialized dementia care facility requires a physician declaration, which is based on diagnosed ADRD.

Municipalities also subsidize personal care or practical help (meal preparation, housecleaning, etc.) for elderly who live at home, whether purchased publicly or privately. Informal care in recipient's home, provided by family, friends, neighbors, etc., is offered voluntarily, and generally unpaid. However, provisions do exist for informal carers to become registered as formal helpers or receive respite care when taking care of an elderly person with either physical or cognitive impairment.

In recent years, recruitment of personnel for the health care sector, especially for the LTC sector, has proved increasingly difficult. LTC institutions suffer from a high rate of personnel turnover due to low wages and unattractive working conditions. The recruiting problems in this sector are leading to an upward pressure on wages, both for attracting and retaining workers. Starting from July 1st, 2025, a new law on the elderly (*Ældreloven*) has raised wages of workers in the health care sector by more than 17 percent.⁸ The reform also increases annual allotments for elder care by 1 billion DKK (0.15 billion dollars, nearly a 2 percent increase) to enhance elderly autonomy, improve employee trust, foster citizen-oriented leadership, and promote closer partnership between relatives, local communities, and civil society.⁹

3. Data and Definitions

Sample: Our primary data source is the Survey of Health, Ageing and Retirement in Europe (SHARE) for Denmark, a panel survey of individuals aged 50 or older and their spouses or partners. SHARE has been collected since 2004 (wave 1), with Denmark participating in all waves. We use data from wave 6 of 2015 and wave 7 of 2017 to avoid including the Covid years in our analysis. Our study focuses on individuals who were 65 years or older in 2015.

⁸ DR, Penge, 5/3/2024.

⁹ Ældreloven.

Wave 6 of the SHARE survey data for Denmark has been linked to Danish administrative register data at the individual level.¹⁰ The Danish register data comprise of a high-quality longitudinal data set. The data includes all people living in Denmark, from birth (or immigration) until death. Through personal identification numbers for every citizen, it is possible to link family members across generations through the general population register. Thus, it is possible to identify children and grandchildren of the elderly population, including the SHARE sample, allowing us to find information, e.g., on education and employment of offspring.¹¹ Population data is linked to third-party information on income and wealth reported in the tax registers.¹² The registers furthermore contain information on health and health care in the form of hospitalizations, diagnoses, visits to general practitioners and specialist clinics, purchases of prescription medicine, and use of long-term care. This information has been reported by the health care sector and public authorities providing formal LTC.

In the following, descriptive statistics in Table 1a is based on SHARE waves 6 and 7, whereas Table 1b is entirely based on register data. Results presented in Table 2a and onwards are based on SHARE wave 6 linked to administrative register data.

Cognitive Impairment: To study cognitive abilities in the population, we use a set of questions in SHARE. To ensure comparability across countries, we chose questions on cognitive ability that can also be found in a fairly similar form in the US Health and Retirement Study (HRS).¹³ Our SHARE-based cognition score uses responses for the following four questions/tests concerning cognition: Immediate Word Recall (scored: 0-10), Delayed Word Recall (scored: 0-10), Serial 7's (scored 0-5), and Date naming (scored 0-4). Points scored on these four questions/tests are aggregated to create the cognition score, resulting in a score ranging from 0 to 29.¹⁴

¹⁰ We were able to link the majority of individuals in SHARE to information in the administrative registers using the anonymized data accessible through secure portals for researchers in Statistics Denmark.

¹¹ Family links are not complete for individuals born before 1935.

¹² The advantage of using information from tax registers is that the information is not self-reported, but usually reported by employers, pension funds, public authorities, etc.

¹³ From data based on HRS, it has been shown that a score based on these questions has a very high correlation with an expanded set of questions.

¹⁴ Immediate word recall requires the respondent to recall as many words as possible from a list of 10 words that have just been read aloud by the interviewer. In delayed word recall, the respondent attempts to remember the same words after answering several unrelated questions, without hearing the list again. In both exercises one point is rewarded per correct word. Serial 7s involves subtracting 7 from 100, then repeatedly

We select a score of 6 or lower as a measure of cognitive impairment.¹⁵ Sometimes SHARE respondents are unable to respond to the survey, for example due to health or cognitive issues, or if the respondent is too busy, or refuses to respond. In such cases, the survey questions may be answered by a proxy respondent.¹⁶ In total, around 4 percent are proxy interviews in our data. SHARE asks proxy respondents whether the individual for whom they are reporting (the main SHARE respondent) experiences limitations with respect to instrumental activities of daily living (IADLs).¹⁷ If the main SHARE sample member is experiencing two or more IADL limitations, we classify the SHARE sample member as cognitively impaired. With this definition, a small majority of SHARE sample members for whom there are only proxy responses are classified as having cognitive limitations.

Figure 1a presents the distribution of cognitive scores. The proportion of respondents classified as cognitively impaired based on the proxy responses is shown in a bar on the far left of the figure. This group of “proxy cognitively impaired” accounts for 4.25 percent of the sample in Denmark, compared to 4.33 percent in the US. The distribution to the right of this bar shows the distribution of cognition scores. The cut-off for our definition of cognitively impaired is represented by the first vertical dashed line, with 3.25 percent of the sample regarded as cognitively impaired by this definition. When we combine the two cognitively impaired groups, 7.5 percent of our sample is considered cognitively impaired, compared to 8.1 percent for the US. The next dashed lines indicate the quintiles of the distribution. When determining the breakpoints, we assume that proxy responses belong to the lowest quintile.

Figure 1b shows the distribution of cognitive impairment separately for age groups 65-84 and 85 and above, respectively. The figure clearly documents that cognitive impairment is more prevalent in older age groups, and that more proxy responses with the main respondent

subtracting 7 from each subsequent result, for a total of five steps. Date naming requires the respondent to state the current day of the month, month, year, and weekday. Each correct response earns one point.

¹⁵ The threshold of a score of 6 and below as a measure of cognitive impairment builds on evidence from Crimmins et al. (2011) and Langa et al. (2017). Scores of 6 or less on a similar 27-point cognition scale corresponded to dementia diagnoses obtained from a neuropsychological assessment (Crimmins, Kim, Langa, & Weir, 2011).

¹⁶ SHARE only accepts responses from a proxy respondent if the proxy reports that they have permission from the respondent to respond to the survey on their behalf.

¹⁷ IADL activities include preparing meals, shopping for groceries, making phone calls, taking medication, and managing money.

experiencing cognitive difficulties can be found in the older group, 26.82 versus 1.53 percent (15.75 versus 2.58 percent in the US).

Physical Limitations: We mainly base our analysis of physical limitations on functional limitations, a self-reported measure included in SHARE.¹⁸ Respondents (or their proxies) are asked whether they experience difficulties with activities of daily living. The reported limitations include Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs). ADLs capture self-reported difficulties carrying out the following six activities: Using the toilet, getting dressed, taking a bath, walking across a room, eating, and getting in/out of bed. IADLs are self-reported measures of difficulties related to using a phone, managing money, taking medicine as prescribed, shopping for groceries, preparing a meal, and reading a map. Respondents (or proxies) were asked to exclude any difficulties they expected to last for less than three months. We categorize an individual as physically impaired if two or more ADLs are reported.

Figures 2a and 2b show the distribution of ADL limitations across our sample, with Figure 2a including the entire group of elderly, and Figure 2b showing the distributions for our two age groups separately. Two clear findings emerge, confirming results from other countries. First, physical impairments are higher for the elderly, which is perhaps unsurprising. Secondly, the vast majority of elderly do not report any physical limitations (84.3 percent overall, 88.2 percent for the younger group, and 53.1 percent for the older, compared to 78.9, 82.3 and 56.5 percent for the US).

Care Utilization and Outcomes: Next, we explore the uses and costs of long-term care across the groups with cognitive and physical impairments. We distinguish between three types of care: Formal care provided at home, informal care provided at home, and long-term residency in a nursing home or protected housing for the elderly. We find that 5.8 percent of our sample receive formal home care, 39.6 percent receive informal home care, and 5.2 percent of our sample have a

¹⁸ Our linked survey-register data allows us to compare self-reported measures in SHARE with more objective measures of health care use from the register data. For example, a frailty index based on ADLs and IADLs (such as in The Danish Economic Council, Autumn, 2021) can be compared to an index of diagnoses based on register data. Population data will also allow exploring heterogeneity with respect to gender, education, etc. While we leave these detailed linked-data analyses for future studies, we compare dementia rates in SHARE and register data in Section 4.

long-term residency in a nursing home or protected housing for the elderly. These numbers are considerably higher than the corresponding numbers for the US, at 4.0, 13.7 and 2.3 percent, hence showing the relatively widespread use of care in Denmark.

Figure 3 shows the share receiving each type of care by cognition quintile (cf. Figure 1a). Nursing home care (including protected housing for the elderly) is most concentrated in the low end of the cognition distribution. Informal care is more spread out, with some care received even at the high end of the cognition distribution. Formal home care is the intermediate case.

4. Descriptive statistics

The joint distribution of cognitive and physical impairments is represented in Table 1a. Most of the elderly, 82.2 percent, report neither physical nor cognitive limitations.¹⁹ For comparison, 76.6 percent of the corresponding US sample have neither type of limitation. Those with one or more physical impairments, but no cognitive impairments, represent 10.3 percent of the Danish sample, compared to 16.6 percent in the US.²⁰ Having a single physical impairment is about as common as having two or more. Further, 7.5 percent of the sample have cognitive impairments, compared to 8.1 percent in the US.²¹ Of these, more than one quarter have no physical impairments.²² Two thirds of those with cognitive limitations have two or more ADL limitations.²³ In the following, we group all cognitively impaired individuals under a single heading, without distinguishing by the number of physical limitations. The reason is that the ADL related survey questions ask whether the difficulty is “Because of a health or memory problem...” Thus, the individual may be physically able to perform the task, but would need help due to a cognitive limitation, implying that the impairment is in fact cognitive in nature.

We might expect that the SHARE report underestimates the rate of cognitive impairment, due to attrition in SHARE for the oldest cohorts. Therefore, for Denmark in particular, we compare the

¹⁹ From Table 1a, $11.87 + 69.93 + 0.44 = 82.24\%$.

²⁰ From the table, $1.46 + 3.41 + 0.22 + 2.17 + 2.96 + 0.10 = 10.32\%$.

²¹ $3.23 + 4.22 = 7.45\%$.

²² $(1.67 + 0.41)/7.45 = 27.92\%$. This is likely a result, in part, of the wording of the question, which asked whether the respondent had difficulty with a task, “because of a health or memory problem.” An ADL limitation could thus indicate a cognitive limitation rather than or more so than a physical.

²³ $(1.33 + 3.38)/7.18 = 65.60\%$.

survey-based rate of cognitive impairment with dementia rates in register data from the Danish hospital data, keeping in mind that the SHARE measure is based on the test, whereas the register data on dementia are based on medical diagnoses (Danish register data, 2018). Using register data for the entire Danish population in 2018, we construct an indicator for having been admitted to hospital within the last 20 years with a diagnosis (main or secondary diagnosis) of dementia (Alzheimer's, vascular dementia, other dementia, or unspecified dementia).

The resulting dementia rates based on the register data are shown in Table 1b. From the table, 2.1 percent of men and 2.3 percent of women in the 65–84-year-old group suffer from dementia, as do 9.8 percent of men and 12.8 percent of women in the 85+ group. This should be compared to the 7.5 percent in SHARE with cognitive impairments, Table 1a. In particular, weighing the two age groups in the register data together, the overall register dementia rate for the 65+ group is 3.2 percent.²⁴ As this is less than the 7.5 percent cognitive impairment rate in SHARE, there is no indication from this comparison that the rate of cognitive impairment is underestimated in SHARE, after all. This way, we use the register data to lend some support to the cognitive impairment measure for Denmark in SHARE.

Before leaving the register data, we note that the detailed statistics are of interest in themselves. First, dementia rates are about five times higher in the 85+ age group than in the 65-84 group, and this is true across gender, and for each of the specified diagnoses, Alzheimer's disease and vascular dementia. Within gender, Alzheimer's disease is more than twice as common as vascular dementia in the 65-84 age group, and more than three times as common in the 85+ group. Dementia rates are relatively similar across gender, although slightly higher among women than men, within each age group and specified dementia type.

Returning to our SHARE sample, we now focus on the three main groups identified so far, namely, those without impairments, those with physical but no cognitive impairments, and the cognitively impaired. First, we examine how they compare across a few demographic and socio-economic factors. Results appear in Table 2a. Consistent with Figures 1b and 2b, we find in Table 2a that the non-impaired group is younger on average than either impaired group. The mean age is 8.9 years higher in the cognitively impaired group than in the non-impaired group

²⁴ From Table 1b, $0.021 \cdot 471,168 + 0.023 \cdot 524,127 + 0.098 \cdot 41,295 + 0.128 \cdot 79,473 = 36,169$ dementia cases out of a total population of $471,168 + 524,127 + 41,295 + 79,473 = 1,116,063$ individuals, so 3.24%.

(this difference is 9.4 years in the US case). The result for the cognitively impaired is consistent with the register data, too, as the risk of dementia rises sharply with age, as evident from Table 1b. Further, from Table 2a, the non-impaired group is significantly more likely to be married, compared to either the physically or cognitively impaired groups (48 percent against 16 and 30 percent), which is consistent with the younger age, too. The physically and cognitively impaired groups also have less schooling, perhaps in part due to their higher age (a cohort effect), with more than one half not finishing high school (57 and 58 percent), compared to less than one third among the non-impaired.

In terms of financial variables, mean income in the non-impaired group is 19 and 23 percent greater than the physically and cognitively impaired groups, respectively (compared to more than 50 percent greater in the US). Mean and median wealth levels among the non-impaired are more than double those of either impaired group. Presumably, the income differences are partly due to higher labor force participation rates among the younger cohorts, which are also healthier. Similarly, the wealth differences can be expected to be due partly to the older cohorts having spent down some of their assets, both with age, consistently with the life cycle model, and because of higher health care expenditures.

Next, we investigate how the three groups compare in terms of need and care. Results are presented in Table 2b. While informal care is reported in SHARE, where respondents were asked if they receive help from family or friends, who provided help, and how often, SHARE wave 6 does not report the number of hours. Instead, respondents report how often they receive help. Categories are daily, weekly, monthly, and less often. These questions were asked for up to three helpers. We impute average hours of informal care for each frequency using information on hours provided in SHARE waves 1 and 2.²⁵ The results for hours of informal and formal care are included separately in Table 2b.

From the table, the average cognition score is 3.73 for the cognitively impaired, 13.52 for the physically impaired, and 16.01 for the non-impaired. The physically impaired group has 3.17 ADL limitations, and the cognitively impaired group 2.56 (compared to 2.67 in the US).

²⁵ A related approach was adopted by Meijer et al. (2022).

The results for limitations with respect to IADLs lend some support to our assessments of physical and cognitive impairments. Thus, many IADL functional tasks, like shopping for groceries, managing money, and reading a map, can likely be managed with physical, but not cognitive limitations. From Table 2b, we find that the cognitively impaired group has more IADL limitations than the physically impaired group (average 3.73 and 2.10 IADLs, respectively, with 2.93 and 1.45, respectively, in the US).

Not everyone in the groups with cognitive or physical impairments receives care. The numbers are 81 percent for the physically impaired, and 74 percent for the cognitively impaired. This is compared to 70 respectively 75 percent for the US. At the same time, 37 percent of the non-impaired receive care (some of these individuals have a single ADL limitation).

Both informal and formal home care are more common among the physically impaired than the cognitively impaired. Further, within each impaired group, informal home care is more widespread than formal home care (73.5 versus 53.2 percent for the physically impaired, and 69.9 versus 37.3 percent for the cognitively impaired), and the differences are statistically significant. Informal care is more common in Denmark than in the US, with rates at 73.5 and 69.9 percent for the physically and cognitively impaired, compared to 56.2 and 48.5 percent in the US.

Like the probability of informal care, also the intensity of informal care is lower for the cognitively impaired group, averaging 7.12 hours of informal home care per week, compared to 6.73 hours per week among the physically impaired. In contrast, the intensity of formal care is greater for the cognitively impaired, averaging 5.78 hours of formal home care per week, compared to 5.56 hours per week among the physically impaired, and 3.00 hours among the non-impaired. The pattern is different in the US, with the intensity of both informal and formal care greater for the cognitively impaired than for the physically impaired.

Nursing home use is more widespread among the cognitively impaired than the physically impaired, 47.3 against 21.8 percent. This difference is about as dramatic as that in the US (23.7 against just 5.6 percent). Conditional on receiving care in a nursing home, the number of days in nursing home per year is nearly 300 or more across all groups, reflecting the fact that nursing home stays in Denmark tend to be permanent terminal stays.

5. Regression analyses

The descriptive statistics in Table 2b are useful for understanding how the receipt and intensity of the different types of care depend on cognitive and physical impairments, without account of other factors. In this section, we consider a series of regression analyses, to account for further factors that may influence the demand for care. Cognitive and physical impairments are retained among the regressors throughout. Beyond these, we first include age and age squared. We know from Figures 1b and 2b that both cognitive and physical impairments depend strongly on age. Including age (and its square) in the regressions allows for the possibility that age matters for the care received in other ways, beyond the effect operating through impairments, as well as the possibility that age and its square capture effects of impairments that are not fully picked up by our impairment measures. Next, in further regressions, we control in addition for marital status, gender, the interaction of marital status and gender, the existence and number of any children, schooling level, and financial variables (income and wealth).²⁶ Clearly, the financial variables affect the ability to pay for care. Including these variables allows an analysis of whether they are nevertheless of minor importance in a country like Denmark, at least for the demand for formal care, due to the universal provision. Including marital status and gender variables allows an analysis of the importance of the position in the household for care received. Including information on children allows addressing whether the presence of other family members beyond the spouse matters, as they might, for example, act as informal caregivers.

As in Table 2b, we consider the receipt of any care, as well as the separate types of care, namely, informal care, formal home care, and residence in a nursing home. We consider linear probability models for the probability of receiving care.²⁷ In addition, to focus on the intensity of care, we consider regressions using as the dependent variable the number of hours of informal care received in the past week, conditional on receiving informal care, and similarly the number of hours of formal care received in the past week, conditional on receiving formal care.

Any Care: We first consider the probability of receiving any care. Results are shown in Table 3. Both physical and cognitive impairments are strong determinants of receipt of care. From the

²⁶ We use the inverse hyperbolic sine of both income and wealth in place of logs because of the existence of zeros and negative values. We do not have access to data on race or ethnicity.

²⁷ Results from Probit models lead to similar conclusions.

coefficients, the physically impaired (first row) have higher probability of receiving any care than the cognitively impaired (second row). Rates are slightly below 50 percent, which is less than in the US (58 to 68 percent). Note that when adding the intercept, the coefficient on each type of impairment in Table 3, first column (no other regressors) matches that in the summary statistics in Table 2b ($0.443 + 0.366 = 0.809$ for physical impairment, $0.374 + 0.366 = 0.740$ for cognitive impairment), which is as it should be. Like in the case of the US, the coefficients on both types of impairments in Table 3 are reduced when adding age and age squared as regressors, and the coefficient on physical impairment is reduced further when adding the other regressors. Together, the results show the importance of age and the other regressors as correlates with both physical and cognitive impairments, as well as with the demand for care.

In quantitative terms, besides the impairments, age comes through as an important predictor of the receipt of care. A 10-year increase leads to an increase of approximately 3.8 percentage points in the probability of receiving care, based on the specification including only age and age squared as additional regressors (from the estimates, $100 \times 0.000550 - 10 \times 0.00168$), although the effect disappears in the model with a complete set of controls (last column in the table). For comparison, the increase is about 2.5 percentage points in the US, whether using age and its square, only, or all regressors. The difference between the two results for Denmark reinforces the importance of other regressors, beyond age, in conditioning the demand for care.

In the last column of Table 3, we include additional controls for other important drivers of the demand for care, such as gender, marital status, and their interaction, as well as presence and number of children, income, wealth, and education dummies. Unmarried women are more likely to receive care than unmarried men, and the difference is more than three times greater in Denmark, at 13 percentage points, than in the US, 3 percentage points. Unlike in the US, married individuals are less likely to receive care in Denmark. In principle, informal care provided by the spouse is included in the care measure for married individuals and, since it should be relatively easy for the spouse to assist his/her partner, the result is somewhat surprising, possibly suggesting that some informal care remains unreported. The reduction in the probability of receiving care for married men compared to unmarried men is 11.9 percentage points and significant. The interaction term (gender times marital status) is significant, too, in Denmark, unlike in the US, and negative, so the reduction is even larger for women. Married women are

26.3 percentage points less likely to receive care than unmarried women ($11.9 + 14.4$). The fact that women face a greater loss in care probability from being married than men (the interaction term, negative 14.4 percentage points) is consistent with the notion of women being the primary caregivers. The effect is so strong as to override the unconditional increase in probability of receiving care from being female, the upshot being that married men more frequently than married women benefit from care, possibly of the spouse (the difference is $14.4 - 13.0 = 1.4$ percentage points).

In Denmark, higher education and income increase the probability of receiving care, whereas children and wealth are insignificant. This is unlike the result for the US, where education and wealth reduce the probability of care, while income is insignificant. Possibly education and income increase the demand for privately paid care in Denmark and potentially improve the ability to work the system and obtain publicly paid care, too. Another explanation may be that the levels of public services provided vary across municipalities. Municipalities with more high-income taxpayers are generally able to provide better long-term care services for the elderly. The correlation between education/income and services received may partly reflect this correlation at the municipality level. For comparability across countries, regional or municipality dummies are not included in the regressions.

Informal Care: The results for receipt of informal care appear in Table 4a. As for any care (Table 3), both physical and cognitive impairments are strong determinants of receipt, with results in the first column of Table 4a (no other controls) matching those for informal care in the summary statistics in Table 2b ($0.378 + 0.357 = 0.735$, $0.342 + 0.357 = 0.699$), as they should. From the point estimates, those with physical impairments are more likely to receive informal care than the cognitively impaired. This difference remains even as other controls are added, and coefficients are reduced. Still, the difference is statistically insignificant in Denmark, unlike in the US.

The probability of receiving informal care increases significantly with age, by about 2.7 percentage points for a 10-year increase in age, without other controls included. This is more than the comparable increase in the US, although the effect again disappears when including other controls (last column), just like for any care (Table 3).

Unmarried women are more likely to receive informal care than unmarried men. At 14 percentage points, the difference is even higher than for any care (13 percentage points, Table 3), and nearly three times the difference in the US (5 percentage points). As for any care, and unlike in the US, married individuals are less likely to receive informal care in Denmark. The reduction in the probability of receiving informal care for married men compared to unmarried men is 10.2 percentage points and significant. The interaction term is again negative and significant, hence reinforcing the notion of women being the primary caregivers. At negative 14.7 percentage points, the interaction term is nearly three times greater in magnitude than the US term. Married women are 25 percentage points less likely to receive informal care than unmarried women ($10.2 + 14.7$). As for any care, the interaction term is stronger than the gender term, so that married men more frequently than married women receive informal care, possibly of the spouse (the difference is $14.7 - 14.0 = 0.7$ percentage points).

The likelihood of informal care increases with income, whereas education and wealth are insignificant. For comparison, it decreases with educational level and wealth in the US, possibly because it is substituted by paid formal care.

Results for hours of informal care, conditional on receiving informal home care, appear in Table 4b. Physical impairment increases the number of hours of informal care, even with other controls included. In contrast to the US, cognitive impairment does not increase hours of informal care in Denmark, except when other controls are omitted, presumably because individuals facing cognitive impairment receive formal home care or have been admitted to nursing homes or other care facilities. Other characteristics are insignificant in Denmark, whereas being married or having children increases hours of informal care in the US.

Formal home care: Results in Table 5a are for receipt of formal home care only. As for any care (Table 3) and informal care (Table 4a), results in the first column of Table 5a (no other controls) match those for formal care in the summary statistics in Table 2b ($0.457 + 0.075 = 0.532$, $0.298 + 0.075 = 0.373$), as they should. Also, similarly to the results for informal care, Table 5a shows that the probability of receipt of formal care is higher for the physically impaired than for the cognitively impaired, and this difference remains as other controls are added, and coefficients are reduced. This pattern of higher rates for physical than for cognitive impairment, which remains after adding other controls, is common to formal and informal care both in Denmark and in the

US. Similarly, the likelihood of receiving formal care increases with age in both countries, and the effect remains significant when including other controls, unlike for informal care in Denmark. Further, unlike for any care and informal care, the effects of gender and the interaction with marital status are insignificant for formal care in Denmark. In contrast, women are more likely to receive formal care in the US.

As for the US, education increases the demand for formal care in Denmark. On the other hand, unlike for the US, income and wealth are insignificant, which is perhaps not surprising, given the universal provision of public formal home care in Denmark. Comparing across tables, while income is insignificant for formal home care (Table 5a), it increases the demand for informal care (Table 4a), hence showing that the effect of income on any care (Table 3) operates through informal care, only.²⁸ This reinforces the point regarding the importance of the universal provision of formal care.

Results for the number of hours of formal home care, conditional on receiving formal home care, appear in Table 5b. Both physical impairment and cognitive impairment are important predictors of hours of formal care in Denmark, with both significant regardless of whether other controls are included, and larger coefficients for physical than for cognitive impairment. This contrasts with the US case, where physical impairment is less important, with a coefficient less than one third of that on cognitive impairment.

Further, higher education increases the number of hours of formal home care in Denmark, just like it increases receipt of formal (and any) care, whereas it is insignificant for hours of formal home care in the US. Age, gender, marital status, children, and income are insignificant in both countries. Wealth increases hours in the US, but remains insignificant in Denmark, again presumably reflecting universal provision.

Nursing home: Table 6 shows the results for the probability of being in a nursing home or sheltered housing facility for the elderly. As for Tables 3 through 5, results in the first column of Table 6 (no other controls) match those for nursing home in Table 2b ($0.200 + 0.017 = 0.217$, $0.456 + 0.017 = 0.473$). Cognitive impairment is the most important explanatory variable for nursing home use. Those with cognitive impairments are more than 40 percentage points more

²⁸ Income is insignificant for nursing home care, too (Table 6).

likely to receive care in a nursing home than the non-impaired. For comparison, in the US, the cognitively impaired are about 20 percentage points more likely to be in a nursing home or a sheltered housing facility than the non-impaired. Further, in Denmark, the physically impaired are 18 percentage points more likely to be in such a facility than the non-impaired, whereas the difference is about 5 percentage points in the US. Thus, the use of nursing home care or sheltered housing facilities for both the cognitively impaired and the physically impaired is widespread in Denmark, relative to the US. This partially confirms results of Bom et al. (2023), who find that while residency in a nursing home or other sheltered facility for the elderly is more common in the Netherlands and Denmark than in the US, Americans are more likely to enter a nursing home facility for shorter stays, whereas this is uncommon in Denmark and the Netherlands.²⁹

Unmarried women are less likely than unmarried men to be receiving care in a nursing home or sheltered housing facility, as are married men, compared to unmarried men. However, the interaction term is significant, too, positive, and larger than the gender coefficient. Thus, married women are more likely than married men to be in a nursing home or sheltered housing facility (the difference is $4.4 - 3.7 = 0.7$ percentage points), again consistent with the notion of women being the primary caregivers. Qualitatively, this pattern in Denmark matches that in the US, but the effects (gender, marital status, interaction) are larger in Denmark. Other characteristics are insignificant.

To summarize, our descriptive statistics and regression results reveal some systemic differences in the organization and provision of long-term care between Denmark and the United States. In Denmark, unlike in the US, income and wealth do not influence either the likelihood or the intensity (measured in hours) of formal home care, likely because formal home care is universally available and subsidized in Denmark. Furthermore, the use of nursing home care differs across the settings, too; in the US it seems to be used for shorter stays, whereas in Denmark it involves long-term terminal stays. Finally, women seem to be more involved in caring for their partners in Denmark compared to the US, likely because of the high cost of private care services in Denmark.

²⁹ Bom et al. (2023) compare the US, the Netherlands and Denmark and finds that elders in the US are more likely to be disabled, but even after adjusting for disability, they are more likely to be admitted to a nursing home.

6. Costs

From the results, people with cognitive impairment are a particularly vulnerable group among the elderly, and need considerable amounts of long-term care, especially intensive care such as in nursing homes, which they demand to a greater extent than those with only physical impairments. With ageing populations, policy makers will increasingly need data on the (predicted future) costs of long-term care for planning purposes.

Table 7 shows the total imputed costs of long-term care in Denmark in 2016. These include the costs of the three types of care: Formal home care, informal care, and nursing home care.

For formal home care and care in a nursing home or sheltered housing facility (henceforth, nursing home), there is data available to impute the costs, whereas imputing the value of informal care is more complicated and requires several assumptions. For our cost imputation, we draw on the method developed in Gruber and McGarry (2025) (see also the chapter on the US in this volume, and Gørtz et al., 2025).

For formal care, we multiply the number of hours of formal home care by the average hourly public cost of home care.³⁰ We then aggregate across each of the groups with cognitive and physical impairments, using the SHARE individual level weights.

To impute the cost of nursing home care, we use data on the number of slots in nursing homes in Denmark and how these slots are allocated across the three types of elderly. Most nursing home stays are permanent in the sense that once assigned a nursing home slot, the person usually does not move home. We use a measure for the annual cost of a nursing home slot from Foged et al. (2024), based on the rate that municipalities charge residents from other municipalities. This measure includes costs of caring for the elderly individual but excludes costs for rent and meals. It is an average cost in the sense that it is possible and perhaps highly likely that the cost varies across individuals depending on the level of care needed. It is for example possible that people with dementia require more intensive care than other residents. We cannot distinguish between resident types when calculating the average cost. Most municipalities charge the elderly residents

³⁰ Using cost estimates from DST Statistikbanken, table REGK100, number of hours of home care from DST Statistikbanken, Table AED06, and methodology as described in KL – Local Government Denmark (2023).

in nursing homes for rent and meals, but this user fee varies across municipalities and is means tested.

Valuing an hour of informal care is more difficult. One challenge relates to whether an hour of informal care should be valued using the hourly wage rate of a professional delivering home care or nursing, or the caregiver's own wage rate (lost productivity). In the latter case, a second challenge arises if the provider does not have a job (for example, if the caregiver has retired to provide care for a family member). We estimate a proxy for the value of the caregiver's time. Following the procedure in Gørtz et al. (2025), we estimate the value of caregivers' time based on their observable characteristics. To do this, we use our linked SHARE survey and register data. This linked data provides information on caregivers' age, gender, marital status etc. Using information in the register data, we estimate individual level probabilities of employment and potential wage for our sample of caregivers. We multiply these together, then multiply by the hours of care from the data. The result is an estimate of the wage foregone due to care giving. For caregivers who are not working, we multiply hours of care by the probability of not working, then multiply the result by the mean hourly wage of home care assistants. We reweigh our results using SHARE population weights to achieve measures that correspond to the total Danish population.

The total and per capita costs are shown in Table 7. We find that the total cost of long-term care is \$9.5 billion dollars (2016 level), amounting to almost 3 percent of GDP, or \$8,803 per elderly person. The cost per capita in Denmark is almost identical to that in the US. Looking at the separate categories of impairments, we see that the per capita costs are \$36,158 for the physically impaired, and \$52,734, or 46 percent higher, for those with cognitive impairments (bottom row of the table). In the US, the per capita costs for the cognitively impaired are more than twice those for the physically impaired. When breaking down by type of care, we find that those with cognitive impairments carry around twice as high per capita nursing home costs as those with physical impairments only (compared to four times as high in the US case). In contrast, those with physical impairments carry about as high informal and higher formal home care costs per capita compared to those with cognitive impairments, presumably because the physically impaired are more likely to still be living at home (whereas the per capita costs of both types of

home care is about twice as high or more for the cognitively impaired compared to the physically impaired in the US).

Finally, we show that the total imputed costs for informal care amount to 4 billion dollars, about the same as the amount spent on nursing homes, and around 2-3 times the public expenditure on formal home care. This is a sizeable cost, corresponding to 2.9 percent of GDP in Denmark, and higher than comparable estimates for England and Spain, at 1.2 and 0.9 percent. Research is still needed to analyze the employment, income, and welfare consequences for caregivers of providing such massive amounts of informal care.

7. Conclusion

We estimate that the total cost of informal care in Denmark far exceeds the cost of formal home care and roughly equals the cost of nursing home care. The high cost of informal care relative to formal home care underscores the extent of the need for care, as well as the difficulties faced by the LTC sector in attracting and retaining care workers. At the same time, the cognitively impaired need intense formal care and, especially, care in a home with nursing, to a greater extent than the physically impaired, who can better make do with informal care. With the population ageing, dementia cases expected to increase steeply, and nursing homes and sheltered home facilities already being the costliest care category, this puts pressure on the health care sector and public finances going forward.

Recent policy measures include a wage increase of 17 percent for workers in the health care sector, starting from July 1st, 2025, which should help address the recruiting and retaining issue. Other aspects of the policy package, including increased allotments for elder care to enhance elder autonomy and promote closer partnership between relatives and local communities, can be seen as intended to mainly enhance informal care, by supporting caregivers outside of the public institutions. Based on our results, these dimensions of the policy will largely benefit the physically impaired, but may not suffice for the cognitively impaired, who need the intense formal and nursing home care broadly.

References

- Bom, Judith, Pieter Bacx, Eddy Van Doorslaer, Mette Gørtz, and Jonathan Skinner (2023): What explains different rates of nursing home admissions? Comparing the United States to Denmark and the Netherlands. *Journal of the Economics of Ageing*, 25:100456.
- Crimmins, E., Kim, J., Langa, K., and Weir, D. (2011). Assessment of cognition using surveys and neuropsychological assessment: The Health and Retirement Study and the Aging, Demographics, and Memory Study. *The Journals of Gerontology: Series B*, 66B, Suppl 1, i162–i171.
- Foged, S., Hansen, P., Houlberg, K., Pedersen, L., and Darger, M. (2024). Kommunernes ressourceforbrug og økonomiske styring på ældreområdet. VIVE.
<https://www.vive.dk/media/pure/5xp6me7z/24743883>
- Forsikring & Pension (2020). Fremtidige udgifter til ældrepleje. Analyserapport 2020:4.
- Gørtz, M., Christensen, B. J., and Datta Gupta, N. (2025). Long-Term Care in Denmark, in *Long-Term Care Around the World*, eds. Gruber, J., and McGarry, K., NBER, National Bureau of Economic Research, University of Chicago Press, pp. 69-106.
- Gruber, J., and McGarry, K. (2025). Long-Term Care in the United States, in *Long-Term Care Around the World*, eds. Gruber, J., and McGarry, K., NBER, National Bureau of Economic Research. University of Chicago Press, pp. 353-388.
- KL – Local Government Denmark (2023): Sundheds- og plejeudgifter til ældre på tværs af sektorer. By Kleist, B. H., KL. KL Analysenotat.
<https://www.kl.dk/media/10fdnzqf/aldersfordelte-sundhedsudgifter.pdf>
- Langa, K., Larson, E., Crimmins, E., Faul, J., Levine, D., Kabeto, M., and Weir, D. (2017). A comparison of the prevalence of dementia in the United States in 2000 and 2012. *JAMA Internal Medicine*, 177(1), 51-58.
- Meijer, E., Casanova, M., Kim, H., Llana-Nozal, A., and Lee, J. (2022): Economic costs of dementia in 11 countries in Europe: Estimates from nationally representative cohorts of a panel study. *The Lancet Regional Health – Europe*, Volume 20, Article 100445.
- Nichols, E. et al. (2022). Estimation of the global prevalence of dementia in 2019 and forecasted prevalence in 2050: An analysis for the Global Burden of Disease Study 2019. *Lancet Public Health*, 7(2), E105–E125.

Tables and Figures

Tables

Table 1a. Joint Distribution of Activities of Daily Living Limitations and Cognition Scores

Weighted percent	Cognition score 0 - 6	Cognition Score 7 - 12	Cognition Score 13+	Proxy cognitively impaired	Proxy not cognitively impaired	Total
0 ADLs	1.67%	11.87%	69.93%	0.41%	0.44%	84.33%
1 ADL	0.24%	1.46%	3.41%	0.25%	0.22%	5.57%
2+ ADL	1.31%	2.17%	2.96%	3.55%	0.10%	10.10%
Total	3.23%	15.50%	76.30%	4.22%	0.76%	100.00%

Source: SHARE, 2015 and 2017.

Table 1b. Dementia diagnoses by age group, Danish population

	Age group			
	< 50	50-64	65-84	85+
Men				
Dementia	0.0%	0.3%	2.1%	9.8%
- Alzheimer's disease	0.0%	0.1%	0.9%	5.3%
- Vascular dementia	0.0%	0.0%	0.4%	1.6%
- Other type of dementia	0.0%	0.0%	0.2%	0.3%
- Unspecified dementia	0.0%	0.2%	1.0%	4.6%
Observations	1,796,712	567,298	471,168	41,295
Women				
Dementia	0.0%	0.2%	2.3%	12.8%
- Alzheimer's disease	0.0%	0.1%	1.2%	7.3%
- Vascular dementia	0.0%	0.0%	0.4%	1.8%
- Other type of dementia	0.0%	0.0%	0.1%	0.2%
- Unspecified dementia	0.0%	0.1%	1.0%	6.1%
Observations	1,734,196	566,921	524,127	79,473

Source: Danish register for hospital admissions, population data, 2018. The indicator for having been diagnosed with dementia is constructed based on having been admitted to hospital within the last 20 years with a diagnosis (main or secondary diagnosis) of dementia (Alzheimer's, vascular dementia, other dementia, or unspecified dementia).

Table 2a. Demographic Characteristics by Presence of Cognitive Impairments or ADL Limitations

	Impairment			
	0-1 ADLs & Score 7+	2+ ADLs & Score 7+	Score 0-6 (All ADLs)	Total
	n=1,063	n=59	n=55	n=1,177
Age	73.746 (0.216)	77.241 (1.112)	82.608 (1.011)	74.401 (0.217)
Female (0 or 1)	0.569 (0.015)	0.668 (0.062)	0.571 (0.067)	0.575 (0.014)
Married (0 or 1)	0.484 (0.015)	0.160 (0.048)	0.302 (0.062)	0.456 (0.015)
Any children (0 or 1)	0.853 (0.011)	0.891 (0.041)	0.787 (0.056)	0.851 (0.010)
Number of Children	2.064 (0.041)	2.126 (0.174)	2.215 (0.214)	2.075 (0.039)
Less than HS (0 or 1)	0.327 (0.015)	0.566 (0.067)	0.584 (0.069)	0.353 (0.014)
High school or equivalent (0 or 1)	0.015 (0.004)	-	-	0.015 (0.004)
Some college incl. associate's (0 or 1)	0.428 (0.015)	0.291 (0.062)	0.338 (0.066)	0.416 (0.015)
College degree or higher (0 or 1)	0.230 (0.013)	0.143 (0.048)	0.057 (0.032)	0.216 (0.012)
Work 0 or 1	0.101 (0.009)	-	-	0.090 (0.008)
Income	31,258 (553)	26,238 (1,082)	25,381 (1,174)	30,672 (505)
Income (median)	26,452	24,934	26,072	26,186
Wealth	245,294 (98,436)	88,137 (24,895)	52,086 (13,043)	226,469 (88,377)
Wealth (median)	65,942	31,821	12,188	62,891

Note: SHARE 2015 and Danish register data. Income and Wealth are in 2015 USD and winsorized at the 99th percentile. Cells with “-” are censored due to Statistics Denmark data restrictions.

Table 2b. Impairment and Care Use by Presence of Cognitive Impairments or ADL Limitations

	Impairment			
	0-1 ADLs & 0-2 Score 7+ n=1,063	2+ ADLs & Score 7+ n=59	Score 0-6 (All ADLs) n=55	Total n=1,177
Limited score (out of 29)	16.010 (0.117)	13.518 (0.557)	3.726 (0.342)	15.454 (0.130)
Number of ADLs	0.055 (0.007)	3.172 (0.189)	2.561 (0.317)	0.360 (0.032)
Number of IADLs	0.153 (0.018)	2.099 (0.233)	3.733 (0.292)	0.447 (0.036)
Any Care (0 or 1)	0.366 (0.015)	0.809 (0.052)	0.741 (0.060)	0.411 (0.014)
Informal care (0 or 1)	0.357 (0.015)	0.735 (0.058)	0.699 (0.062)	0.396 (0.014)
Formal care (0 or 1)	0.075 (0.008)	0.532 (0.066)	0.373 (0.066)	0.116 (0.009)
Nursing Home (0 or 1)	0.017 (0.004)	0.218 (0.054)	0.473 (0.068)	0.052 (0.006)
Informal care hours per week, personal and practical (conditional on informal care)	4.481 (0.328)	6.726 (1.579)	7.120 (2.034)	4.956 (0.361)
Formal care hours per week, personal and practical (conditional on formal care)	3.009 (0.415)	5.561 (1.199)	5.781 (0.901)	4.124 (0.430)
Number of days in NH in the year (conditional on nursing home)	329 (23)	294 (29)	338 (11)	325 (11)

Note: SHARE 2015 and Danish register data. Standard errors in parenthesis. SHARE population weights are used.

Table 3. Adjusted Association between Cognitive Impairment and Any Long-Term Care Use

	(1) Any Care (0 or 1)	(2) Any Care (0 or 1)	(3) Any Care (0 or 1)
2+ ADLs & Score 7+	0.443*** (0.0531)	0.397*** (0.0552)	0.362*** (0.0564)
Score 0-6 (All ADLs)	0.374*** (0.0613)	0.258*** (0.0632)	0.259*** (0.0658)
Age – 65		-0.00168 (0.00591)	-0.00834 (0.00631)
(Age - 65) Squared		0.000550** (0.000225)	0.000678*** (0.000256)
Female (0 or 1)			0.130*** (0.0460)
Married (0 or 1)			-0.119*** (0.0444)
Female * Married			-0.144** (0.0577)
Number of Children			-0.0151 (0.0139)
Any children (0 or 1)			0.0706 (0.0531)
Income (Inverse Hyperbolic Sine)			0.0125* (0.00656)
Wealth (Inverse Hyperbolic Sine)			-0.00166 (0.00200)
Less than HS (0 or 1)			0.129 (0.105)
Some college (0 or 1)			0.105 (0.103)
College degree or higher (0 or 1)			0.181* (0.105)
Constant	0.366*** (0.0154)	0.311*** (0.0299)	0.0912 (0.130)
Observations	1,177	1,176	1,138
R-squared	0.067	0.101	0.158
Mean dependent variable	0.411	0.411	0.411

Note: Observations have been weighted with SHARE population weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4a. Adjusted Association between Cognitive Impairment and Any Unpaid Care Use

	(1) Informal care (0 or 1)	(2) Informal care (0 or 1)	(3) Informal care (0 or 1)
2+ ADLs & Score 7+	0.378*** (0.0600)	0.332*** (0.0616)	0.300*** (0.0652)
Score 0-6 (All ADLs)	0.342*** (0.0645)	0.226*** (0.0643)	0.231*** (0.0692)
Age – 65		-0.00343 (0.00590)	-0.00967 (0.00634)
(Age - 65) Squared		0.000615*** (0.000224)	0.000727*** (0.000259)
Female (0 or 1)			0.140*** (0.0463)
Married (0 or 1)			-0.102** (0.0440)
Female * Married			-0.147** (0.0579)
Number of Children			-0.0146 (0.0139)
Any children (0 or 1)			0.0684 (0.0533)
Income (Inverse Hyperbolic Sine)			0.0122* (0.00635)
Wealth (Inverse Hyperbolic Sine)			-0.000166 (0.00205)
Less than HS (0 or 1)			0.108 (0.105)
Some college (0 or 1)			0.0920 (0.103)
College degree or higher (0 or 1)			0.160 (0.106)
Constant	0.357*** (0.0153)	0.309*** (0.0299)	0.0812 (0.128)
Observations	1,177	1,176	1,138
R-squared	0.052	0.087	0.137
Mean dependent variable	0.396	0.396	0.396

Note: Observations have been weighted with SHARE population weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4b. Adjusted Association between Cognitive Impairment and Amount Unpaid Care Use

	(1) Helped hours per month, informal	(2) Helped hours per month, informal	(3) Helped hours per month, informal
2+ ADLs & Score 7+	14.48*** (4.867)	13.25*** (4.967)	11.08** (5.137)
Score 0-6 (All ADLs)	14.62** (6.484)	11.50 (7.044)	5.913 (5.396)
Age – 65		0.228 (0.270)	0.0440 (0.323)
(Age - 65) Squared		0.00466 (0.0107)	0.0156 (0.0148)
Female (0 or 1)			2.617 (1.924)
Married (0 or 1)			-0.440 (1.901)
Female * Married			0.0344 (2.613)
Number of Children			-1.059* (0.606)
Any children (0 or 1)			1.774 (2.501)
Income (Inverse Hyperbolic Sine)			-0.130 (0.287)
Wealth (Inverse Hyperbolic Sine)			0.0392 (0.0803)
Less than HS (0 or 1)			2.431 (3.099)
Some college including associate's (0 or 1)			0.421 (2.925)
College degree or higher (0 or 1)			-0.867 (2.856)
Constant	6.927*** (0.593)	4.333*** (1.200)	4.349 (4.569)
Observations	1,177	1,176	1,138
R-squared	0.039	0.050	0.060
Mean dependent variable	8.494	8.494	8.494

Note: Informal care includes personal and practical care. Observations have been weighted with SHARE population weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5a. Adjusted Association between Cognitive Impairment and Any Paid Care Use

	(1) Formal care (0 or 1)	(2) Formal care (0 or 1)	(3) Formal care (0 or 1)
2+ ADLs & Score 7+	0.457*** (0.0665)	0.409*** (0.0661)	0.421*** (0.0662)
Score 0-6 (All ADLs)	0.298*** (0.0671)	0.178** (0.0748)	0.135* (0.0777)
Age – 65		0.00291 (0.00432)	0.000344 (0.00478)
(Age - 65) Squared		0.000392* (0.000202)	0.000495** (0.000239)
Female (0 or 1)			0.0148 (0.0324)
Married (0 or 1)			-0.0491* (0.0270)
Female * Married			-0.0301 (0.0355)
Number of Children			-0.00344 (0.00955)
Any children (0 or 1)			-0.0183 (0.0344)
Income (Inverse Hyperbolic Sine)			0.00151 (0.00222)
Wealth (Inverse Hyperbolic Sine)			-0.00103 (0.00121)
Less than HS (0 or 1)			0.0746** (0.0370)
Some college (0 or 1)			0.0877** (0.0348)
College degree or higher (0 or 1)			0.0979*** (0.0365)
Constant	0.0751*** (0.00879)	0.000140 (0.0146)	-0.0354 (0.0493)
Observations	1,177	1,176	1,138
R-squared	0.142	0.225	0.237
Mean dependent variable	0.116	0.116	0.116

Note: Observations have been weighted with SHARE population weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5b. Adjusted Association between Cognitive Impairment and Amount Paid Care Use

	(1) Helped hours per month, formal	(2) Helped hours per month, formal	(3) Helped hours per month, formal
2+ ADLs & Score 7+	11.91*** (3.184)	11.12*** (3.135)	11.89*** (3.303)
Score 0-6 (All ADLs)	8.327*** (2.136)	6.341*** (2.169)	5.727** (2.246)
Age – 65		0.0841 (0.121)	0.0464 (0.142)
(Age - 65) Squared		0.00519 (0.00533)	0.00729 (0.00667)
Female (0 or 1)			0.776 (0.804)
Married (0 or 1)			0.513 (0.765)
Female * Married			-1.246 (0.996)
Number of Children			-0.0281 (0.255)
Any children (0 or 1)			-1.008 (0.909)
Income (Inverse Hyperbolic Sine)			0.0383 (0.0691)
Wealth (Inverse Hyperbolic Sine)			-0.0381 (0.0355)
Less than HS (0 or 1)			1.198 (0.916)
Some college including associate's (0 or 1)			1.438* (0.807)
College degree or higher (0 or 1)			1.432* (0.862)
Constant	1.069*** (0.173)	-0.321 (0.426)	-1.140 (1.249)
Observations	1,176	1,176	1,138
R-squared	0.130	0.159	0.163
Mean dependent variable	2.168	2.168	2.168

Note: Formal care includes personal and practical care. Observations have been weighted with SHARE population weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 6. Adjusted Association between Cognitive Impairment and Any Long-Term Nursing Home Use

	(1) Nursing Home (0 or 1)	(2) Nursing Home (0 or 1)	(3) Nursing Home (0 or 1)
2+ ADLs & Score 7+	0.200*** (0.0557)	0.185*** (0.0557)	0.181*** (0.0569)
Score 0-6 (All ADLs)	0.456*** (0.0688)	0.417*** (0.0705)	0.449*** (0.0709)
Age – 65		-0.00162 (0.00366)	-0.000172 (0.00340)
(Age - 65) Squared		0.000224 (0.000177)	0.000158 (0.000168)
Female (0 or 1)			-0.0370* (0.0220)
Married (0 or 1)			-0.0586*** (0.0190)
Female * Married			0.0440* (0.0246)
Number of Children			-0.00213 (0.00591)
Any children (0 or 1)			0.0107 (0.0228)
Income (Inverse Hyperbolic Sine)			0.00181 (0.00226)
Wealth (Inverse Hyperbolic Sine)			-0.00131 (0.000975)
Less than HS (0 or 1)			-0.0350 (0.0350)
Some college (0 or 1)			-0.00171 (0.0341)
College degree or higher (0 or 1)			-0.0198 (0.0339)
Constant	0.0172*** (0.00440)	0.00318 (0.0111)	0.0424 (0.0457)
Observations	1,176	1,176	1,138
R-squared	0.240	0.259	0.294
Mean dependent variable	0.0521	0.0521	0.0521

Note: Nursing home includes residential housing for the elderly. Observations have been weighted with SHARE population weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 7. Estimated Annual Costs of Care by Cognition Status

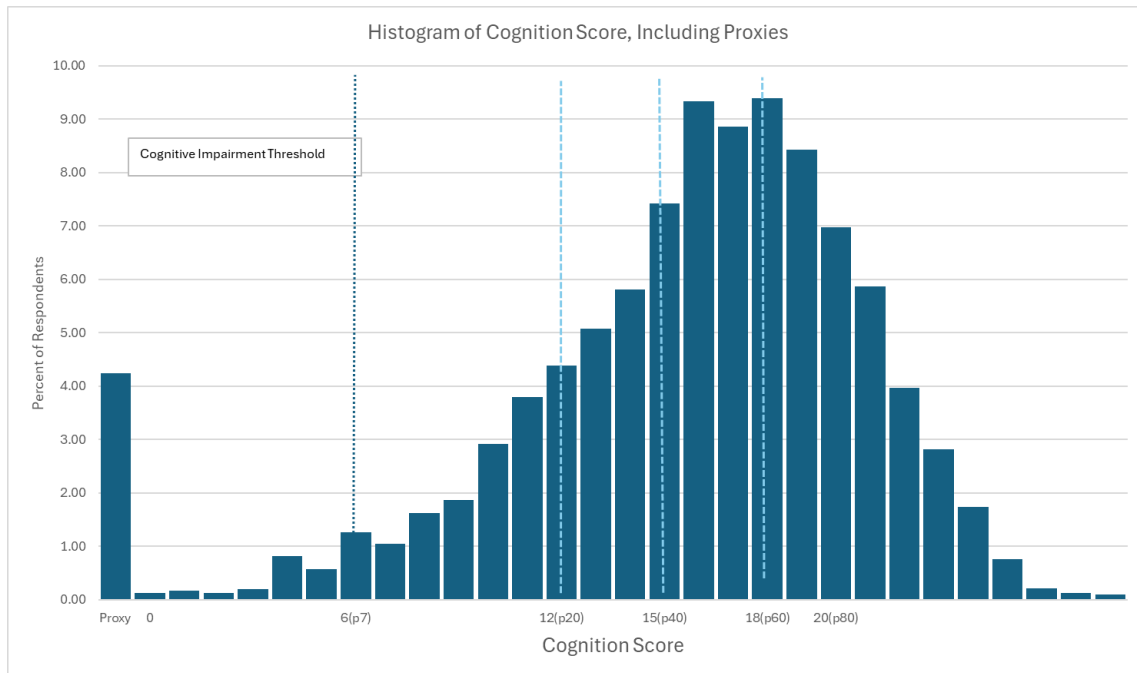
		0 - 1 ADLs & Score 7+ *	2+ ADLs & Score 7+ *	Score 0 - 6, All ADLs **	Total
	N	1,066	59	55	1,177
	Population (millions)	0.89	0.06	0.05	1.07
Formal Home Care	National total (Billions \$)	0.7	0.5	0.4	1.6
	Per capita (\$)	747	9,798	7,142	1,477
Informal Care	National total (Billions \$)	2.9	0.6	0.5	4.0
	Per capita (\$)	3,228	9,974	10,041	3,692
Nursing Home	National total (Billions \$)	1.1	0.9	1.8	3.9
	Per capita (\$)	1,278	16,385	35,551	3,635
Total Cost	National total (Billions \$)	4.7	2.0	2.7	9.5
	Per capita (\$)	5,253	36,158	52,734	8,803

*) Population using population weights for SHARE.

**) Source for population data: DST Statistikbanken FOLK1A, population in the first quarter of 2016.

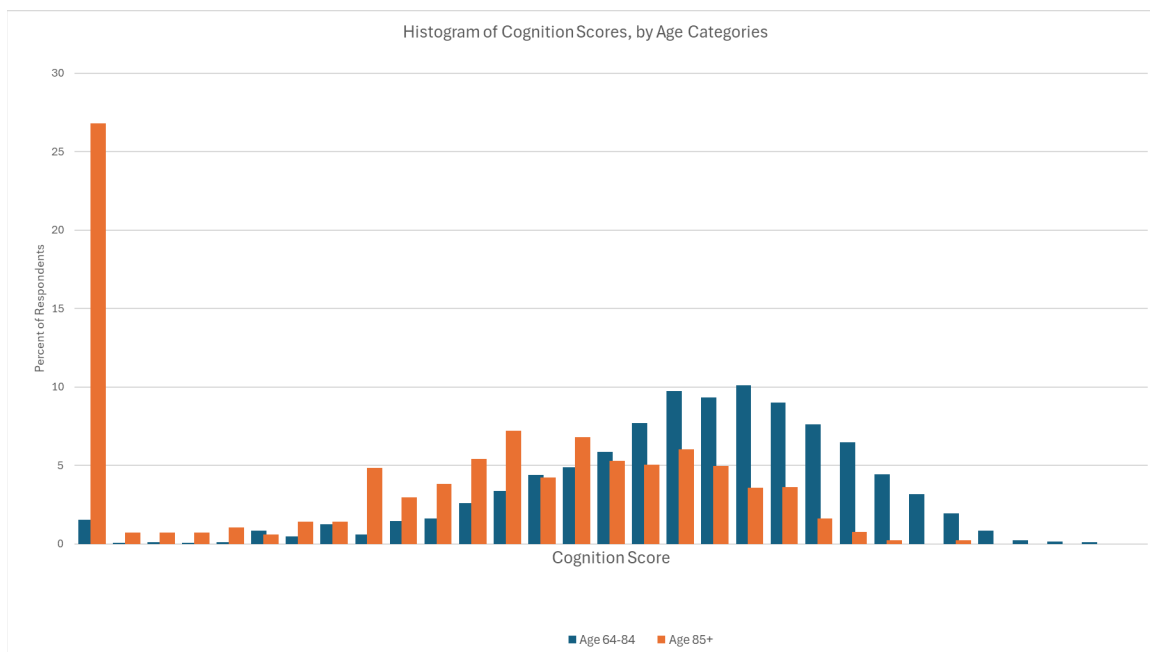
Figures

Figure 1a. Distribution of Sample Cognition Scores; Overall



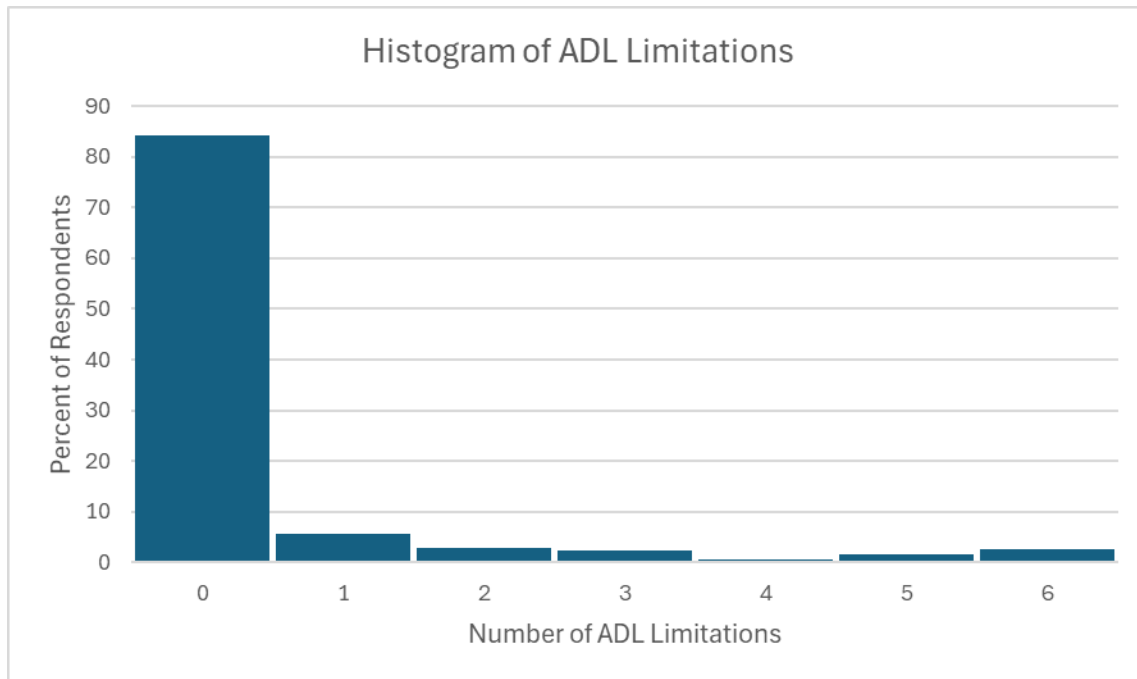
Source: SHARE 2015 and 2017.

Figure 1b. Distribution of Sample Cognition Scores by Age



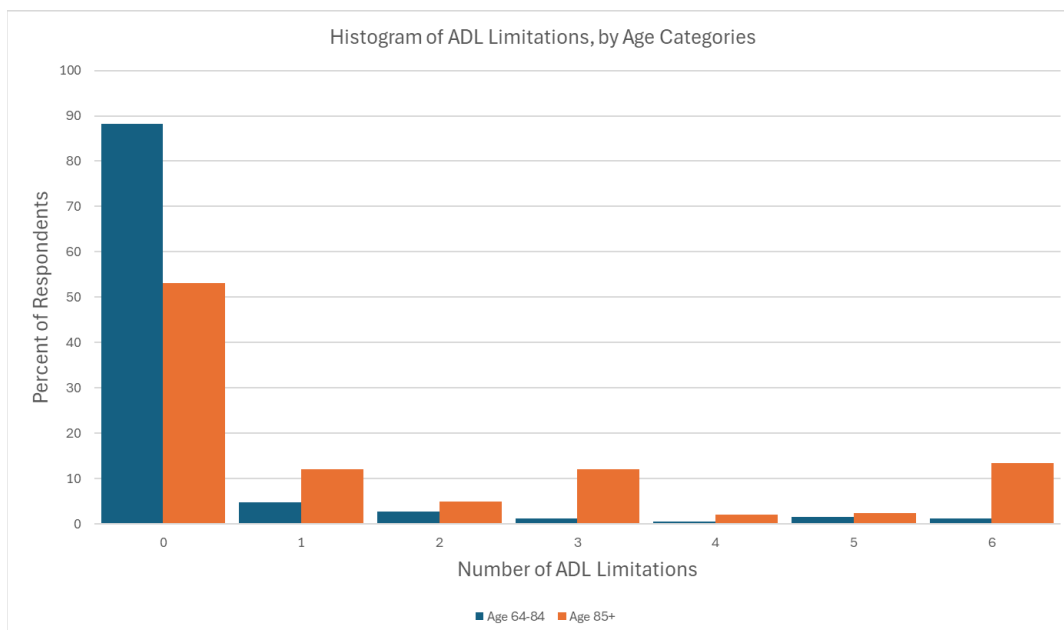
Source: SHARE 2015 and 2017.

Figure 2a. Distribution of Activities of Daily Living Limitations; Overall



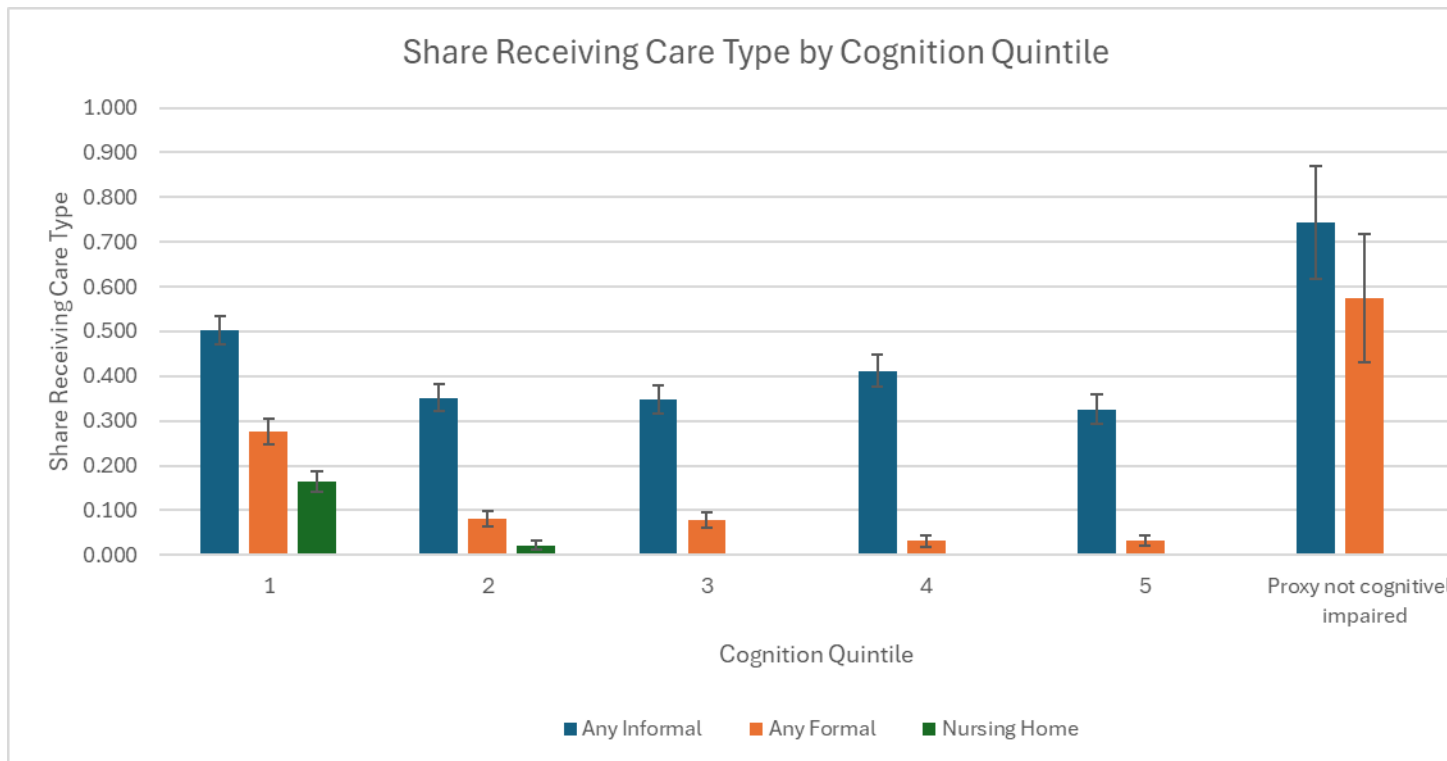
Source: SHARE 2015 and 2017.

Figure 2b. Distribution of Activities of Daily Living Limitations by Age



Source: SHARE 2015 and 2017.

Figure 3. Long-Term Care Use by Cognition Score



Source: SHARE 2015 and administrative register data.

Note: Nursing home rates for cognition quintiles 3-5 and "Proxy not cognitively impaired" cannot be reported due to Statistics Denmark's data rules.