Self-assessed cognitive abilities and financial wealth: Are people aware of their cognitive decline?*

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Abstract

We investigate whether people correctly perceive their own cognitive decline and the potential financial consequences of misperception. Using longitudinal data from the Health and Retirement Survey to examine the relationship between self-ratings of memory ability and assessed memory performance, we show that older people tend to underestimate their own cognitive decline. We then estimate the financial consequences of this underestimation showing that those who experience a significant cognitive decline across waves but are unaware of it are more likely to experience financial wealth losses. We finally investigate the potential reasons for the different wealth trajectories of people unaware of their declining memory performance. We show large and consistent evidence supporting the idea that these financial wealth losses are the results of bad financial decisions, not of rational disinvestment strategies.

Keywords: Aging; cognitive abilities; financial decisions; HRS.

JEL codes: J14, G11, J24, C23.

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1 Introduction

The decline of cognitive functioning is a complex phenomenon and its causes and economic consequences are still not well understood. This is unfortunate because cognitive functioning is crucial for task performance and decision making as it influences the ability of an individual to process information and make the right choice. The role of cognitive functioning is even more important in the light of a declining importance of publicly-provided safety nets – especially social security and healthcare – and an increasing relevance of individual decision-making skills. For instance, most countries implemented pension reforms which substituted defined benefit pensions with defined contribution plans. As a result, older adults are now asked to make complex decisions which crucially affect their lifetime resources and health. This explains the growing body of research in economics on the cause and consequences of financial (il)literacy (see Lusardi et al., 2014 for a review) and its relationship with the age related process of cognitive decline (Agarwal et al., 2009; Korniotis and Kumar, 2011; Finke et al., 2016).

These issues are particularly relevant in developed countries where the older population holds a substantial share of the total wealth[1] and raise fundamental questions about the optimal policy response (Agarwal et al., 2009). In particular, it is important to understand whether people recognize their own cognitive decline and whether they are able to protect themselves from it. For instance, if people perceive or predict their own cognitive decline, they may delegate financial decisions to someone they trust – another family members or to a financial advisor – without incurring any financial loss. On the contrary, if people are unaware of their cognitive decline they may incur financial losses or being subject of financial frauds or scams (Lusardi et al., 2014). This might be even worse for people with initially high cognitive ability who might be more likely to manage directly their finances and avoid advice due to self-confidence (Kim et al., 2018).

Using data from the Health and Retirement Survey (HRS), we study the relationship between self-ratings of memory ability and assessed memory performances (i.e., the score in the word recall test) and show that older people tend to largely underestimate their own cognitive decline. We also analyze the financial consequences of this underestimation focusing on individuals who experienced a significant cognitive decline across waves (as measured by the change in their test scores). We show that respondents unaware of their cognitive decline are more likely to experience a significant financial loss compared to respondents who are aware of the fact that their memory performance are declining, and, more generally, compared to all other respondents who did not experience a similar decline in their memory performance. The decline in wealth across waves involves mainly people in the third and fourth quartile of the distribution of the initial total wealth and represents roughly a 3% decline with respect to the their mean total wealth. The wealth loss for respondents who are not

[1] According to 2016 Survey of Consumer Finance of the Federal Reserve Bank, the highest value of the median family net worth is found among families whose head is 75+, roughly 265'000 dollars.

aware of their declining memory performance is mainly driven by an even larger decrease in their financial wealth (about 8%), particularly in the value of their financial assets.

Since the wealth loss is mainly due to a decrease in the value of the financial assets of the wealthier respondents (unaware of their declining memory performance), such loss might be the result of bad financial decisions of respondents not aware of their declining cognitive abilities. This is supported by the fact that we do not find similar wealth losses among people aware of their declining performance or among unaware respondents who are less likely to take financial decisions in the household (non-financial respondents). Furthermore, we show that these people are more likely to show better memory performance before the memory loss occurrence. This suggests an overconfidence interpretation which seems to be consistent with Korniotis and Kumar (2011), who show that older investors lose their investment skills as their cognitive ability decline and with recent evidence from a special HRS module on financial advice (Kim et al., 2018), which shows that people with higher cognitive abilities are less likely to avoid financial advice or help due to self-confidence.

Alternative "rational" explanations for such differences in the wealth trajectories, especially between people aware and unaware of their cognitive decline, can be eventually found in differences in health or other unobserved characteristics. For instance, if people unaware of their cognitive decline have lower subjective life expectancy they might optimally decide to disinvest more and this would explain their different wealth trajectories. However, respondents who are unaware of their cognitive decline are on average in better physical health. Moreover, different from the respondents aware of their declining memory performance, they do not show any negative change in their subjective life expectancy. Given the better health condition and the longer subjective time horizon, the life cycle hypothesis would predict a larger disinvestment for respondents aware of their cognitive decline, which is just the opposite of what we observe. Additionally, we do not find differences in financial transfer to children or differences in consumption using the HRS Consumption and Activities Mail Survey (CAMS).

The rest of this paper is organized as follows. Section 2 reviews the literature on cognitive aging and decision making. Section 3 describes our data. Section 4 describes our modeling strategy. Section 5 presents our empirical results. Finally, Section 6 concludes.

2 Cognitive aging and decision making

As people get older, their cognitive performance gradually deteriorates although there is evidence of substabtial heterogeneity across individuals at all ages (e.g., Schaie, 1996). The age-related decline might range from what can be defined as normal cognitive aging to large drops in cognitive performances due to neurological pathologies, such as Alzheimer's diseases and other forms of dementia (Leshner et al., 2017).

Cognitive ability is generally considered as multidimensional because it includes a wide range of skills required to perform various mental processes (e.g., reasoning, remembering, understanding and problem solving). The psychological literature usually distinguishes between fluid and crystallized intelligence (Horn and Cattell, 1967). Fluid intelligence comprises fundamental skills, such as memory, executive functioning, abstract reasoning and processing speed (Salthouse, 1996), which are more closely related to biological factors. It is generally related to the performance on new tasks and is characterized by a steady decline over one's adult life starting already from the age of 20. On the contrary, the crystallized intelligence, which consists of the knowledge and experience acquired during the life, shows little age-related decline and partially compensates the large decline in fluid intelligence. Most day-to-day tasks rely on a different combination of these two broad types of intelligence. Therefore, our ability to perform a specific task may decline over time at different rates (or even improve) depending on the task considered. For most tasks we can assume that cognitive performance is hump shaped with respect to age with a peak reached around age of 50.

A rich literature, mainly in psychology, has investigated how and to what extent the age related process of cognitive decline affects individuals' decision-making ability (see Carpenter and Yoon, 2011 for a review). According to this literature, older adults are more likely to use heuristic and biased strategies in their decision making because the aging process increases the cost of engagement in effortful cognitive activities (Hess, 2014). Older adults may in fact chose to limit both the quantity and the complexity of the information that they use. Consistent with this view, Abaluck and Gruber (2011) find that the elderly choices under Medicare part D tend to focus on a quite narrow range of dimensions, which is inconsistent with a fully informed rational decision process.

Given the fundamental role of preferences in economic modeling, economists have recently focused their attention on the relationship between cognition and risk aversion (Dohmen et al., 2010; Benjamin et al., 2013) and how aging affects this relationship. For instance, Bonsang and Dohmen (2015) find that the association between aging and risk aversion is mediated by numerical ability. Recent experimental evidence in psychology (Henninger et al., 2010; Koscielniak et al., 2016) also confirms the positive correlation between aging and risk aversion and the mediating effect of the age-related decline in processing speed and memory.

3 Data

3.1 The Health and Retirement Study

The Health and Retirement Study (HRS) is a bi-annual household panel survey that collects detailed information on a nationally representative samples of approximately 20,000 Americans over age 50 and their spouses. Interviews are conducted in-person and by telephone. We use data from the RAND-HRS files, a cleaned and easy-to-use version of the data which includes RAND imputations of wealth, income, and medical expenditures starting from 1992, the first HRS wave, to 2014 (wave

11). These files have been used extensively in the economic literature because they are consistent and comparable across waves. We confine attention to the data from 1998 to 2014 because the cognitive tasks and questions on self-rating of memory ability changed in 1996 and full information on total wealth are available only since 1998. Our main sample includes all respondents over 50 with non-missing information on our variables of interest, namely household wealth data and memory ratings and tasks. To avoid selection issues due to selective mortality and institutionalization, we further restrict the sample to people not older than 80 years of age.

For robustness checks we also take advantage of the HRS-CAMS, a paper-and-pencil survey that is collected biennially in odd-numbered years. In particular, we use data on total individual's spending and on 4 expenditure categories, namely durables, non-durables, housing and transportation.

3.2 Perceived and assessed memory ability

HRS includes both self-rating of both current memory ability and of changes in memory abilities with respect to the previous wave. Participants are asked to rate their current memory as either (1) "Excellent", (2) "Very good", (3) "Good", (4) "Fair", or (5) "Poor". For perceived changes in memory, participants are asked to rate their current memory compared to their memory in the last interview (two years before) as either (1) "better now", (2) "about the same", or (3) "worse now". We reverse-score both variables, so higher scores represent better memory and positive changes over time represent improvements.

HRS assesses memory performance using two word list recall tasks. The interviewer reads a list of 10 words to the respondent and asks her to recall as many words as possible from the list in any order. The respondent hears the list only once and is asked to recall the words two times, immediately after the encoding phase (immediate recall) and after a few minutes (delayed recall). Since we sum up the score of the two tests, the total scores ranges from 0 to 20.[2] Figure 1 shows the distribution of the memory test score in levels and first differences. The mean test score is 9.78 while first differences are, on average, only slightly negative (-.37) suggesting that many respondents improve their score across waves. This might be partially due to the so-called retesting effect. Although each respondents is exposed to a different list of words at each wave, repeated exposure to the same test format might induce some learning. If attrition across waves is correlated with cognitive functioning, sample selection might also partially explain the observed distribution. All in all, it is reassuring to observe that the share of respondents who improve their score across waves strongly declines with age.

In order to compare perceived with assessed memory changes, we dichotomize perceived memory changes as declining (worse now) or not declining (about the same or better now). For assessed memory performance, we need to define a thresholds that allows us to distinguish respondents who

[2] For more information about the cognitive measures in the HRS see Ofstedal and Herzog (2005).

experienced a significant memory loss across waves from those who did not. Following the neuropsychological literature, we can define a significant memory loss when a respondent experiences a decline equal to one standard deviation or more in the word recall test across waves. Such "absolute" definition, which corresponds to the loss of three or more words, may understate cognitive declines among respondents with poor scores already in the baseline year (floor effect). Therefore, in the main text we use a "relative" definition of memory loss defined as a 20% decline in the initial test score (first quintile of the memory change distribution and on average a decline of almost 4 words). For robustness concerns, in the Appendix we show the main results using the absolute definition.

HRS also includes other cognitive tasks which test different cognitive dimensions represented in many mental status questionnaires. Figure 3 shows that our measure of relative memory decline is strongly correlated with the most important cognitive dimensions. In particular, we show evidence of correlation with three other cognitive dimensions, namely serial 7, backward counting and the total mental status score which sums scores from counting, naming, and vocabulary test. On average, our definition of memory loss is associated with a 10% standard deviation decline across waves in the other test scores. This clearly indicates that this measure of memory loss captures an overall deterioration of an individual' cognitive performance, including dimensions involving simple numerical calculation like serial 7 or backward counting.

3.3 Household wealth

HRS contains detailed information on individual components of household wealth. Such a large amount of information is summarized in the RAND-HRS data though a series of wealth measures. Our main variable of interest is the net value of total wealth, which is calculated as the sum of the relevant wealth components less all debt. In particular, it includes the net value of housing, private business and real estate, plus the value of all financial assets , including stocks, mutual funds, investment trusts, checking, savings and money market accounts, certificates of deposit, government bonds and bills, and other savings including individual retirement accounts (IRAs). All monetary values have been converted to 2014 dollars using the CPI as deflator. It is worth noting that the interview includes an asset verification procedure, in which the respondent is asked to verify or correct the asset values in the previous and the current waves whenever there is a large discrepancy (more than $50,000) between reported asset values. Unfortunately, missing or incomplete information regarding some wealth component might represent a serious challenge. The HRS-RAND files contain imputed values for missing or incomplete information (e.g. brackets) but we restrict the sample only to observations where the imputation level is below 20% of the assets (or debts) value (87% of the observations).[3] To avoid issues with outliers, we winsorize the total wealth at the 1st and 99th percentiles. Figure 2 shows that, as expected, the wealth distribution is right-skewed.

[3] More information about the imputation procedure can be found in Hurd and Rohwedder (2016)

3.4 Descriptive statistics

Figure 4 compares the age-profiles of the mean overall memory score (the sum of the scores in the immediate and delayed word recall) and of the mean perceived memory rating and shows that the first profile is much steeper than the second. Such result is not affected by cohort effects, as confirmed by Figure A.1, which separately analyzes the longitudinal trajectories of the first three HRS cohorts,[4] and by Figure A.2, which plots the mean residuals by age from a fixed effect regression.

We find similar evidence when we compare individual changes in test scores with self-rating of the change in memory across waves. Table 1 shows that most respondents who experienced a severe cognitive loss between two waves (defined as either a standard deviation decline or a 20% decline in their memory score) rate their memory as stable or improved. As expected, the proportion of respondents who experience a memory loss increases with age (Figure 5), but the ratio between aware and unaware is not affected by aging.

Figure 6 shows the distribution of the assessed memory performance in the wave before the occurrence of the cognitive loss. Although we use the relative definition of cognitive loss (a 20% decline of the initial memory score), respondents who experienced a severe loss across waves still show on average higher initial memory performance than people who did not experienced a severe loss (top figure). When we focus only on respondents with a severe memory loss (bottom figure), the distributions of the initial memory performances of respondents aware and unaware of their cognitive decline are instead much more similar. If anything, unaware respondents performed slightly better than aware respondents in the previous wave.

Finally, in Table 2 we investigate the characteristics of the people who are more likely to be unaware of their memory decline. Specifically, we report marginal effects of probit estimates of the probability of being unaware conditional on having a relative memory loss. In Column 1, we control for basic socio-demographic characteristics and wealth quartiles, while in the following columns we additionally include controls for memory test score in the previous wave (Column 2) and health conditions in the previous waves (Column 3) or health changes across waves (Column 4).

Consistently with Figure 5, age strongly affects the likelihood of being unaware, but females are more likely to be unaware of their memory decline. What is worth noting is that respondents who start from better test scores and are in better health conditions are more likely to be unaware of their memory decline (see Column 2–4). Education is not associated with awareness (Column 1) unless we condition on previous memory test score and health conditions. Contrary to what one might expect, among people experiencing a significant memory decline those who are unaware of it are not retired people with low education and poor health and cognitive functioning. Instead, they used to be in

[4] The HRS includes six entry cohorts but here we only consider the first three for which we have a longer observation window, namely the 1993 Study of Assets and Health Dynamics (AHEAD) cohort, the Children of Depression and War Baby cohorts entering in 1998, and the original 1992 HRS cohort.

better health and with good memory capacity and likely to be still confident about their skills.

4 Modeling

Our empirical model tries to capture the association between declines in memory performance and individuals' wealth trajectories and, in particular, whether respondents' awareness about their cognitive decline affects this association. Although HRS respondents are asked to rate both their actual memory performance and its change over time, we focus only on perceived memory changes for two main reasons. First, we want to investigate the wealth trajectories of respondents who experience a large memory decline, so we are more interested in changes in memory performance and not in the memory stock at time t. Second, among respondents who experienced a significant memory decline, we can easily split the sample between those who self-rate their memory as declining or not. On the contrary, it would be far more complicated and less comparable across people to define a threshold for the self-rated memory stock at time t (e.g., poor or fair) to compare with the assessed memory performance. Hence, we estimate the following baseline model for the individual wealth change:

$$\Delta W_{it} = \beta_1 Aware_{it} + \beta_2 \ Unware_{it} + \beta_3 X_i + \beta_4 Z_{it} + \delta_t + \epsilon_{it} \tag{1}$$

where $Aware_{it}$ is a dummy variable which identifies those respondents who experience a memory decline (relative or absolute) and self-rate their change in memory as declining, while $Unware_{it}$ those respondents who experienced a memory decline (relative or absolute) but self-rate their change in memory as stable or improving. The model also includes a vector of time-invariant controls, X_i, such sex, race and education, a vector of time-invariant controls, Z_{it}, such as quadratic in age, marital status, labor force status, geographical controls (census division) and a control for respondents who did not experience a memory decline but self-rate their change in memory as declining, plus survey-year fixed effects, δ_t. Note that model (1) is in first differences, so the interpretation of the regression coefficients differs from a model in levels. For instance, the coefficient β_3 represents the effect of the time invariant regressors on the rate of change of the individuals' memory performances, not on their levels.

To make sure that we are comparing individuals who are ex-ante similar, we also take potential differences in the initial wealth and memory levels into account by controlling for the memory score and wealth in the previous wave. Indeed, as already noted in the discussion of Figure 6, respondents who experience a memory decline across two waves have on average better memory scores at the baseline. Additionally, we investigate the heterogeneity of the results across quartiles of the initial wealth distribution.

Given the right-skewed distribution of wealth (Figure 2), we also consider the use of the log transformation. Unfortunately, the non-negligible number of negative or null wealth values (especially in the case of financial wealth) prevents us from following this approach for the full sample. However, when focusing on respondents in the third or fourth quartile of the initial wealth distribution—for whom the probability of having a negative wealth value is very low—the results using the log transformation are very similar to those reported in the main text.

5 Results

We start by investigating the relationship between severe declines in memory performance (at least 20% of their initial level) and wealth changes across waves, as described in the first-difference regression model (1). After conditioning on the initial wealth and memory levels, Table 3 shows that memory losses are associated with large declines in respondents' total wealth across waves (Column 2). However, such wealth losses are concentrated among individuals who rate their memory as stable or improving. In the last three columns we condition only on respondents who experience a severe memory decline to shows that the difference in wealth losses between aware and unaware respondents is statistically significant (Column 4). The difference is especially large for financial respondents (Column 5 vs. Column 6), which suggests that awareness of one's own cognitive decline is relevant only for people who actually take financial decisions.

In Table 4 we exploit the heterogeneity of the effect along the wealth distribution to take into account potential concerns related to the right-skewed wealth distribution. The table shows that the wealth decline observed for respondents unaware of their own memory decline is mainly concentrated among respondents in the third and fourth quartile of the initial wealth distribution and represents roughly a 3% decline with respect to the mean wealth value (Columns 5–8).

So far we only investigated the relationship between perceived or actual memory changes and total wealth trajectories. In what follows, we disaggregate total household wealth to pin down the potential mechanisms behind these losses. Specifically, we show that the wealth losses for respondents who are unaware of their declining memory are mainly the results of decreases in their financial wealth (Table 5). Using the HRS-RAND definition of financial wealth—which excludes IRAs— we account for 60% of the total wealth loss estimated in Table 3 (reported also in Column 1 of Table 5). If we also include IRAs, we account for more than 80%. When we look at the heterogeneity along the wealth distribution, we again note that the effect is concentrated among those who initially hold positive financial wealth and those with wealth above the median (Table 6). More specifically, people in the third and fourth quartiles of the wealth distribution who are unaware of their memory decline experience significant financial losses across waves, the magnitude of which corresponds to roughly 8% of their mean financial wealth.

Since financial wealth losses are observed only among respondents unaware of their cognitive decline who hold positive financial wealth in the previous wave, we concentrate on this group. Table 7 shows that half of the average loss in financial wealth (18 thousand dollars reported in Table 6) it is due to a decrease in the net value of the stocks and mutual funds (column 1) that they own. The other half is due to a decrease in the net value of their savings held as certificates of deposit, checking and savings accounts, and other savings (column 4–6). We do not observe instead any increase in the value of their debt.

All in all, our results show that wealth losses are concentrated among wealthier respondents who are unaware of their cognitive decline, and the losses involve mainly their financial assets. Since wealth losses are concentrated among the financial respondents, who are more likely to take financial decisions, it is possible that these people may have undertaken bad financial investments because unaware of their falling cognitive performance. We also know that respondents who experience a significant memory loss show better cognitive performance at the baseline (Figure 6 and Table 2) and are therefore more likely to be more confident about their ability and less likely to delegate financial decision to others.

Our "bad-investment interpretation" is supported by the analysis of the changes in consumption based on the HRS-CAMS subsample reported in the Appendix (Table A.2). In particular, we show that memory losses, for both aware and unaware respondents, are not associated with increases in total consumption or in any other consumption category (e.g., durable vs. non-durable). So we can exclude that these people are consuming more because of a rational (optimal disinvestment) or irrational behavior.

Despite the evidence reported so far strongly supports our interpretation, still we cannot exclude alternative explanations for our results related to differences in other observable or unobserved characteristics between people aware and unaware of their declining memory performance. In the next section, we investigate some of these alternative mechanisms into details.

5.1 Alternative explanations

One alternative explanation of our findings is that the negative wealth changes observed for the unaware respondents are not wealth losses but rational disinvestments related to the fact that they might have a shorter life horizon. As already noted in Table 2, among the respondents who experience a significant memory decline, those who are unaware are more likely to be in better health or to rate it better. However, since we are investigating changes in wealth trajectories, what is relevant here is whether memory losses change individuals' life expectancy and how, eventually, they react to it. This is investigated in the first two columns of Table 8, where we regress changes in subjective life expectancy on memory loss,[5] as in model (1) for wealth changes. We find evidence of a negative association between the memory loss and subjective life expectancy only for respondents aware of their cognitive decline. This is not surprising and clearly allows us to reject the rational disinvestment explanation. The same table (Columns 3 and 4) also rejects the alternative explanation according to

[5] HRS asked the respondents what is the percentage chance that she will live up or above a target age which varies depending of the age of the respondent at the interview date (from 75 to 95).

which people unaware of their cognitive decline face higher medical expanses which negatively affect their wealth trajectories. In this case, for both aware and unaware respondents, there is no evidence that changes in out-of-pocket medical expenditure are associated with the occurrence of memory losses.

Finally, in Table A.1 we show that memory losses are not associated with changes in financial transfer to children (both in the probability and in the total amount). This rules out the possibility that the children, having noted the declining memory of their parents, take control of their parents' finances or anticipate the children's bequest.

5.2 Robustness checks

In this section we discuss the results of a battery of robustness check implemented mainly to assess the sensitivity of our results to alternative definition of memory loss. As already mentioned, our results are robust to the use of an absolute definition of memory loss of a standard deviation decline based typically used in the neuropsychological literature. In particular, in Table A.3 we show that results in this case are quantitatively and qualitatively similar to those reported in the main text (Table 3).

Additionally, we show that our results are robust to the use of different thresholds for the relative definition of memory loss. Instead of using the 20% threshold (which roughly corresponds to the first quintile of memory change) we consider both a lower threshold of %15 (Table A.4) and a higher threshold of 25% (Table A.5). In either case, memory losses are associated with wealth losses. However, the difference between aware and unaware respondents is smaller when using a lower threshold but is larger when using the higher threshold.

Another concern is potential misspecification of model (1), especially regarding the underlining interaction between respondents' memory loss and their wealth trajectories. It is possible that the estimated difference in wealth changes between respondents aware and unaware of their memory loss is only the consequence of a different timing or dynamic. For instance, some respondents might just experience a wealth loss one a few years before the assessment of the memory loss in HRS. More generally, it is interesting to investigate how the wealth trajectories of these people look like before and after the memory loss event. In Figure A.3, we separately show the wealth changes of aware and unaware respondents as in an event study. More specifically, we look at the wealth changes of (un)aware respondents up to 4 years before and after the memory loss event. The figure shows that a significant negative wealth change is observed only at the time of the memory loss event for unaware respondents. Aware respondents, instead, do not show significant changes in wealth, and, if anything, they seem to experience a positive wealth change after 4 years. It is worth noting that the design of this event study is not clean because many respondents experience more than one memory loss event, and in a few cases they might be both aware and unaware, though at different point in time.[6] However it is reassuring that results are quantitatively similar to those reported in the main text.

Finally, in Table A.6 we show that our main results are robust to the inclusion of controls for initial health (H_{t-1}), namely self-rated health, activities of daily living and instrumental activities of daily living, in a given wave or their changes across waves (ΔH_t).

6 Conclusions

Using data from HRS, a large representative longitudinal dataset on American people over age 50, we show that people tends to largely underestimate their own cognitive decline and the financial consequences of financial consequences of misperception. To evaluate people awareness of their cognitive decline we investigate the difference between self-rating of changes in memory ability across waves and the actual change in memory measured using using two word list recall test. We find that people unaware of their own cognitive decline are more likely to experience a larger decline in their financial wealth compared to respondents who are aware of their declining memory respondents, and to all other respondents who did not experience a similar decline in their memory performance. We investigate several alternative explanations for such result including a rational disinvestments explanation related to the fact that they might worse health conditions and a shorter (subjective) life horizon. Moreover, we do find differences in consumption nor in transfer to children. Then, the more reasonable explanation for our results seems to be that unaware respondents are likely to make bad financial decision that negatively affect their wealth trajectories across waves. This is consistent with an overconfidence interpretation since wealth losses are concentrated among financial respondents and people in the highest wealth quartiles who show better initial memory performances.

After the recent financial crisis, there has been a strong commitments among policymakers to improve the quality of household financial decision making and a lot attention has been devoted on individuals' financial literacy and how to improve it especially at younger ages. However, what we show is that the financial wealth decline involves wealthier respondents who initially have better cognitive performances. Therefore, what does matter is not only whether people in old age have accumulated sufficient financial knowledge but whether people realize that their cognitive performance are declining so they can eventually delegate financial decision to somebody they trust or eventually increase demand for annuitization.

Policy implication are not simple to draw. Clearly, we cannot prevent old age people making independent financial decision but at least incentivize them to delegate important financial decisions which might affect their lifetime resources in old age.

[6] To partially take care of this issue, we consider only the timing with respect to the first memory loss event.

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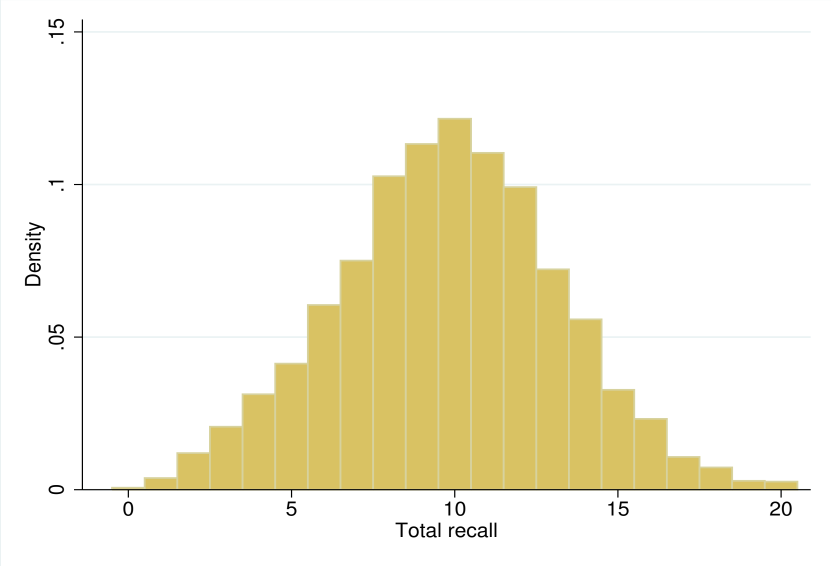
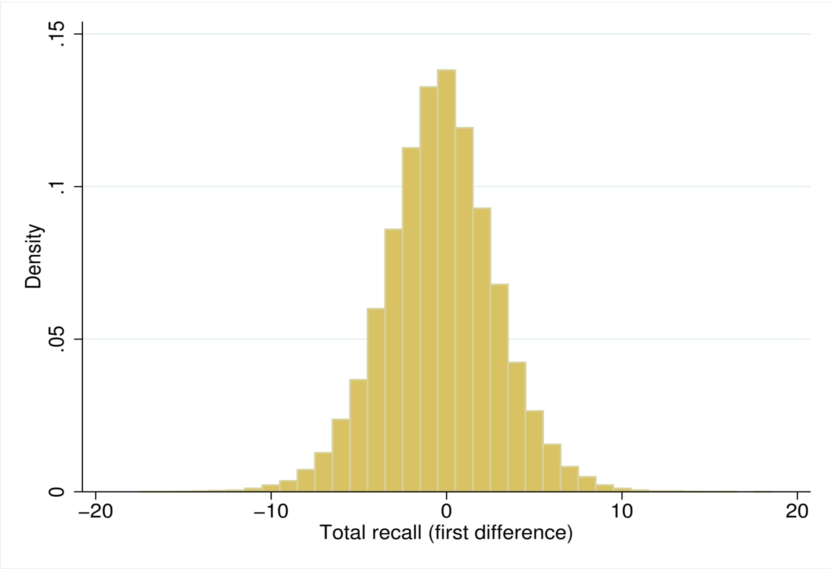
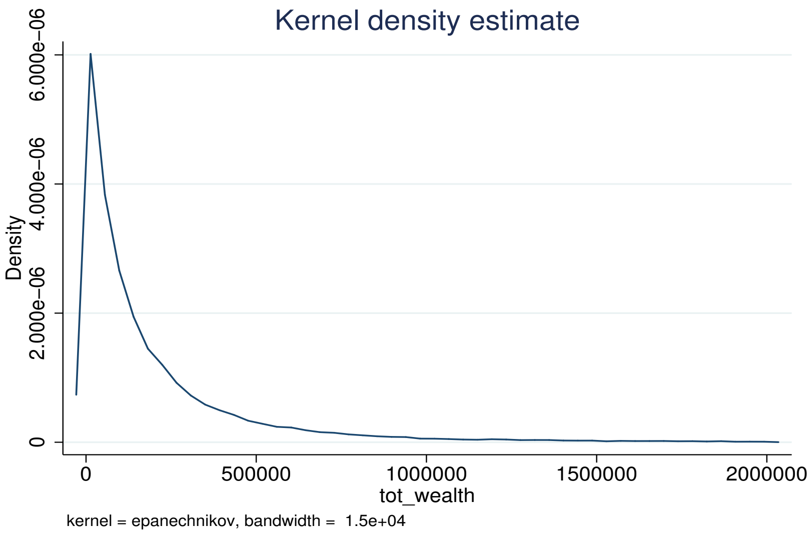
Figure 1: Test score density, level (top) and first difference (bottom)





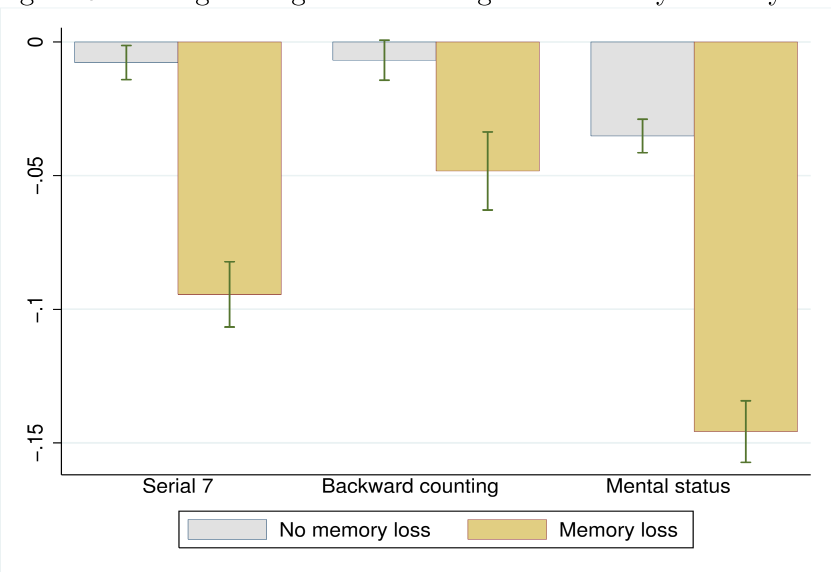
Notes - This figure shows the density of the memory test score in levels (top panel) and first differences (bottom panel). The vertical red lines show the mean value.

Figure 2: Total Wealth distribution



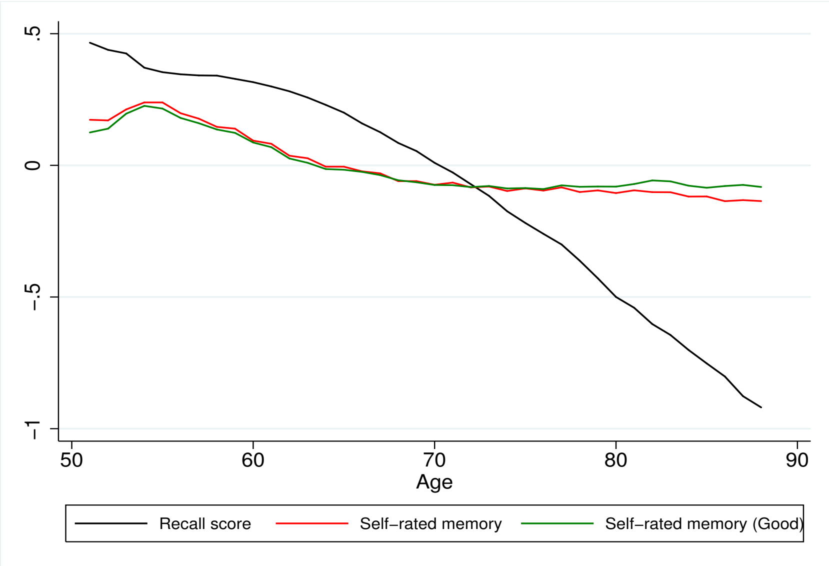
Notes - This figure shows the unconditional real wealth distribution (in 2014 US dollars) among HRS individuals in our sample using the HRS respondent-level sample weights.

Figure 3: Average changes in other cognitive tests by memory loss



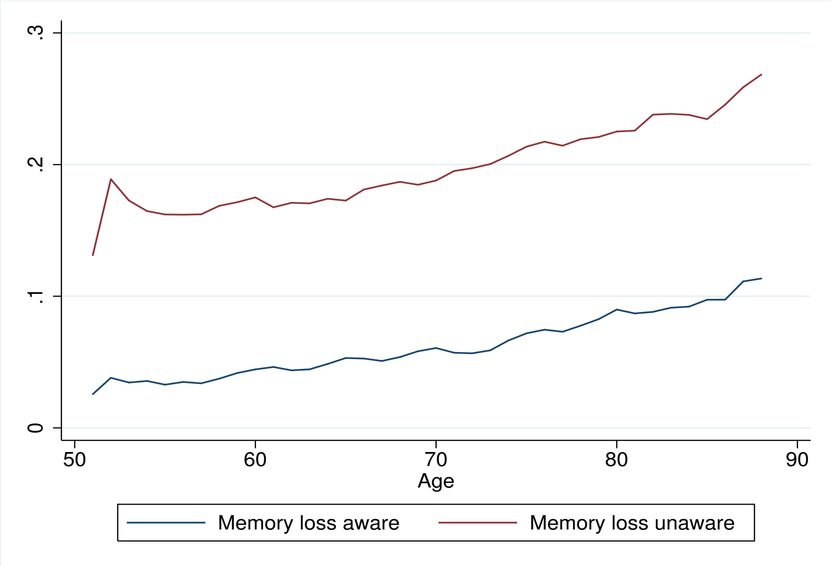
Notes - This figure compares the average changes in other cognitive test scores (serial 7, backward counting and total mental status) for respondents who experience a memory loss versus all the other respondents.

Figure 4: Age profiles of assessed vs. self-rated memory



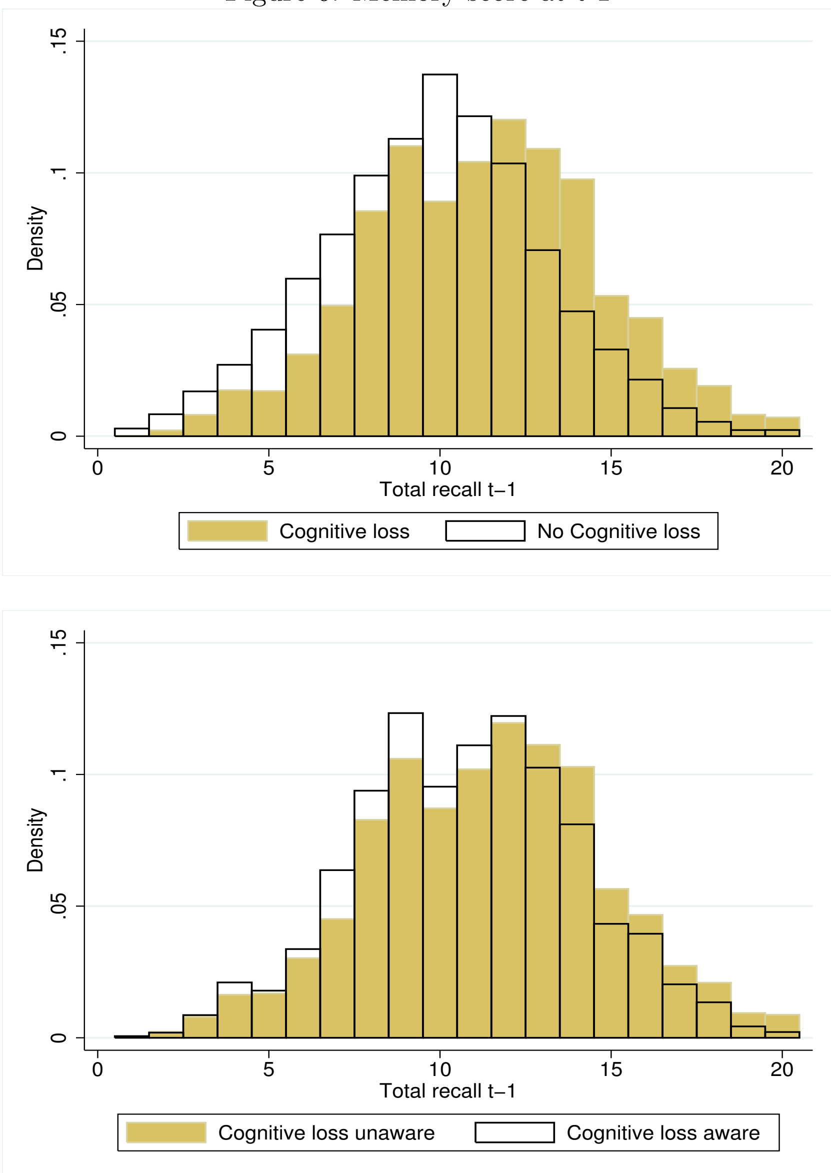
Notes - This figure compares the average age-profile of the word recall test (assessed memory) and the self-rated memory. We report both the mean of self-rated memory score (that ranges from 1 “poor” to 5 “excellent”) and the share of people rating their memory at least “good”. The age-profiles are constructed by pooling all observations from HRS (1996-2014) and then collapsing the standardized test scores and self-rated memory performance at their mean value by age using the HRS respondent-level sample weights. We smooth the curves using a 3-years moving average.

Figure 5: Share of respondents aware and unaware of their memory loss, by (age)



Notes - This figure shows the proportion of respondents aware and unaware of their memory loss (defined as 20% decline or more in their word recall test) by age. The figure is constructed constructed by pooling all observations from HRS (1996-2014) and using the HRS respondent-level sample weights. We smooth the curves using a 3-years moving average.

Figure 6: Memory score at t-1



Notes - This figure compares ...

Table 1: Self-rated vs. assessed memory

Longitudinal (relative)		
	Memory loss	
Self-rated change	No	Yes
Stable or improved	46,956	15,774
Worse	12,277	5,012

Longitudinal (absolute)		
	Memory loss	
Self-rated change	No	Yes
Stable or improved	48,473	14,386
Worse	13,000	4,335

Notes - This table compares the self-rated change in memory (compared to the last interview) with two different measures of memory loss based on the word recall test: 1) the "relative" memory loss is defined as 20% decline in the total recall score (first quintile); the "absolute" memory loss is defined as a recall score change $\leq$-3 (one standard deviation).

Table 2: Probit estimates of the probability of being unaware conditional on having a relative memory loss

	(1)	(2)	(3)	(4)
Age	-.002 *	-.002	-.003 **	-.002
	(.001)	(.001)	(.001)	(.001)
Age^2	-.000	.000	.000	.000
	(.000)	(.000)	(.000)	(.000)
Alone_{t-1}	-.017 *	-.017 *	-.023 **	-.017 *
	(.010)	(.010)	(.009)	(.010)
Female	.029 ***	.043 ***	.042 ***	.043 ***
	(.009)	(.009)	(.009)	(.009)
Education	.000	-.003 *	-.007 ***	-.003 *
	(.001)	(.001)	(.001)	(.001)
Working_{t-1}	.052 ***	.047 ***	.008	.048 ***
	(.009)	(.009)	(.009)	(.009)
Q2 wealth_{t-1}	.027 **	.022 *	.000	.022 *
	(.011)	(.011)	(.011)	(.011)
Q3 wealth_{t-1}	.021 *	.012	-.023 *	.012
	(.013)	(.012)	(.012)	(.012)
Q4 wealth_{t-1}	.017	.007	-.042 ***	.007
	(.014)	(.014)	(.013)	(.014)
Recall_{t-1}		.024 ***	.017 ***	.023 ***
		(.003)	(.003)	(.003)
SRH_{t-1}			.061 ***	
			(.003)	
ADL_{t-1}			-.057 ***	
			(.011)	
ΔSRH				-.047 ***
				(.011)
ΔADL				.021 ***
				(.004)
N	19843	19843	19843	19843
Mean	.76	.76	.76	.76

Notes - The table shows marginal effects from probit estimates of the probability of being unaware conditional on experiencing a relative memory loss. Column (1) includes only socio-demographic controls and survey year fixed effects (not reported); Column (2) adds the initial memory score; Column (3) also includes controls for initial health, Self-rated health (SRH) and limitation with activity of daily living (ADL); finally, Column (4) includes changes in health across waves instead of the initial health levels. Significance levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Standard errors are robust and clustered at household level. Observations are weighted using the HRS respondent-level sample weights.

Table 3: Change in total wealth (thousand 2014 USD) and memory loss

	All			Only resp. with memory loss		
	(1)	(2)	(3)	(4)	(5)	(6)
Mem. loss	-1.203	-21.213 ***				
	(4.167)	(4.384)				
Mem. loss aware			-10.202			
			(7.828)			
Mem. loss unaware			-25.052 ***	-13.064 *	-18.005 **	-5.649
			(4.754)	(7.582)	(9.257)	(12.849)
N	83193	83193	83193	20231	14270	5961
Mean wealth	423.665	423.665	423.665	385.909	342.084	490.820
Mean change	4.737	4.737	4.737	1.316	-2.494	10.542
Age (sq) and year FE	Yes	Yes	Yes	Yes	Yes	Yes
Socio-dem. controls	Yes	Yes	Yes	Yes	Yes	Yes
Initial wealth and memory	No	No	Yes	Yes	Yes	Yes
Financial respondent (FR)	All	All	All	All	Only FR	Non-FR

Notes - Socio-demographic controls include: quadratic in age, marital status, years of education, labor force status, gender, race, dummy for financial respondent and census region. Significance levels: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are robust and clustered at household level. Observations are weighted using the HRS respondent-level sample weights.

Table 4: Change in total wealth (thousand 2014 USD) and memory loss by quartile of the initial wealth

	1st Quartile		2nd Quartile		3rd Quartile		4rd Quartile	
	All	w/ loss	All	w/ loss	All	w/ loss	All	w/ loss
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mem. loss aware	-6.110**		-.147		-1.779		22.568	
	(2.713)		(4.673)		(8.222)		(25.149)	
Mem. loss unaware	-3.293*	2.222	-2.596	-1.572	-10.525**	-7.675	-30.441**	-50.273*
	(1.812)	(2.764)	(2.544)	(5.304)	(4.724)	(8.763)	(14.224)	(25.704)
N	20799	5560	20800	5213	20797	4869	20797	4589
Mean wealth	29.777	27.294	134.186	131.246	361.747	356.240	1169.031	1141.174
Mean change	23.207	19.995	23.721	21.875	43.726	35.494	-63.616	-71.576
Age (sq) and year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Socio-dem. controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initial Memory	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes - Socio-demographic controls include: quadratic in age, marital status, years of education, labor force status, gender, race, dummy for financial respondent and census region. Significance levels: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are robust and clustered at household level. Observations are weighted using the HRS respondent-level sample weights.

Table 5: Changes in other wealth components (thousand 2014 USD)

	Only resp. with memory loss					
	(1)	(2)	(3)	(4)	(5)	(6)
Wealth components:	Total	Financial	IRA	Housing	Real estates	Business
Mem loss unaware	-25.052***	-15.171***	-5.317***	-3.256**	-2.248*	.994
	(4.754)	(2.810)	(1.459)	(1.470)	(1.300)	(1.448)
N	83193	83193	83193	83193	81040	81040
Age (sq) and year FE	Yes	Yes	Yes	Yes	Yes	Yes
Socio-dem. controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes - Socio-demographic controls include: quadratic in age, marital status, years of education, labor force status, gender, race, dummy for financial respondent and census region. Significance levels: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are robust and clustered at household level. Observations are weighted using the HRS respondent-level sample weights.

Table 6: Changes in financial wealth (thousand 2014 USD), heterogeneity

	(1) Fin. wealth$_{t-1}$ ≤0	(2) Fin. wealth$_{t-1}$ >0	(3) 3rd Quartile wealth$_{t-1}$	(4) 4rd Quartile wealth$_{t-1}$
Mem. loss unaware	.578	-18.189 ***	-6.362 **	-27.989 ***
	(1.313)	(3.431)	(3.020)	(8.009)
N	23250	59943	18432	20054
Mean financial wealth	3.368	148.253	84.591	344.706
Mean change	14.026	-6.110	13.290	-32.399
Age (sq) and year FE	Yes	Yes	Yes	Yes
Socio-dem. controls	Yes	Yes	Yes	Yes
Financial resp:	Yes	Yes	Yes	Yes

Notes - Socio-demographic controls include: quadratic in age, marital status, years of education, labor force status, gender, race, dummy for financial respondent and census region. Significance levels: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are robust and clustered at household level. Observations are weighted using the HRS respondent-level sample weights.

Table 7: Changes in financial wealth components (thousand 2014 USD), only financial wealth$_{t-1}$ >0

	All respondents					
	(1) Stocks	(2) Bonds	(3) Debts	(4) CD	(5) Checking accounts	(6) Other
Mem. loss unaware	-9.131 ***	.218	.038	-1.950 ***	-3.396 ***	-4.193 ***
	(2.051)	(.795)	(.205)	(.591)	(.938)	(1.161)
N	59943	59943	59943	59943	59943	59943
Mean wealth category	71.913	9.650	3.092	17.314	35.987	16.482
Mean Change	-3.660	-.140	1.195	.194	.724	-2.033
Age (sq) and year FE	Yes	Yes	Yes	Yes	Yes	Yes
Socio-dem. controls	Yes	Yes	Yes	Yes	Yes	Yes
Financial resp:	Yes	Yes	Yes	Yes	Yes	Yes

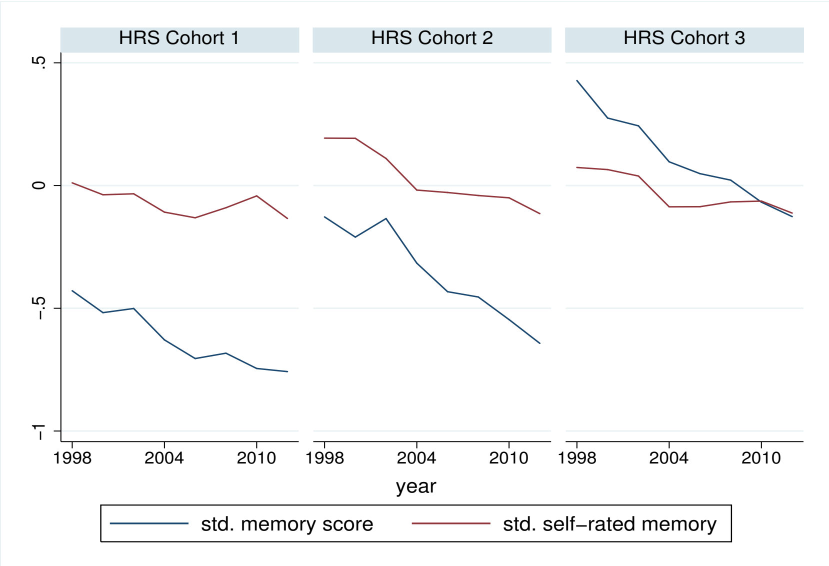
Notes - Socio-demographic controls include: quadratic in age, marital status, years of education, labor force status, gender, race, dummy for financial respondent and census region. Significance levels: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are robust and clustered at household level. Observations are weighted using the HRS respondent-level sample weights.

Table 8: Changes in subjective life expectancy and in out of pocket health expenditure (OOP)

	(1)	(2)	(3)	(4)
	Subjective life exp.		OOP	
Mem. loss	-.454		.084	
	(.329)		(.116)	
Mem. loss unaware		.218		.000
		(.354)		(.106)
Mem. loss aware		-2.088 ***		.384
		(.610)		(.367)
N	63929	63929	69089	69089
Age (sq) and year FE	Yes	Yes	Yes	Yes
Socio-dem. controls	Yes	Yes	Yes	Yes

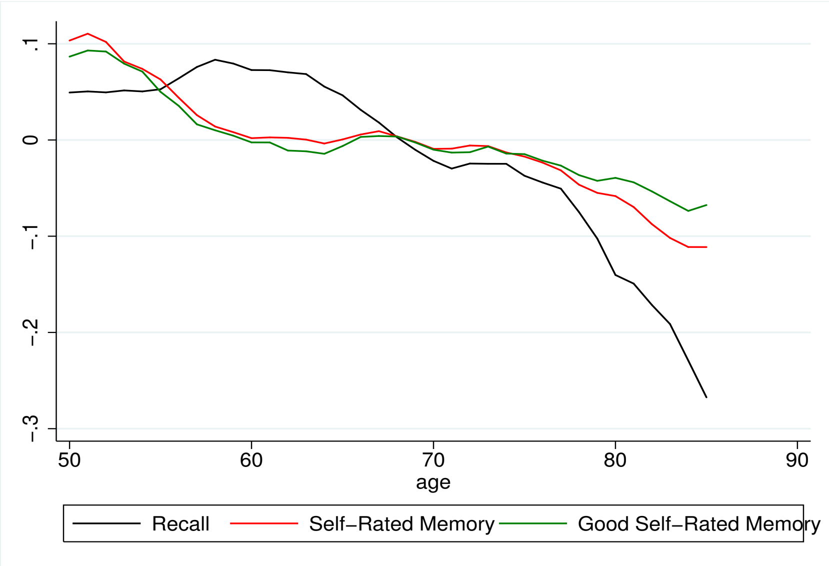
Notes - Socio-demographic controls include: quadratic in age, marital status, years of education, labor force status, gender, race, dummy for financial respondent and census region. Column (1) and (3) includes all respondents while (2) and (4) only include respondents who experienced a memory loss across two waves. Significance levels: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are robust and clustered at household level. Observations are weighted using the HRS respondent-level sample weights.

Figure A.1: Longitudinal trajectories of assessed vs. self-rated memory by HRS cohort



Notes - This figure compares the average longitudinal profile of the word recall test (assessed memory) and of the self-rated memory of the first three HRS cohorts.

Figure A.2: Age profiles HRS, fixed effects



Notes - This figure compares the same average age-profile of the word recall test (assessed memory) and the self-rated memory as in Figure 1 but using the residuals from a fixed effect regression without controls.

Figure A.3: Estimated wealth changes timeline

Notes - This figure shows the estimated wealth changes over time with respect to the first memory loss event (t=0) for unaware (upper figure) and aware respondents (bottom figure). The estimated time coefficients are the results of a regression that also includes controls for initial wealth and test scores, quadratic in age, gender, race, education and survey year fixed effects. The figure also includes 95% confidence intervals.

Table A.1: Changes in transfers to children

	(1)	(2)	(3)	(3)
	Transfers (Yes/No)		Transfers (amount $)	
Memory loss	-.001		-.868	
	(.005)		(1.082)	
Mem loss unaware		.001		-.636
		(.006)		(.775)
Mem loss aware		-.006		-1.618
		(.010)		(3.313)
N	81040	81040	13869	13869
Age (sq) and year FE	Yes	Yes	Yes	Yes
Socio-dem. controls	Yes	Yes	Yes	Yes
Initial wealth and memory	Yes	Yes	Yes	Yes

Notes - In Column (1), the dependent variable is a dummy variable indicating whether the respondent did any transfer to children, while in Column (2) the dependent variable is the amount transferred to children conditional on having done a transfer. Socio-demographic controls include: marital status, years of education, labor force status, gender, race, dummy for financial respondent and census region. Significance levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Standard errors are robust and clustered at household level. Observations are weighted using the HRS respondent-level sample weights.

Table A.2: Changes in consumption (thousand 2014 USD), HRS-CAMS

	All respondents				
	(1) Total spending	(2) Durable	(3) Non-Durable	(4) Household spending	(5) Transp. spending
Rel. Mem loss aware	-1.576	-.003	-.773	-.165	-.635
	(1.494)	(.048)	(.974)	(.481)	(.827)
Rel. Mem loss unawaree	.705	-.050	.367	.263	.125
	(1.011)	(.035)	(.553)	(.377)	(.552)
N	13823	13823	13823	13823	13823
Mean consumption category	46.631	.403	26.916	9.443	9.870
Mean Change	-1.458	-.039	-.213	-.539	-.667
Age (sq) and year FE	Yes	Yes	Yes	Yes	Yes
Socio-dem. controls	Yes	Yes	Yes	Yes	Yes
Financial resp:	Yes	Yes	Yes	Yes	Yes

Notes - Data come from the HRS Consumption and Activities Mail Survey (CAMS). Socio-demographic controls include: quadratic in age, marital status, years of education, labor force status, gender, race, dummy for financial respondent and census region. Significance levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Standard errors are robust and clustered at household level. Observations are weighted using the HRS respondent-level sample weights.

Table A.3: Change in total wealth (thousand 2014 USD) and absolute memory loss

	All			Only resp. with memory loss		
	(1)	(2)	(3)	(4)	(5)	(6)
Abs. Mem loss	-2.309	-23.054 ***				
	(4.368)	(4.628)				
Abs. Mem loss aware			-10.363			
			(8.912)			
Abs. Mem loss unaware			-27.323 ***	-16.194 *	-19.293 *	-10.377
			(4.994)	(8.771)	(10.291)	(16.266)
N	83193	83193	83193	20231	14270	5961
Mean wealth	423.665	423.665	423.665	385.909	342.084	490.820
Mean change	4.737	4.737	4.737	1.316	-2.494	10.542
Age (sq) and year FE	Yes	Yes	Yes	Yes	Yes	Yes
Socio-dem. controls	Yes	Yes	Yes	Yes	Yes	Yes
Initial wealth and memory	No	No	Yes	Yes	Yes	Yes
Financial respondent (FR)	All	All	All	All	Only FR	Non-FR

Notes - This table replicates Table 3 except for the use of the absolute definition of memory loss. Socio-demographic controls include: quadratic in age, marital status, years of education, labor force status, gender, race, dummy for financial respondent and census region. Significance levels: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are robust and clustered at household level. Observations are weighted using the HRS respondent-level sample weights.

Table A.4: Change in total wealth (thousand 2014 USD) and relative memory loss (15% of previous wave score)

	All			Only resp. with memory loss		
	(1)	(2)	(3)	(4)	(5)	(6)
Mem loss	-2.289	-22.304 ***				
	(4.005)	(4.199)				
Mem loss aware			-16.885 **			
			(7.216)			
Mem loss unaware			-24.051 ***	-5.903	-11.109	4.165
			(4.477)	(6.667)	(8.015)	(12.960)
N	83193	83193	83193	20231	14270	5961
Mean wealth	423.665	423.665	423.665	385.909	342.084	490.820
Mean change	4.737	4.737	4.737	1.316	-2.494	10.542
Age (sq) and year FE	Yes	Yes	Yes	Yes	Yes	Yes
Socio-dem. controls	Yes	Yes	Yes	Yes	Yes	Yes
Initial wealth and memory	No	No	Yes	Yes	Yes	Yes
Financial respondent (FR)	All	All	All	All	Only FR	Non-FR

Notes - This table replicates Table 3 except for the use of the milder definition of memory loss (15% of previous wave score). Socio-demographic controls include: quadratic in age, marital status, years of education, labor force status, gender, race, dummy for financial respondent and census region. Significance levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Standard errors are robust and clustered at household level. Observations are weighted using the HRS respondent-level sample weights.

Table A.5: Change in total wealth (thousand 2014 USD) and relative memory loss (25% of previous wave score)

	All			Only resp. with memory loss		
	(1)	(2)	(3)	(4)	(5)	(6)
Mem loss	-4.766	-23.928 ***				
	(4.742)	(4.698)				
Mem loss aware			-7.447			
			(8.840)			
Mem loss unaware			-29.574 ***	-20.772 **	-27.404 **	-6.387
			(5.150)	(9.044)	(11.141)	(14.829)
N	83193	83193	83193	20231	14270	5961
Mean wealth	423.665	423.665	423.665	385.909	342.084	490.820
Mean change	4.737	4.737	4.737	1.316	-2.494	10.542
Age (sq) and year FE	Yes	Yes	Yes	Yes	Yes	Yes
Socio-dem. controls	Yes	Yes	Yes	Yes	Yes	Yes
Initial wealth and memory	No	No	Yes	Yes	Yes	Yes
Financial respondent (FR)	All	All	All	All	Only FR	Non-FR

Notes - This table replicates Table 3 except for the use of the stricter definition of memory loss (25% of previous wave score). Socio-demographic controls include: quadratic in age, marital status, years of education, labor force status, gender, race, dummy for financial respondent and census region. Significance levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Standard errors are robust and clustered at household level. Observations are weighted using the HRS respondent-level sample weights.

Table A.6: Memory loss and wealth changes, inclusion of health controls

	(1)	(2)	(3)
Mem. loss unaware	-8.745	7.314	-7.740
	(7.940)	(7.810)	(7.913)
Mem. loss aware	-24.088 ***	-20.927 ***	-23.718 ***
	(4.762)	(4.571)	(4.749)
N	81917	81917	81917
Age (sq) and year FE	Yes	Yes	Yes
Socio-dem. controls	Yes	Yes	Yes
Health_{t-1}	No	Yes	No
ΔHealth_t	No	No	Yes

Notes - Socio-demographic controls include: quadratic in age, marital status, years of education, labor force status, gender, race, dummy for financial respondent and census region. The health controls include self-assessed health, IADL and ADL. Significance levels: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are robust and clustered at household level. Observations are weighted using the HRS respondent-level sample weights.