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# Aging and Financial Decision Making

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This study examines how cognitive changes associated with aging impact the financial decision-making capability of older Americans. We find that a decrease in cognition is associated with a decrease in financial literacy. Decreases in episodic memory and visuospatial ability are associated with a decrease in numeracy, and a decrease in semantic memory is associated with a decrease in financial knowledge. A decrease in cognition also predicts a drop in self-confidence in general, but importantly, it is not associated with a drop in confidence in managing one's own finances. Participants experiencing decreases in cognition do show an increased likelihood of getting help with financial decisions; however, many participants experiencing significant drops in cognition still do not get help.

**Keywords:** economics; behavior and behavioral decision making; microeconomic behavior; finance; aging, financial literacy; retirement

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## 1. Introduction

There are concerns that financial decision making in the older population is compromised by the presence of cognitive decline in advanced age. These concerns combined with demographic changes resulting in an increasingly larger older population have sparked several recent studies on aging and financial decision making.<sup>1</sup> Recent studies find that older individuals are prone to worse financial decision making. For example, Korniotis and Kumar (2011) find that older investors exhibit less investment skill, and Agarwal et al. (2009) find that suboptimal credit behavior increases past age 53. Finke et al. (2011) suspect that financial decision-making ability declines with age as financial literacy declines; indeed, they show that average financial literacy scores are lower by about 1% for each year after age 60. These existing studies indirectly examine the effects of cognitive aging on financial ability by comparing across individuals of different ages. Such comparisons confound the effect of cognitive decline with other differences, such as cohort effects. For example, Malmendier and Nagel (2011) find the cohort effect of early-life economic conditions on risk taking decades later. Direct measures of cognition collected repeatedly from the same individuals are needed to

identify the effect of a decrease in cognition on financial ability.

We use longitudinal data from the Rush Memory and Aging Project, a large cohort study of aging, to identify, within individuals, the impact of decreases in cognition on financial literacy, financial confidence, and self-participation in financial decisions. In analyses restricted to persons without dementia based on a detailed clinical evaluation, we find that a decrease in cognition is a significant predictor of a decrease in financial literacy among older Americans. Drops in cognition are associated with decreases in each of the components of financial literacy we measure, numeracy and financial knowledge. We use our rich cognitive assessment, including measures of five domains of cognition, to identify which components of cognition are driving these changes in financial literacy. We find that decreases in episodic memory and visuospatial ability are associated with a decrease in numeracy, and a decrease in semantic memory is associated with a decrease in financial knowledge.

Although participants experiencing decreased cognition also show declines in their financial literacy, these participants may not recognize—or may be reluctant to admit to—this decline in their financial capability. We find that a decrease in cognition predicts a drop in self-confidence in general, but importantly, it does not predict a decrease in confidence in managing one's own finances. Similarly, Holland and Rabbitt (1992) find that individuals in their 70s do not rate their

<sup>1</sup> For example, see Li et al. (2011), Samanez-Larkin (2011), and the references therein. Also, Samanez-Larkin and Knutson (2014) provide a recent summary of much of this work.

sensory abilities as poor any more so than individuals in their 50s, despite significant declines in their measured ability. It is noteworthy that they find that those older individuals who do recognize their decline in sensory ability adjust their road-use behavior and have fewer accidents. Perhaps there is an analogy between driving and financial choices, and older Americans who have a drop in cognition would be more likely to take precautions in their financial decision making if made aware of the connection.

The detrimental effects of cognitive aging on the financial choices of older Americans can potentially be mitigated by financial decision support provided within or outside of the household. We find that individuals who experience a decrease in cognition are more likely to stop managing their own finances and pass on this responsibility to their spouses, and they are more likely to get financial help from outside their households. However, there are still many participants who are experiencing cognitive decreases who are not getting help with their financial decisions. Even among the participants experiencing statistically significant decreases in cognition, about half are not getting help with their financial decisions. These participants are likely to benefit from trustworthy, knowledgeable advice, but knowing who to trust in financial matters can be problematic.

## 2. Data Description and Construction of Measures

Our data come from the Rush Memory and Aging Project (MAP), an ongoing longitudinal study of aging (Bennett et al. 2012). Since its establishment in 1997, MAP has enrolled older participants from throughout the Chicago metropolitan area. Participants undergo yearly interviews and detailed clinical evaluations, including medical history, neurological, and neuropsychological examinations. The MAP data include demographic information for each participant, such as age, sex, and education. In 2010, a decision-making assessment was added to MAP. The Institutional Review Board of Rush University Medical Center approved MAP and the decision-making substudy.

We exclude data from the 71 participants who were diagnosed with dementia at the time of their first decision-making assessment. For these participants, even completing the decision-making assessment is rare; only 19 of these participants provided answers to each of our outcomes of interest. Our conclusions are robust to including these participants, but we exclude them to avoid any selection bias due to the participants who could not complete the survey. Dementia is diagnosed in accordance with the standards set by the National Institute of Neurologic and Communicative Disorders and Stroke and the Alzheimer's Disease and Related

Disorders Association (Bennett et al. 2005). At the time of these analyses, 575 participants without dementia at the initial decision-making assessment had completed at least two decision-making assessments. Two decision-making assessments are required to observe increases and decreases in decision-making measures over time.

Since its beginning, MAP has collected yearly cognitive test scores for each participant. Cognition is assessed with 19 tests, which are listed in the online appendix, available for download on the first author's website (<http://condor.depaul.edu/kgamble/>), by the five cognitive domains assessed in the battery: episodic memory, perceptual speed, semantic memory, visuospatial ability, and working memory. Episodic memory captures the memory of specific events, whereas semantic memory captures the knowledge of concepts. Working memory captures the ability to store and process transitory information. Perceptual speed involves the ability to process information quickly and make mental comparisons. Visuospatial ability involves understanding visual representations and the spatial relationships among objects. The raw scores of each of the 19 cognitive tests are converted to z-scores using the baseline mean and standard deviation of the entire MAP cohort on that test. These 19 z-scores are averaged to compute the global cognitive function score. The z-scores within each domain are averaged to compute each cognitive domain score. We calculate each participant's change in cognition from the first decision-making assessment to the most recent assessment.

We connect each participant's change in cognition to the concurrent change in a variety of measures related to financial decision-making capability.<sup>2</sup> The decision-making questionnaire includes 16 standard financial literacy questions, 9 to test numeracy and 7 to test financial knowledge.<sup>3</sup> We measure financial literacy, numeracy, and knowledge by adding the number of correct answers in each category of questions. Participants may respond that they do not know the answer, and they can refuse to answer any question. Participants are aware of these possibilities: 26% of participants refused or said they do not know to at least one financial literacy question during the decision-making study. Typically, these participants refused or said they do not know only rarely. Among the participants who used these options at least once, the average number is 1.65 refusals or "do-not-knows" per survey. These responses are treated the same as incorrect answers in this analysis.

<sup>2</sup> The exact wording of each decision-making question used in this study is provided in the online appendix.

<sup>3</sup> The decision-making questionnaire included two additional financial knowledge questions that were removed in this analysis because the wording of those questions varied from standard presentations. The results including the additional questions are consistent with the results presented.

The nine numeracy questions range in difficulty from elementary calculations to understanding compound interest. Each question includes multiple-choice answers. The easiest question involves comparing percentages to find the biggest. Two questions require calculating amounts from percentages, and three questions require simple subtraction or division of dollar amounts. One question involves comparing the interest rate earned to the rate of inflation during the same period to determine which direction purchasing power changes. The most challenging two numeracy questions concern the growth of invested money over time.

The seven financial knowledge questions test a wide range of financial competency. The first question tests whether the participant knows what the abbreviation “FDIC” means. The remaining financial knowledge questions include multiple-choice answers. The concepts tested include the relationship between bond prices and interest rates, the value of paying off credit card debt, the value of frequent stock trading, and how stock and bond returns compare historically. Each financial knowledge question includes a follow-up question immediately after to assess the participant’s confidence in her answer to the preceding knowledge question, using a four-point scale from extremely confident to not at all confident. We score an extremely confident answer as a 3, fairly confident as a 2, a little confident as a 1, and not at all confident as a 0. We measure each participant’s confidence in her financial knowledge by summing the confidence scores to these nine questions.

We also use two additional measures of confidence. We assess self-confidence using a single question that asks participants to report their general level of confidence on a 10-point scale, with 1 indicating that they are not at all confident and 10 indicating that they are completely confident. We assess financial confidence with a single question that asks participants to report to what extent they agree with the statement “I am good at managing day-to-day financial matters such as keeping up with checking accounts, credit cards, payments, and budgeting.” Responses are reported on a seven-point scale, from 6 (strongly agree, indicating the highest level of financial confidence) to 0 (strongly disagree, indicating the lowest level of financial confidence).

Participants are also asked who is primarily responsible for making their financial decisions. They are asked explicitly if they, their spouse, their child, or someone else is responsible, and they are asked to specify the relationship for a response that includes someone else. Thus, we can identify participants who make their own financial decisions, households that make their own financial decisions (participant or spouse), participants who get help with financial decisions (spouse or other person is specified, possibly in addition to self), and

participants who get help from outside the household (someone other than the participant or spouse is included as primarily responsible).

### 3. Cognition Change

#### 3.1. Procedure for the Cognition Change Sample

We use simple regressions to identify the effect of a change in cognition on these decision-making variables. Each regression is of the following form:

$$\Delta y_i = a \times \Delta \text{Cognition}_i + b + \varepsilon_i.$$

In each regression the dependent variable is the change in the decision-making variable ( $y$ ) from participant  $i$ ’s first decision-making assessment to her most recent ( $\Delta y_i$ ). When this dependent variable is binary, we use the logistic form for the regression.

The right-hand side includes participant  $i$ ’s change in cognitive function score ( $\Delta \text{Cognition}_i$ ) and a constant. The coefficient of the first term ( $a$ ) captures the effect of a one-unit change in cognitive score. The error term is  $\varepsilon_i$ . The coefficient  $a$  captures the effect of both increases and decreases in cognition collectively. Since the focus of this study is on understanding the impact of decreases in cognition on financial decision making, we also run the previous regression using only the subset of participants who experience a decrease in cognition. For this subset the coefficient  $a$  captures only the association of decreases in cognition with the dependent variable.

#### 3.2. Summary Statistics for the Cognition Change Sample

Table 1 presents summary statistics for the 575 participants in the cognitive change sample. They are mostly female, well-educated, older Americans. The average age is 82.23 years, and only 23% are male. The participants average 15.11 years of education. About two-thirds (377 participants) of the sample experience a decrease in their global cognition z-score from their first decision-making assessment to the most recent. The average decrease in measured cognition among this group is  $-0.29$ . Many participants (34%) increase their cognition score. The same questions are repeated each year, and participants benefit from the effect of practice. The average increase is smaller in size at  $0.19$ .

Studies around the world find low levels of financial literacy (Lusardi and Mitchell 2011b). Participants in this study perform similarly. Participants answer, on average, 11.20 of the 16 financial literacy questions correctly in their initial decision-making assessment. They correctly answer the same percentage of numeracy questions and financial literacy questions on average (70%). This percentage does not change by much overall from first assessment to the most recent. Lusardi



**Table 1** Summary Statistics for Cognition Change Sample

	All participants		Decrease in cognition	
	Initial level	Change	Initial level	Change
Participants	575		377	
Male (%)	23		22	
Age	82.23 (7.36)		83.17 (7.19)	
Education	15.11 (2.86)		15.21 (2.93)	
Cognition	0.22 (0.54)	−0.13 (0.35)	0.22 (0.55)	−0.29 (0.30)
Financial literacy	11.20 (2.30)	−0.15 (2.10)	11.08 (2.36)	−0.34 (2.21)
Numeracy	6.32 (1.35)	−0.11 (1.54)	6.26 (1.37)	−0.24 (1.58)
Financial knowledge	4.88 (1.47)	−0.04 (1.32)	4.82 (1.49)	−0.10 (1.40)
Self-confidence	7.17 (1.83)	0.08 (1.94)	7.17 (1.88)	0.06 (2.04)
Confidence in managing finances	4.98 (1.38)	−0.03 (1.33)	4.88 (1.45)	−0.12 (1.52)
Confidence in financial knowledge	14.77 (4.33)	0.02 (3.56)	14.52 (4.41)	−0.19 (3.60)
Participant makes financial decisions (%)	88	−13	87	−16
Household makes financial decisions (%)	91	−10	91	−12
Gets help with financial decisions (%)	41	12	45	12
Gets help outside of household (%)	25	11	29	12

*Notes.* This table presents summary statistics for the whole sample and the subsample of participants who experienced a decrease in cognition score during the decision-making assessment. Age and education are stated in years. Cognition is a z-score scaled to all participants in the Memory and Aging Project at baseline. Values are reported as means (standard deviation) or percentages.

and Mitchell (2011a) analyze a three-question financial literacy module included in the 2004 Health and Retirement study. Two of their questions, one about inflation and one about compound interest, match questions used in our measure of literacy. They find that only 50% of respondents answered the questions about both inflation and compound interest correctly. In contrast, 65% of our respondents answered the same questions about inflation and compound interest correctly.<sup>4</sup>

Participants display a high level of self-confidence: their self-confidence averages 7.17 on the 10-point scale, with a 10 indicating completely confident (72% of the maximum level). Confidence in managing finances is similarly high on average (4.98 out of 6, 83% of the maximum level), meaning that most participants agree with the statement that they are good at managing their day-to-day financial matters. Confidence in financial knowledge averages 14.77 out of 21 (70% of the maximum level), which is a little higher than the score for a participant who indicates he or she is fairly confident for each question (14).

Consistent with their high confidence in their ability to manage finances and their high confidence in their financial knowledge, the vast majority of participants (88%) are primarily or jointly responsible for their financial decisions at the time of their first decision-making assessment. About 41% get help with financial decisions, including from a spouse, child, or outside advisor. Just 25% get help with financial decisions from someone other than a spouse. Over time, fewer

participants make their own financial decisions, and more get help. At time of the most recent decision-making assessment, the percentage of participants making their own financial decisions dropped by 13%, and 11% more got help with financial decisions.

### 3.3. Cognition Changes and Literacy

In this subsection we examine the impact of decreases in cognition on financial literacy and its components (numeracy and financial knowledge). Table 2 presents results of six regressions following the form specified in the procedures section of this paper. Changes in cognition are associated with changes in financial literacy and its components. A one-unit change in cognition is associated with a literacy change of 1.084, which comes from a 0.648 change in numeracy and a 0.437 change in financial knowledge. Each association is statistically significant at the 1% level.

We rule out the possibility that the positive association between cognition changes and literacy changes in this regression could be driven by those participants with improvements in their cognition score improving their financial literacy scores as well and not from those with decreases in their cognition score getting worse on literacy. Since the impact of decreases in cognition is the focus of this study, we rule out the previous possibility by running the same regression only for the subset of participants whose global cognition score dropped. Decreases in cognition are associated with decreases in financial literacy and its components. A one-unit decrease in cognition is associated with a financial literacy decrease of 1.237, which comes from a 0.765 decrease in numeracy and a 0.473 decrease in financial knowledge. The associations with literacy overall and

<sup>4</sup> The overlapping financial literacy questions are provided in the online appendix as numeracy question 9 (inflation) and numeracy question 7 (compound interest).

**Table 2** Decrease in Cognition and Literacy

	Literacy change			Numeracy change			Knowledge change		
	Estimate	SE	p-value	Estimate	SE	p-value	Estimate	SE	p-value
<i>Cognition change</i>	1.084***	0.248	0.00	0.648***	0.183	0.00	0.437***	0.158	0.01
<i>Intercept</i>	−0.012	0.092	0.90	−0.031	0.068	0.64	0.020	0.058	0.74
<i>Cognition decrease</i>	1.237***	0.375	0.00	0.765***	0.269	0.00	0.473**	0.240	0.05
<i>Intercept</i>	0.021	0.157	0.89	−0.017	0.113	0.88	0.038	0.101	0.71

*Notes.* This table presents regression results of the effect of cognitive changes on financial literacy, and separately on its components, numeracy and knowledge. *Cognition change* provides the association between participants' cognition changes and their changes in the specified outcome variable. *Cognition decrease* provides the previous association only among the subset of participants who experience a decrease in cognition.

\*, \*\*, and \*\*\* indicate statistically significant at the 10%, 5%, and 1% levels, respectively.

numeracy are also statistically significant at the 1% level, whereas the association with financial knowledge is statistically significant at the 5% level.

The size of these effects of cognitive changes on financial literacy is modest, but it is important to consider that the changes in cognition we are measuring during the decision-making assessment period occur over just two to three years. Individuals experiencing cognitive decreases are likely to experience further decreases over time. Thus, the impact of decreases in cognition on financial literacy is expected to accumulate over time.

### 3.4. Breakdown by Cognitive Domain

The association of drops in cognition with drops in financial literacy and its components can be separated into the five domains of cognition tested. Table 3 presents summary statistics for these five domain-specific cognitive measures. As with the global cognition score, participants' average score has dropped over time. The changes in these domain-specific cognitive measures are positively correlated; however, there is a lot of independent variation in these measures. The correlations range from a low of 6% between visuospatial ability and working memory to a high of 34% between episodic memory and semantic memory.

Table 3 also presents regression results for how decreases in these cognitive domain scores are associated with changes in the components of financial literacy. Numeracy changes are most strongly predicted by a drop in episodic memory; a one-unit decrease in episodic memory is associated with a 0.725 decrease in numeracy, which is statistically significant at the 1% level. Numeracy changes are also associated with visuospatial ability ( $p = 0.03$ ). Knowledge changes are most strongly predicted by a drop in semantic memory; a one-unit decrease in semantic memory is associated with a 0.632 decrease in the participant's financial knowledge, which is statistically significant at the 5% level.

### 3.5. Cognition Changes and Confidence

We next examine the effect of changes in global cognition on a variety of confidence measures. First, we

**Table 3** The Components of Global Cognition

	<i>Cognition decrease</i>					
	Initial level		Change			
<i>Episodic memory</i>	0.32 (0.74)		−0.30 (0.42)			
<i>Perceptual speed</i>	0.09 (0.78)		−0.31 (0.46)			
<i>Semantic memory</i>	0.22 (0.62)		−0.21 (0.39)			
<i>Visuospatial ability</i>	0.24 (0.74)		−0.26 (0.61)			
<i>Working memory</i>	0.15 (0.74)		−0.22 (0.49)			
	Numeracy change			Knowledge change		
	Estimate	SE	p-value	Estimate	SE	p-value
<i>Episodic memory decrease</i>	0.725***	0.242	0.00	0.294	0.213	0.17
<i>Intercept</i>	0.173	0.130	0.18	0.024	0.114	0.83
<i>Perceptual speed decrease</i>	0.369*	0.219	0.09	0.212	0.191	0.27
<i>Intercept</i>	−0.022	0.122	0.86	0.013	0.107	0.90
<i>Semantic memory decrease</i>	0.404	0.300	0.17	0.632**	0.246	0.01
<i>Intercept</i>	0.065	0.134	0.63	0.203*	0.112	0.07
<i>Visuospatial ability decrease</i>	0.472**	0.212	0.03	0.024	0.194	0.90
<i>Intercept</i>	0.136	0.143	0.34	−0.060	0.131	0.65
<i>Working memory decrease</i>	0.333	0.254	0.19	0.153	0.211	0.47
<i>Intercept</i>	−0.017	0.145	0.68	−0.010	0.120	0.42

*Notes.* This table presents summary statistics and regression results for the effect of cognitive changes within each of the five domains on the components of financial literacy, numeracy, and knowledge. *Cognition decrease* provides the association of the change in cognitive domain score with the change in the specified component of financial literacy only among the subset of participants who experience a decrease in cognition. Standard errors are in parentheses.

\*, \*\*, and \*\*\* indicate statistically significant at the 10%, 5%, and 1% levels, respectively.

examine the effect of a decrease in cognition on general self-confidence. Table 4 shows that a one-unit change in cognition is associated with a 0.416 change in self-confidence on a 10-point scale. This weak association in changes is driven by a strong association among the subset of those participants experiencing declining cognition. A one-unit decrease in cognition is associated with a 0.968 decrease in self-confidence, which is statistically significant at the 5% level. However, we find a very different result for the effect of a decrease

**Table 4** Decrease in Cognition and Confidence

	Change in self-confidence			Change in confidence in managing finances			Change in confidence in financial knowledge		
	Estimate	SE	p-value	Estimate	SE	p-value	Estimate	SE	p-value
<i>Cognition change</i>	0.416*	0.234	0.08	0.163	0.168	0.33	1.042**	0.426	0.01
<i>Intercept</i>	0.131	0.086	0.13	−0.094	0.061	0.13	0.153	0.157	0.33
<i>Cognition decrease</i>	0.968***	0.350	0.01	0.098	0.267	0.72	1.062*	0.616	0.09
<i>Intercept</i>	0.342**	0.147	0.02	−0.092	0.110	0.40	0.126	0.259	0.63

Notes. This table presents regression results of the effect of cognition changes on three different measures of confidence. *Cognition change* and *Cognition decrease* are defined as in Table 2.

\*, \*\*, and \*\*\* indicate statistically significant at the 10%, 5%, and 1% levels, respectively.

in cognition on one's confidence for managing financial matters. Neither changes in cognition nor decreases in cognition are associated with changes in confidence in managing one's finances. Despite the drop in self-confidence associated with a decrease in cognition, participants who have a decrease in cognition do not reduce their confidence in managing their own finances.

Similarly, participants who experience a decrease in cognition do not significantly reduce their confidence in their financial knowledge. Although we find that a one-unit change in cognition is associated with a 1.042 change in participants' confidence in their financial knowledge with statistical significance nearly at the 1% level, this result is not driven primarily by those with a decrease in cognition. In this case the statistical strength of the association is due to those increasing their cognition score also increasing their confidence in their financial knowledge. Among those participants experiencing a decrease in cognition, there is a weak statistical significance in the association between decreases in cognition in the change in confidence in their financial knowledge, with a *p*-value of 0.09.

In §3.3, we documented a statistically significant finding that financial knowledge does drop with decreases in cognitive score. Thus, these participants do not appear to recognize fully the detrimental effect of decreased cognition on their financial ability despite their decrease in self-confidence in general.

### 3.6. Cognitive Changes and Seeking Financial Help

Having shown that decreases in cognition are strongly associated with a decrease in financial literacy but not

one's financial confidence, we now examine to what extent those participants who experience a decrease in their cognitive score get help with their financial decision making. Because the dependent variables in this subsection are binary, we alter our regression to the logistic form; otherwise, the explanatory variables are the same. Table 5 presents these logistic regression results. A one-unit decrease in cognition results in an increase in the odds that a participant stops making her own financial decisions by  $e^{1.098} - 1 = 203\%$ . This relationship is statistically significant at the 1% level. Similarly, a one-unit decrease in measured cognition results in an increase in the odds that both the participant and the participant's spouse (a household) stop making their own financial decisions by  $e^{1.290} - 1 = 263\%$ . Again, this relationship is statistically significant at the 1% level.

Participants who experience a decrease in their cognition are more likely to obtain help with making financial decisions. A one-unit decrease in measured cognition results in an increase in the odds that a participant obtained help for her financial decisions by  $e^{0.864} - 1 = 137\%$ . This result is statistically significant at the 5% level. It includes obtaining help from a spouse as well as anyone outside the household. Similarly, a one-unit decrease in measured cognition results in an increase in the odds that a participant obtained help for her financial decisions from outside her household by  $e^{0.878} - 1 = 141\%$ , which is statistically significant at the 5% level. Typically, help from outside the household is provided by a son, a daughter, or a professional financial advisor.

**Table 5** Decrease in Cognition and Seeking Financial Help

	Participant stopped			Household stopped			Obtained help			Obtained help outside household		
	Estimate	SE	p-value	Estimate	SE	p-value	Estimate	SE	p-value	Estimate	SE	p-value
<i>Cognition change</i>	−1.123***	0.323	0.00	−1.119***	0.347	0.00	−0.658**	0.331	0.05	−0.787**	0.341	0.02
<i>Intercept</i>	−2.113***	0.145	0.00	−2.414***	0.164	0.00	−2.065***	0.142	0.00	−2.227***	0.151	0.00
<i>Cognition decrease</i>	−1.098***	0.406	0.01	−1.290***	0.432	0.00	−0.864**	0.427	0.04	−0.878**	0.434	0.04
<i>Intercept</i>	−2.043***	0.203	0.00	−2.462***	0.232	0.00	−2.205***	0.217	0.00	−2.284***	0.223	0.00

Notes. This table presents logistic regression results of the effect of cognitive changes on participants' participation in their own financial decisions. *Cognition change* and *Cognition decrease* are defined as in Table 2.

\*, \*\*, and \*\*\* indicate statistically significant at the 10%, 5%, and 1% levels, respectively.

Despite the strong association between decreases in cognition and seeking help with financial decisions, there are still many participants who experience significant declines in their cognition who are not getting help. We use each participant's complete history of cognitive scores, including those prior to the start of the decision-making assessment, to determine the long-term cognitive trajectory of each individual. The number of annual cognition scores for participants in our sample ranges from 2 for the most recent enrollees to 15 for long-time participants. On average, participants have 6.6 cognitive scores with median of 7. Thus, we have a long history of cognitive function scores to determine which participants are experiencing a decline in cognition during their time in MAP. For each participant we determine the slope of her cognitive ability by running a simple linear regression of cognition scores on age and a constant. There are 146 participants who have experienced both decreased cognition during the decision-making assessment and a statistically significant cognitive decline during their participation in MAP. Of these 146 participants, only about half (76) get help with their financial decision making.

#### 4. Conclusion

We utilize the data from the Rush Memory and Aging Project and the Decision Making substudy to identify the detrimental impact of decreases in cognition associated with aging on the financial decision-making ability of older Americans. We find that decreases in cognition are associated with decreases in financial literacy. We provide evidence that participants do not recognize this decrease. Despite showing significant drops in their self-confidence in general, the participants' confidence in their ability to manage their own finances and their confidence in their financial knowledge do not decrease with drops in measured cognition. Whether it is sought out or unsolicited, participants who experience a decrease in their cognitive score are more likely to obtain help with their financial decisions, although perhaps not as many get assistance as need it, and bad advice may be a problem.

The importance of studying financial decision making in the older population has never been greater. Prior to 1980, retirees relied on a combination of employer-sponsored defined benefit pensions and Social Security for monthly income. For these retirees, institutions shouldered the responsibility and the risk of investing contributions and managing payouts. Since 1980, many defined benefits plans have been replaced by defined contribution plans, which leave the responsibility of managing investments and withdrawals to the individual retiree. Poterba et al. (2008) document that in 2000, 87% of personal retirement contributions went

to individual accounts, with the largest proportion of these going to 401(k) accounts. The next generation of retirees will have the responsibility and risk of managing the money in these individual accounts sensibly. As the baby boom generation of Americans begins to retire, there will be an ever-larger portion of the population shouldering this great financial responsibility of managing their own retirement wealth.

After the massive shift from defined benefit pensions to self-directed defined contribution retirement accounts, economists documented the many heuristics and biases of these new retirement savers (Benartzi and Thaler 2007). Research also helped reveal solutions such as automatic enrollment and default investment portfolios (Choi et al. 2004) that have greatly increased retirement savings. As this generation of workers begins to retire, we believe that research on the financial decision making of older Americans will be equally as important in revealing the heuristics, biases, and behaviors of this new generation of retirees. This information is essential to developing the innovations that will help them maximize their well-being during this last period of their lives, when many important and influential financial decisions are made.

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