Chapter 9

Annuities, Financial Literacy, and Information Overload

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Financial literacy plays an important role in many investment decisions and on saving behavior. Research shows that individuals who are less financially sophisticated avoid the stock market (Christelis et al., 2006; Kimball and Shumway, 2006; van Rooij et al., 2007, 2008), are less likely to save for retirement (Lusardi and Mitchell, 2006, 2007, 2008, 2009), and may be more likely to succumb to the default bias (Agnew and Szykman, 2005). In addition, individuals with less knowledge tend to make poor debt decisions related to mortgage refinancing (Campbell, 2006) and often transact in more costly manners than others (Lusardi and Tufano, 2009). Literature in this area continues to grow rapidly as researchers find an increasing number of investment behaviors that are influenced by financial knowledge.

This chapter contributes to this literature by examining a financial decision that is relatively understudied from the financial literacy perspective. With the shift from defined benefit (DB) plans to defined contribution (DC) plans, it is a decision that a growing number of retirees will face: specifically, whether they should annuitize their retirement savings.[1] This complicated decision requires that individuals consider not only their future consumption needs and portfolio allocation options but also their longevity risk. For many retirees, this can be a daunting task, especially for the least financially literate. In this chapter, we use data collected from a large-scale laboratory experiment to study how financial literacy relates to this decision, as well as how it influences the information overload that participants may experience. We also study whether these variables have an influence on participants' confidence and satisfaction levels once they have made their choices. Although the investment decision in our experiment is much less complicated than the one that people might encounter in the real world, the controlled setting of our experiment provides a good opportunity to study how financial literacy may influence this important retirement decision. Moreover, this chapter provides additional insight into why the annuity market may be smaller than theoretically expected. Researchers often refer to this finding as the 'annuity puzzle'.

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We begin with a brief review of the existing literature. We then describe our laboratory experiment and the choice that participants were asked to make. Next, we discuss several of the quantitative measures that we include in the experiment. Finally, we present our results, provide our conclusions, and discuss their implications.

Prior studies related to annuities, financial literacy, and overload

The literature exploring the influence of financial literacy on important financial decisions related to retirement investing is growing rapidly. Several studies have shown that individuals with greater financial knowledge are more likely to plan for retirement, accumulate greater wealth, and participate in the stock market. For example, van Rooij et al. (2008) show that financial sophistication fosters stock market participation. They find that a one standard deviation increase in the level of financial sophistication increases the probability of owning stocks by 8 percentage points. They explain that 'a high level of financial skills lowers economic and psychological barriers to invest'. Furthermore, Lusardi and Mitchell (2009) show that, even after controlling for a range of socioeconomic factors, advanced financial knowledge is still significantly related to retirement planning. In addition, Agnew et al. (2009) find that individuals who do not understand several financial concepts are less likely to participate in both automatic enrollment and voluntary enrollment 401(k) plans. Agnew and Szykman (2005) also demonstrate that individuals with lower financial literacy are more likely to choose the default investment option in an experiment examining retirement investment choices.

Most of the focus on financial literacy in the retirement literature has centered on the asset accumulation phase of saving. To date, there has been relatively less focus on the decumulation phase and, specifically, the decision whether or not to buy annuities, which is the subject of this chapter. While annuities are an attractive choice for many retirees because they insure against longevity risk, the size of the actual lifetime annuity market is far smaller than theoreticians would expect, and it is unclear why. As a result, academics have worked to uncover 'rational' and, more recently, behavioral reasons for this finding. It is clear that the rational supply-side and demand-side explanations summarized by Brown (2008*a*, 2008*b*) do not completely explain the small market. That said, newer research focusing on behavioral factors appears promising and is providing new insight into the 'annuity puzzle' (e.g., Brown et al., 2008). As Brown (2008*a*) argues, the fact that behavioral biases may influence the decision to choose annuities suggests that financial knowledge may also play a role. He points

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out that those who are less financially literate may be more susceptible to framing and other biases. Brown (2008*a*) provides a helpful review of the limited research in this area and summarizes the often conflicting results.

One reason there has been relatively little work in this area is that it is difficult to find data that directly measure financial literacy. Until recently, education was often used as a proxy for financial literacy. The early studies using only this variable find mixed results relating educational attainment to annuity purchases. For example, Johnson et al. (2004) find, using Health and Retirement Study data, that annuity payments outside of Social Security payments increase with education. Given that higher educated individuals are more likely to have private pensions, this might be expected. Yet Brown (2001) examines stated intentions to annuitize DC balances and finds no significant relationship between education and this decision, after controlling for 'annuity equivalent wealth'. One issue with interpreting these findings is that education and financial literacy are not perfectly correlated, so schooling is an imperfect proxy (Lusardi and Mitchell, 2007). As a result, it has not been until recently that researchers have attempted to control for literacy in addition to education in their analyses.

In a new study, Previtero (2010) controls for both general education and financial education levels using a unique dataset of 18,000 participants enrolled in IBM's DB plan from 2000 to 2008. The main focus of that paper is to determine whether past stock performance influences the decision to annuitize. The author finds evidence that it does, but no evidence that having prior financial education on its own matters. Interestingly, he argues that those with past financial education may weigh recent stock returns more heavily in their decisions. This evidence of excessive extrapolation is another example of a behavioral bias influencing the decision to annuitize. It is important to note that he finds that those with financial education are also susceptible to excessive extrapolation behavior. Agnew et al. (2010) also find evidence of excessive extrapolation in their experimental work concerning annuities.

In another empirical study, Mottola and Utkus (2007) examine individuals in two DB plans and conclude that individuals who are more affluent, married, and male are more likely to choose a lump sum over an annuity. They remark that individuals that choose the lump sum have demographic characteristics often characterizing individuals with higher levels of financial experience and financial literacy. Similarly, we find evidence that financial literacy is negatively related to choosing an annuity in an early analysis of the same experimental data we use in this study (Agnew et al., 2008). As we mention in that article, the preference for the investment option may be driven by familiarity with investment vehicles, proxied for by high financial literacy scores or by participants' overconfidence in their ability to invest. It could also be because the added complexity of the

investment decision made the annuity option relatively more attractive for those with less financial literacy. Our current study expands this earlier analysis to control for additional factors that may affect the overall significance of our financial literacy measure.

One of the new factors we add to our study is the analysis of information overload (both cognitive and emotional). When people experience information overload, they can become overwhelmed by the task at hand and may experience anxiety and stress. In some cases, they may simply avoid the decision or use a simple heuristic to make a choice. This strategy can have a negative consequence on financial outcomes, depending on the heuristic used.[2] Eppler and Mengis (2004) argue that specific personal characteristics (such as existing knowledge) can influence how much overload a person experiences, suggesting that financial literacy may have an influence on overload. We also find evidence of this in our past research, suggesting that people with less financial knowledge do report greater levels of information overload (Agnew and Szykman, 2005). Furthermore, in a preliminary analysis of the data to be described later, we find additional support for the inverse relationship between overload and financial literacy (Agnew and Szykman, 2010). We also show that those who experience more overload are more likely to choose annuities. This current chapter advances this analysis by examining in more detail the important relationship between overload and financial literacy, as well as overload and the annuity decision, by using more sophisticated statistical techniques that control for important variables. We also expand the analysis to include confidence and satisfaction measures. To our knowledge, this is the first time that these measures have been analyzed in the context of the annuity decision.

The annuity experiment

Our data were collected in a large experiment first described in Agnew et al. (2008), where we reported that message framing influences choice. The present study focuses specifically on new findings that relate to the annuity decision and to financial literacy and information overload.[3]

Our basic experimental design is a three (annuity bias, investment bias, no bias) by three (annuity default, investment default, no default) between-subjects design. In the experiment, participants start with a ten-question financial literacy quiz designed to measure their financial sophistication. Once all participants complete the quiz, we measure their risk preferences by using a lottery choice experiment (Holt and Laury, 2002). Next, participants are shown a five-minute slide show that contains the framing manipulation (annuity bias, investment bias, no bias). At the conclusion

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of the slide show, participants are led through detailed instructions and examples on how to play our 'retirement game'. Next, we tell participants they have $60 in an 'account' to begin the game. Participants then decide whether to 'purchase an annuity', which would give them a fixed payment every round, or allocate their money between a simulated 'market' and a risk-free 'holding account'. Unfair annuity pricing and adverse selection are avoided by making the annuity price actuarially fair and making subjects aware upfront of their identical survival probabilities over the six-period game. If participants choose the annuity, they receive $16.77 for every period they 'survive' in the game, which is determined by a die roll. If the investment choice is selected, the participant faces a series of decisions each round. During each round, he/she must decide how much to withdraw (to simulate living expenses), and then how much to allocate between the 'market' and the 'holding account'. Once these decisions are made, dice are rolled to determine the market gains or losses. After incorporating the new returns into each participant's account balance, another die roll is completed to determine whether the participant survives to continue playing another round of the game. Regardless of whether they choose the investment or the annuity choice, participants can live up to a maximum of six rounds.

The design of our specific experiment makes the annuity the less complicated choice because, with the annuity, participants must only make a single decision in the beginning of the game. With the investment option, participants must decide how much money to invest and withdraw in each round. Therefore, if someone is overwhelmed, confused, or overloaded, we would expect them to choose the annuity, because it requires less thought and fewer decisions. Of course, our findings are closely tied to the specific experimental design, and one might envision scenarios where the annuity choice would not be so easy. For example, the many different types of fixed and variable annuities offered in the current market might overwhelm a consumer unfamiliar with these products. The more annuity features and vendors the individual must consider, the more difficult is the decision. In our experiment, the participants only had to consider a simple life annuity that was fairly priced. In addition, the investment option in our experiment required that our consumers make periodic decisions about their portfolios. While participants should ideally be monitoring their portfolio choices and rebalancing as needed, research shows that individuals change their retirement allocations only infrequently over time (Ameriks and Zeldes, 2001; Agnew et al., 2003). This is commonly called inertia. Therefore, in a different scenario with multiple annuity options, and when individuals are prone to inertia, selecting the investment option may, in fact, be the path of least resistance. In addition, although we find no evidence of a default bias in our experiment, the potential influence of

plan architecture on retirement decision-making cannot be denied, given prior research.[4] Therefore, it is possible that a particular plan design might influence one choice over another, based on how the information is presented or how the choice must be made. These caveats should be kept in mind when considering our results.

Measuring financial literacy

As mentioned earlier, before individuals participate in our retirement game, we measure their financial literacy with a ten-question exam. We also attempt to measure their perceived knowledge versus their actual knowledge by asking them how many questions they are very confident they got right on the exam, after they finished it. In previous work (Agnew and Szykman, 2005; Lusardi and Tufano, 2009), individuals' perceptions of their own knowledge has been found to be inconsistent with their actual knowledge. While it is not uncommon to use self-assessed measures in the marketing literature as proxies for actual knowledge, our earlier finding prompts us to gather both types of measure and carry out further analysis of the relationship between perceptions and actual scores.

Table 9.1 reports the actual questions in our exam. By design, these questions vary in difficulty from very simple to more advanced. For example, the first question asks whether it is true that it is best to start early when saving for a future goal. We anticipate that most people should know the answer to this. By contrast, we expect fewer people to be familiar with the answer to the more advanced question asking for the definition of beta (Question 9). Our goal for the quiz is to be able to separate the financially sophisticated participants from the less sophisticated, inasmuch as prior research relates more advanced knowledge to retirement readiness (van Rooij et al., 2007, 2008; Lusardi and Mitchell, 2009).[5]

Table 9.2 reports the accuracy of responses to each question, where most participants could correctly answer the first question (95 percent) but fewer could define beta correctly (25 percent). Two other questions also appear to be more difficult than the others, with accuracy rates below 75 percent: many participants do not know what securities are invested in a money market fund (Question 6, with 33 percent correct) and how interest rates and bond prices move relative to one another (Question 10, with 53 percent correct). In addition, the money market composition question and the beta question elicited more 'Not sure' responses (28 and 62 percent, respectively) compared to the others.[6]

Table 9.3 reports the overall distribution of raw scores. Approximately 56 percent of the sample answer seven or fewer questions correctly, while only 13 percent of the sample answer all of the questions correctly. We use

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TABLE 9.1 Financial literacy questions

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(1) *Saving for a future goal.* If you are saving for a future goal, it's better to start early. That way your money earns more and builds up faster over time.
(a) True   (b) False   (c) Not sure

(2) *Credit card balance.* Keeping a balance on your credit card is okay as long as you can make the minimum payment each month.
(a) True   **(b) False**   (c) Not sure

(3) *ARM.* If you take out an adjustable rate mortgage to buy a house, and interest rates go up, your monthly payments will also go up.
(a) True   (b) False   (c) Not sure

(4) *Lose money stock fund.* If you were to invest $1,000 in a stock mutual fund, it is possible to have less than $1,000 if you withdraw the money.
(a) True   (b) False   (c) Not sure

(5) *Highest long-term growth.* Historically, which option provides the highest long-term growth?
(a) Savings account   (b) Certificate of deposit   (c) Insurance policy
(d) Stock mutual fund   (e) Not sure

(6) *Money market composition.* Which of the following types of investments are typically found in a money market fund?
(a) Stocks   (b) Bonds   **(c) Short-term debt securities**
(d) Not sure

(7) *Diversification.* When an investor diversifies his investments, does the risk of losing money increase or decrease?
(a) Decrease   (b) Increase   (c) Not sure

(8) *Relative risk money market.* A money market fund is riskier than a stock fund.
(a) True   **(b) False**   (c) Not sure

(9) *Beta.* A stock funds' beta rating can best be described as:
(a) A measure of relative   (b) A measure of relative   (c) A measure of relative capital
volatility of the fund vs the   growth vs the S&P 500   outflow of the fund vs the S&P
S&P 500 index   index   500 index
(d) Not sure

(10) *Interest rates and bond prices.* If interest rates go up, then bond prices generally:
(a) Increase   **(b) Decrease**   (c) Not sure

Notes: Financial literacy subject categories are italicized; correct answers are in bold.

Source: Authors' calculations; see text.

the median to split the sample based on the score of seven and below for a low literacy group, and eight and above for a high literacy group. This division captures, in the high literacy category, those who are more likely to give a correct answer to the more difficult questions we previously identified.

Using these two literacy groups, Table 9.4 examines the influence of demographics. We find that more males fall in the high-literacy category than do females and the percentage of subjects with high literacy increases with education, income, and age. These results are broadly consistent with

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TABLE 9.2 Accuracy of responses to financial literacy questions

Financial literacy question	Correct (%)	Not correct (%)	Not sure (%)
Question 1: Saving future goal	95	3	2
Question 2: Credit card balance	88	10	2
Question 3: ARM	86	7	7
Question 4: Lose money stock mutual fund	89	4	7
Question 5: Highest long-term growth	75	14	11
Question 6: Money market composition	33	39	28
Question 7: Diversification	82	11	8
Question 8: Relative risk money market	80	6	15
Question 9: Beta	25	14	62
Question 10: Interest rates and bond prices	53	28	19

Source: Authors' calculations; see text.

TABLE 9.3 Financial literacy raw scores

Actual score	Percent	Cumulative
1	0	0
2	2	2
3	4	6
4	6	12
5	10	22
6	14	36
7	20	56
8	19	75
9	12	87
10	13	100

Notes: There were 828 total observations.

Source: Authors' calculations; see text.

previous literature (e.g., Agnew and Szykman, 2005). In addition, using the participants' estimates of their quiz score relative to their actual financial score, we divide our participants into three groups: those who overestimate, those who correctly estimate, and those who underestimate their score on the exam. Those who underestimate may not have been confident with all of their answers and were forced to guess on some. Those who correctly predict their score most likely have a strong grasp of what they know and what they do not know in finance. Finally, those who overestimate their score are indicating that they feel very confident about the accuracy of some questions that they actually answered incorrectly.

In Table 9.5, Panel 1, the percentages of participants that underestimate, overestimate, and accurately predict their actual financial literacy scores are displayed. As those with a score of one cannot underestimate their scores and those with perfect scores cannot overestimate them, we do not

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TABLE 9.4 Demographics and financial literacy (%)

	Low literacy	High literacy	Proportion of total sample	Number of observations
All	56	44	100	828
Sex				
Male	42	58	47	392
Female	68	32	53	435
Education				
High school or less	82	25	8	68
Some college	73	28	19	160
College	55	45	35	286
Graduate school	43	57	38	311
Income				
<$20,000	84	16	4	37
$20,000–$40,000	79	21	12	100
$40,001–$60,000	63	37	16	131
$60,001–$80,000	44	56	16	132
$80,001–$100,000	51	49	16	130
$100,001–$150,000	50	50	17	140
>$150,000	45	55	11	91
Age (years)				
<30	83	17	11	90
30–40	71	29	11	92
41–50	76	24	14	115
51–65	54	46	29	242
>65	36	64	35	286

Notes: The percentage of individuals in each demographic category may not add to one because of missing values.

Source: Authors' calculations; see text.

discuss the two extreme scores, and focus instead on those with scores between two and nine. It is interesting how the percentage of participants that overestimate (underestimate) their performance declines (increases) with increases in their scores. This result may be driven by the fact that there is less opportunity for individuals to overestimate (underestimate) as the score increases (decreases), but it might also be because as individuals become more financially literate, they are more likely to know what they know. The percentage that correctly estimates their performance does appear (in most cases) to generally increase with actual scores. An accurate

TABLE 9.5 Accuracy of self-assessed financial literacy score

Panel 1: Responses based on raw financial literacy score, whole sample (%)

Actual correct score	Underestimate	Correct	Overestimate	N
1	0	0	100	2
2	13	19	69	16
3	29	24	47	34
4	39	26	35	46
5	35	28	36	85
6	52	19	29	113
7	56	25	19	167
8	58	33	9	158
9	66	28	6	96
10	59	41	0	110

Panel 2: Responses by characteristics excluding individuals with scores of 1 or 10 (%)

Group	Underestimate	Correct	Overestimate	N
All	51	26	23	714
Sex				
Male	44	31	25	306
Female	57	23	20	408
Education				
High school or Less	42	19	39	64
Some college	55	19	26	152
College	54	26	19	242
Graduate school	48	33	19	255
Income				
⟨$20,000	46	29	26	35
$20,000–$40,000	44	24	32	95
$40,001–$60,000	52	25	24	122
$60,001–$80,000	57	17	26	107
$80,001–$100,000	47	36	17	116
$100,001–$150,000	61	22	17	118
>$150,000	40	43	18	68
Age (years)				
<30	51	27	22	85
30–40	48	26	26	88
41–50	51	26	22	107
51–65	49	24	27	211
>65	55	29	16	222

Source: Authors' calculations; see text.

understanding of one's own financial literacy is important because those who do not understand how much they do not know may be less likely to seek assistance.

Panel 2 of Table 9.5 allows us to look at literacy relative to demographics, having eliminated from the sample participants earning the two extreme scores. Interestingly, a larger percentage of men (25 percent) overestimate

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their scores compared to women (20 percent), consistent with overconfi-
dence observed in men related to other financial behaviors such as trading
(Barber and Odean, 2001). Education also seems to matter: the percentage
of participants overestimating their performance declines with more edu-
cation, from 26 percent with some college education to 19 percent with
graduate training. Similarly, the percent of participants overestimating falls
with income, from 32 percent for those making between $20,000 and
$40,000 to 17–18 percent for those making more than $80,000. According-
ly, it appears that some populations (the lowest income and least educated)
identified in previous literature as vulnerable are more likely to overesti-
mate how many questions they answered correctly in this study. Given the
inaccuracy in many of the self-reported scores, we will use the actual tested
financial literacy score for our literacy measure going forward.

Next, we use a multivariate probit analysis to examine how demographics
relate to tested financial knowledge. Table 9.6 reports marginal effects for
the regression relative to a 40- to 50-year-old, college-educated woman, who

TABLE 9.6 Marginal effects from multivariate probit analysis of
tested financial literacy

Dependent variable	High financial literacy (1 = yes, 0 = no)
Sex	
Male	0.221*** (0.044)
Education	
High school or less	–0.137*** (0.050)
Some college	–0.066 (0.041)
Graduate school	0.048 (0.038)
Income	
<$40,000	–0.065 (0.053)
$60,001–$80,000	0.120* (0.062)
$80,001–$100,000	0.054 (0.057)
$100,001–$150,000	0.041 (0.056)
>$150,000	0.052 (0.062)
Age (years)	
<30	–0.086 (0.062)
30–40	0.005 (0.062)
50–60	0.166*** (0.055)
>65	0.267*** (0.055)
Marital status	
Married	–0.043 (0.041)
Pseudo R^2	0.1799
Number of observations	753

Notes: Standard errors are in parentheses. Race/ethnicity is also con-
trolled for. ***Significant at 1 percent level; **significant at 5 percent
level; *significant at 10 percent level.

Source: Authors' calculations; see text.

is unmarried and earning between $40,000 and $60,000. The first column shows the results for the tested financial knowledge. We find older individuals are significantly more likely to be in the high literacy category. In addition, high-school educated individuals are 14 percent less likely to be in the high-literacy category, while men are more likely to fall in the high-literacy category by 22 percent. The findings are broadly consistent with others (e.g., Agnew and Szykman, 2005).

Information overload measures

To capture both the cognitive and emotional aspects of information overload, we use two different measures. The multi-item measures are based on the responses to questions found in Table 9.7, and responses for all questions in the scale are averaged to construct a composite score. We then use a median split for both measures to place individuals in two categories (high and low). As reported in Table 9.8, we estimate two multivariate probit regressions using our binary overload measures as dependent variables to test for a relationship between information overload and literacy. Results show that individuals in the high-literacy category are 10 percent

TABLE 9.7 Overload measures

Cognitive overload (Chronbach's $\alpha = 0.827$)

Each question below answered based on the following scale:
Strongly disagree 1 2 3 4 5 Strongly agree
(1) There was too much information to consider before I had to choose between the investment option and the annuity option.
(2) This decision required a great deal of thought.
(3) This was a difficult decision.
(4) I found this decision to be overwhelming.
(5) It was difficult to comprehend all the information available to me.
(6) This task was stressful.
(7) It was a relief to make decision.

Emotional overload (Chronbach's $\alpha = 0.876$)

Think about the information that was presented to you about the differences between the investment option and the annuity option. Using EACH pair of words listed below, indicate how the information made you feel.

Unafraid	1	2	3	4	5	6	7	Very afraid
Relaxed	1	2	3	4	5	6	7	Tense
Calm	1	2	3	4	5	6	7	Agitated
Restful	1	2	3	4	5	6	7	Excited

Source: Authors' calculations; see text.

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TABLE 9.8 Marginal effects from multivariate probit analysis of cognitive and emotional overload

Dependent variable	High cognitive overload (1 = yes, 0 = no)	High emotional overload (1 = yes, 0 = no)
Sex		
Male	–0.086** (0.043)	–0.143*** (0.043)
Education		
High school or less	0.064 (0.101)	–0.039 (0.104)
Some college	–0.047 (0.062)	–0.030 (0.063)
Graduate school	–0.002 (0.048)	0.007 (0.050)
Income		
<$40,000	0.009 (0.079)	–0.100 (0.077)
$60,001–$80,000	0.052 (0.071)	0.049 (0.071)
$80,001–$100,000	–0.093 (0.071)	–0.044 (0.074)
$100,001–$150,000	0.033 (0.070)	0.045 (0.072)
>$150,000	–0.111 (0.078)	–0.041 (0.082)
Age (years)		
<30	0.162* (0.089)	0.286*** (0.083)
30–40	0.098 (0.082)	0.220*** (0.080)
50–60	0.052 (0.069)	0.045 (0.069)
>65	0.015 (0.071)	–0.128* (0.070)
Marital status		
Married	0.033 (0.057)	0.021 (0.057)
Financial literacy		
High literacy	–0.104** (0.045)	–0.099** (0.046)
Pseudo R²	0.051	0.0907
Number of observations	613	613

Notes: Standard errors are in parentheses. Analysis controls for race, biases, defaults, and risk included in regression but not reported. Race/ethnicity is also controlled for. ***Significant at 1 percent level; **significant at 5 percent level; *significant at 10 percent level.

Source: Authors' calculations; see text.

less likely to be in the high-cognitive-overload category. We find a similar result for emotional overload. Interestingly, we also find that certain demographics matter. Men are less likely to report information overload, regardless of the measure. In addition, those under age 30 are more likely to report cognitive overload (16 percent) and emotional overload (29 percent). One possible explanation for this may be that the young may not have been exposed to annuity products and may be less familiar with them.

Analysis of the annuity choice

Table 9.9 examines participants' actual decisions between annuities and investments in the experiment, where we build on Agnew et al. (2008) by including two additional measures of information overload as

TABLE 9.9 Marginal effects from multivariate probit analysis of decision to pick the annuity

	Dependent variable	
	Pick annuity (1 = yes, 0 = no)	Pick annuity (1 = yes, 0 = no)
Income		
$100,000–$150,000	–0.163** (0.065)	–0.153** (0.062)
Financial literacy		
High literacy	–0.142*** (0.045)	–0.123*** (0.043)
Overload		
Cognitive overload	0.040 (0.044)	
Emotional overload		0.085* (0.045)
Pseudo R^2	0.1129	0.1172
Number of observations	612	612

Notes: Standard errors are in parentheses. Variables of interest (overload and financial literacy) reported. Only statistically significant demographic coefficients reported. Other controls included but not reported include race, biases, defaults, additional demographics (age, income, education, marital status), and risk. ***Significant at 1 percent level; **significant at 5 percent level; *significant at 10 percent level.

Source: Authors' calculations; see text.

well as controls for demographics, risk aversion, and the framing conditions. Here, we report only the marginal effects for the demographic variables that are significant and our variables of interest—financial literacy and overload.[7]

Financial literacy might play a role in this decision in four possible ways. First, as mentioned earlier, the experimental annuity choice requires the least effort, so those with less financial literacy may prefer the less complicated annuity choice. Second, highly literate individuals may be overconfident in their investment abilities and, therefore, more likely to choose the investment option. This would be interesting, given that skill cannot influence the reported investment performance (it is based on dice rolls). Third, a familiarity bias might exist. More financially literate individuals may be more familiar with equities and, as a result, more likely to choose them. Conversely, individuals with low literacy may choose to avoid these types of securities. Finally, the more financially literate may be more likely to invest in the annuity because they appreciate the insurance against longevity risk.

The findings suggest that more financially literate individuals find our investment option more appealing. Thus, the first three theories presented cannot be ruled out. We also find that those with higher income are significantly less likely to choose the annuity, consistent with Mottola and Utkus (2007). A familiarity bias might be driving this result. Although only significant at the 10 percent level, we also find a positive relationship

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between emotional overload and the selection of annuities. Thus, those that felt overwhelmed were more likely to choose the simpler option.

Confidence and satisfaction

We are also interested in whether financial literacy relates to individuals' feelings about their choice immediately after they make it, and then again after the game is over and they know the final outcomes. While most research has focused on how literacy influences actual decisions and intended actions, we believe it is also important to understand how people feel after making their decisions. For example, are more financially literate individuals more content and confident with their choices because they understand their risks? If participants experience more overload, are they less likely to feel satisfied with their choices regardless of outcomes? If we can show that higher literacy and less overload are related to greater feelings of confidence and satisfaction, then this suggests there are additional benefits to financial training and simplifying investment information beyond encouraging sound investment decisions.

We examine how confident individuals are with their decision considering both their literacy and feelings of cognitive and emotional overload in Table 9.10. To measure confidence, we ask participants the following question immediately after making their choice: 'Thinking of the choice you just made between the investment option and the annuity option, circle a number from 1 to 10 to indicate how confident you are that you made a good decision' (1 = not confident; 10 = extremely confident). They answer this question prior to playing the game and before knowing the final financial outcome.

Once the game is over and participants know how much they earn, we ask them a series of three more questions to assess their overall satisfaction.[8] Using a scale from 1 (strongly disagree) to 5 (strongly agree), participants respond to the following three questions: (*a*) I am happy with my choice; (*b*) I am pleased with my choice; (*c*) I feel satisfied with my choice (α = 0.94). We once again average the responses to get a summary score and then use a median split to divide the individuals into high-and low-confidence and satisfaction categories. As before, we estimate a multivariate probit regression, with the binary dependent variable equal to 1 for the high category and 0 for the low category. Likewise, we report only the statistically significant demographic variables. Looking first at pre-game confidence, financial literacy does not matter for confidence, but both types of overload have a significantly negative relationship with participant confidence levels. Those who are in the higher cognitive overload category are 30 percent less likely to be highly confident. Similarly, those who are

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TABLE 9.10 Marginal effect for multivariate probit analysis of confidence and satisfaction

	Pre-game		Post-game	
	High confidence (1 = yes, 0 = no)	High confidence (1 = yes, 0 = no)	High satisfaction (1 = yes, 0 = no)	High satisfaction (1 = yes, 0 = no)
Sex				
Male	0.154*** (0.085)	0.148*** (0.042)	–0.051 (0.043)	–0.077* (0.044)
Age				
Over 65 years old	–0.129* (0.070)	–0.151** (0.072)	0.052 (0.073)	0.001 (0.074)
Financial literacy				
High literacy	0.060 (0.047)	0.068 (0.046)	0.064 (0.050)	0.092* (0.052)
Overload				
Cognitive overload	–0.304*** (0.043)		–0.169*** (0.050)	
Emotional overload		–0.237*** (0.045)		–0.221*** (0.058)
New controls				
Chose annuity	0.010 (0.050)	0.018 (0.051)	0.056 (0.060)	0.085 (0.063)
Total payout			0.008*** (0.002)	0.009*** (0.002)
High confidence			0.270*** (0.047)	0.274*** (0.046)
Round die			0.011 (0.023)	0.012 (0.023)
Pseudo R²	0.105	0.078	0.190	0.204
Number of observations	571	572	563	564

Notes: Standard errors are in parentheses. Variables of interest (overload and financial literacy) reported. Only statistically significant demographic coefficients reported. Other controls included but not reported include race, biases, defaults, additional demographics (age, income, education, marital status), and risk. ***Significant at 1 percent level; **significant at 5 percent level; *significant at 10 percent level.

Source: Authors' calculations; see text.

emotionally overloaded are 24 percent less likely to be in the higher confidence category. We find no relationship between the actual option chosen (annuity or investment) and initial confidence levels following the decision.

 Our post-game regressions examine overall satisfaction once the individuals know how much they earned. Additional control variables account for overall winnings and the number of periods each person 'lives'. We expect that individuals will be more satisfied if they 'live' through more periods and earn more money. We also control for their initial confidence in their decisions because attitude theory predicts that when people have strong attitudes toward something, they will create or change other attitudes that are inconsistent with the pre-existing attitudes (Eagly and Chaiken, 1993).[9] Once again, overload plays a large role. Individuals

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are less likely to be satisfied if they experience cognitive or emotional overload when making their decisions. This is an important finding because it suggests that financial planners may be able to improve their clients' satisfaction by reducing the likelihood that they will experience information overload during the decision-making process. So, while they cannot guarantee financial gains and cannot control for the individual characteristics of each client, they can control how the information is presented, which can improve satisfaction levels. Literacy is also important but not very significant (10 percent level) to post-game satisfaction.

Conclusion

The analysis presented in this chapter explores how financial literacy and feelings of emotional and cognitive overload relate to a financial decision of growing importance to the soon-to-be-retired: specifically, the decision of whether to annuitize retirement savings. Using data from a large-scale laboratory experiment, the analysis from this chapter not only sheds new light on how literacy and overload relate to each other but also reveals how these factors may influence financial choices in general, as well as relate to subsequent levels of satisfaction and confidence. Later, we summarize our main results from this chapter and their implications, as well as provide our recommendations for improving plan participants' decision satisfaction.

In our analysis, we outline several new financial literacy and information overload results with potentially negative implications for some retirement savers. For instance, we identify population subgroups that may be either systematically overestimating or underestimating their financial knowledge. For those who overestimate their knowledge, potential concerns can arise because they may not seek out financial advice due to overconfidence about what they know. As a result, financial educators must realize that they may not be reaching certain segments of the population because those consumers may not be seeking assistance.

In our analysis, we also demonstrate that lower financial literacy relates to more cognitive and emotional overload. Avoiding overloading consumers is a worthwhile priority for those who develop plan communications because overload may hamper individuals' decision-making and can even cause some people to avoid making decisions altogether. The results from this chapter suggest that plan communicators must keep in mind that low-literacy participants may be more susceptible to information overload and develop their materials accordingly.

We also find new evidence suggesting that there are additional benefits gained from reducing information overload beyond encouraging more thoughtful decision-making. Our findings suggest that while framing the

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choice in the simplest fashion may reduce overload, it may also increase individual feelings of confidence and satisfaction. Thus, efforts to make investment products and decisions easier to understand could improve how people feel about their decisions, as well as increase customer satisfaction levels reported to plan sponsors. Of course, financial markets will always be uncertain and even when individuals make informed and intelligent financial decisions, they will still suffer financial losses. Yet based on this evidence, we believe that overloaded individuals will be less confident and less satisfied than others experiencing similar financial performance because the overloaded individuals may not have made thoughtful choices. Simplifying the information presented so that it is more easily understood may help people better understand the associated risks and benefits of their options, enabling them to make more informed decisions. If consumers are less overwhelmed when deciding whether to annuitize, they may actually be more satisfied and confident with their decisions. Industry professionals could do well to focus on making the decision-making process less arduous and consider how important simplicity is in plan design.

Finally, as Choi et al. (2002) have shown in their research, the 'path of least resistance' has a powerful effect on decision-making. We add to this literature by finding additional evidence that this path might hold the most attraction to those who are the least financially literate. In our experiment, the least financially literate were more likely to choose the annuity. We theorize that as the required decisions related to the annuity in our experiment were fewer and less complicated than those required for the investment choice, choosing the annuity was the 'path of least resistance' because it minimized decision-making efforts in this context. As a result, plan architects should carefully consider the choices they present to participants and keep in mind that the choice option that requires the least effort may attract the least financially literate. In conclusion, we believe empowering investors through financial education, simplified plan design, and effective communication is not only good for the investor, as it should encourage more thoughtful and confident decision-making, but also of benefit to plan sponsors and the entire industry by producing more satisfied consumers.

Acknowledgment

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Endnotes

[1] We are referring to single-premium fixed lifetime annuities throughout the text.

[2] One example of an ineffective investment heuristic is using past returns to choose investments. For example, when Sweden introduced their pension scheme, investors making an active investment choice were most likely to choose a technology and health-care fund that recorded the best five-year fund performance out of all 456 funds presented in their investment menu (Cronqvist and Thaler, 2004). Very likely, these individuals were overwhelmed with the number of options, so they relied on past performance to make their fund selection. Unfortunately for those who selected this fund, by 2003 the Internet bubble had burst and this fund had lost 69.5 percent of its value. One worthwhile exercise for the finance community would be to devise heuristics that lead to better outcomes. Regardless of how plans are designed or communication is simplified, there will always be somebody that is overwhelmed with the information. These individuals could benefit if they had at their disposal several basic heuristics that would lead to sound investment decisions.

[3] Detailed explanations regarding the experimental procedure followed can be found in Agnew et al. (2008).

[4] Existing studies examining the annuity decision and defaults provide mixed evidence of their influence. See Brown (2008a) for more details.

[5] Our measure is not designed to measure cognitive ability, and we do not believe that it could serve as a proxy for this because most of the questions require some understanding of economics and finance. Lusardi et al. (2010) and van Rooij et al. (2007) control for IQ and cognitive ability in their study, and find the financial literacy variables remain statistically significant. Although previous research demonstrates that basic financial knowledge can also be important, we note that Lusardi and Mitchell (2009) find that when they include a sophisticated measure of financial literacy with a basic measure in their analysis, the basic measure is no longer significant.

[6] We do not analyze our 'Not sure' responses here but Lusardi and Mitchell (2006, 2008) find that 'Do not know' responses can provide valuable insights. Therefore, we plan to examine our 'Not sure' responses further in future analysis.

[7] Although not reported here but consistent with our previous research, we once again find a significant relationship between the framing condition and choice. In addition, those who are more risk averse are more likely to choose the annuities.

[8] See Agnew et al. (2008) for detail about how this was calculated.

[9] According to attitude theory, when formulating an attitude towards how satisfied one is with one's choice, a person will seek to be consistent with related attitudes that the person currently has (i.e., confidence). According to this, we would not expect a person reporting low satisfaction levels to have reported high confidence in their initial choice.

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