

Enhancing Longevity Awareness to Improve Retirement Security

March 6, 2021

Keywords: retirement expectations; annuity; longevity; life expectancy; framing; behavioral economics; household finance

Classification: Social Sciences, Economic Sciences

Abigail Hurwitz*

Hebrew University of Jerusalem
Environmental Economics and Management
Robert H. Smith Faculty of Agriculture, Food and
Environment
Herzl St, Rehovot, 76100, Israel
+972-8-9489229
abigail.hurwitz@mail.huji.ac.il
orcid.org/0000-0002-6457-1983

Orly Sade

Hebrew University of Jerusalem
The Jerusalem Business School
Mount Scopus
Jerusalem, 91905, Israel
+972-524668590
orlysade@mail.huji.ac.il
orcid.org/0000-0002-2651-1007

Olivia S. Mitchell

University of Pennsylvania
Wharton School
3620 Locust Walk, St 3000 SH-DH
Philadelphia, PA 19104-6302
215-898-0424
mitchelo@wharton.upenn.edu
orcid.org/0000-0002-6419-8314

**Corresponding author.*

Enhancing Longevity Awareness to Improve Retirement Security

Abigail Hurwitz, Olivia S. Mitchell, and Orly Sade

Abstract

Many people have only a vague idea about what life expectancy and longevity risk mean, which may lead them to save suboptimally for retirement or to not purchase longevity insurance. This paper employs an online experiment using vignettes to investigate alternative ways of describing both life expectancy and longevity risk, to assess whether these can raise peoples' awareness of possible retirement shortfalls. We show that merely prompting people to think about financial decisions changes their perceptions regarding subjective survival probabilities. Moreover, providing this information boosts respondents' interest in saving and demand for longevity insurance. Additional evidence from a field experiment shows that life expectancy information also promotes peoples' interest in obtaining advice about long-term saving products.

Significance:

This paper employs an online experiment using vignettes to investigate alternative ways to describe both life expectancy and longevity risk, to assess whether these can raise peoples' awareness of possible retirement shortfalls. This subject is important for researchers and policymakers, as well as financial advisers concerned about when and how people save for, and then withdraw from, retirement accounts. For instance, if a substantial portion of the population incorrectly estimates life expectancy when making financial decisions, or ignores such information when provided, better financial decisionmaking could result from rendering this information more salient. In particular, individuals could be educated or informed about life expectancy, longevity risk, or both, when they make important saving and decumulation decisions. Indeed, we find that prompting people to evaluate financial decisions changes their perceptions regarding subjective survival probabilities. Moreover, providing this information boosts respondents' interest in saving and demand for longevity insurance.

Understanding how individuals judge their own survival probabilities and use these estimates when making financial decisions is important for researchers as well as policymakers. This is because people need to develop an idea of how long they may survive so as to make informed decisions about how quickly to draw down their savings in retirement, when to claim their Social Security and pension benefits, and whether to purchase annuities. Nevertheless, these are not simple decisions for many people due to low financial literacy, cognitive shortcomings, and behavioral biases [1]. This paper uses a demographically diverse and reasonably nationally representative online survey to first measure how people assess their own life expectancies and longevity risk, and then compare these to population life tables. Second, we assess alternative methods to boost peoples' awareness of the risk of living a very long time. Specifically, we use vignettes to experimentally test alternative ways to frame survival probabilities, permitting us to evaluate which presentation enhances people's understanding of their chances of living a very long time. If a substantial portion of the population incorrectly estimates life expectancy when making financial decisions, or ignores such information when provided, then making information about life expectancy, or longevity risk, or both, more salient could enhance retirement security.

Prior research has noted that, when some people make their survival forecasts, they may be aware of publicly available population survival tables [2]. Other work [3] showed that people consider their own characteristics known to affect survival outcomes (e.g., sex, health, own health habits, and parents' longevity). These beliefs are also correlated with financial decisionmaking: for instance, survey respondents who believe they will live longer than average also save more [4]; conversely, people having very low subjective probabilities of survival retire earlier and claim their Social Security benefits earlier than those expecting to

live longer [5].¹ Nevertheless, individuals also can exhibit systematic biases when predicting longevity. For instance, age plays a role in longevity prediction; thus, Elder [6] and Abel et al. [7] reported that younger people overstated mortality rates, but older people understated them. Wu et al. [8] found that subjective life expectancies differed from life table data by age cohort. Another type of bias relates to over-optimism: for instance, smokers tend to be optimistic about their own life expectancies [9-11]. In addition, some may avoid thinking about mortality [12] due to what Becker [13] and others have called ‘death denial’ [14-15].

To assess different ways to boost peoples’ awareness of the risk of living a very long time, we devised and fielded an online survey of 4,380 U.S. residents age 35-83 in April/May of 2020, recruited via the Prolific internet-based “crowd-working” survey platform.² Respondents’ mean age was 49.2, and 43.5% were male; 26% had some college, and 36% had a bachelor’s degree. Over half (57.8%) were married, 22.53% never married, 2.5% widowed, 14.9% divorced, and 2.2% separated.³ Of the respondents, 85.1% believed their health was good, very good, or excellent; on average, participants mentioned having visited the doctor 2.9 times during the last year. Median monthly self-reported income was \$4,700, or about \$56,400 per year, close to the US median annual household income of \$61,937 [16]. Average household monthly income was \$12,600 (about US\$151,200 annually).⁴

¹ Salm [17] showed that consumption and saving choices vary with subjective mortality rates, while Teppa and Lafourcade [18] confirmed a positive relation between subjective life expectancy and demand for annuities in the Netherlands.

² Prolific (www.prolific.ac) is an online survey platform managed by Oxford University. It includes several demographic variables on participants, which permits researchers to screen for respondents with particular characteristics (e.g., age, sex, country of residence). It has been judged to be transparent, extremely useable, and highly valuable to researchers due to the sample diversity and the rate of honest answers compared to MTurk, a commonly used platform [19-20].

³ Our marital sample statistics are similar to those of the U.S. population. For instance, in the 40-44 age group, 60% of participants are married (66% according to 2019 U.S. Census Bureau data), 0.2% widowed (comparing to 0.8%), 10.2% divorced (comparing to 10.9%), 2.33% separated (comparing to 2.8%), and 27.43% never married (comparing to 19.5%).

⁴ We conducted several screening tests to ensure the quality of responses obtained, such as: (1) Recording and evaluating the time that each task was completed; (2) Completion of the survey: we only included in the analysis participants who completed the survey; (3) Survey duration: for only 1% of participants in our study, the survey duration was less than 287 seconds (4.7 minutes); we conducted a robustness test to make sure that this group did not influence our findings. We also included several questions to ensure attention, including: (1) a question about subjective survival probabilities to different target ages; we performed the main analysis both on the entire sample

To evaluate what respondents knew and how accurately they estimated their life expectancy, we ask two questions measuring longevity perceptions. First, we asked participants the following question:⁵ *What is the percent chance [0-100] that you think you will live at least $\{e://Field/AgeDeath\}$ more years?* Here, the target age varied by the respondent's sex and age (see Online Appendix A for additional details).⁶ Second, we asked participants about their subjective probabilities (chances) of living to an age *five years younger* than in the question above. The subgroup we deem the *consistent participants* were those who correctly reported a probability of living to age (X-5) as equal to or greater than their probability of living to age X.⁷

To generate the experimental information of interest, we created two vignettes.⁸ The first was about a single man (woman) age 60, with no children, needing to decide how to withdraw his (her) retirement savings. The second was about a single man (woman) age 40, with no children, deciding whether to increase his (her) retirement savings. Some of our survey participants received only the 'baseline' version of the vignettes, while others received additional information about life expectancy. Specifically, the baseline **annuitization vignette** was as follows:

Next, we will describe a financial decision facing Mr. Smith and then we will ask you what you would recommend to this person: Mr. Smith is a single, 60-year-old man with no children. He will retire and claim his Social Security benefits at 65. When he retires, he will have \$100,000 saved for his retirement, and he will receive \$1,400 in monthly Social Security benefits. Imagine that Mr. Smith asks you about how to manage his \$100,000 retirement savings. Please indicate which one of the two options you would recommend:

and the subset of people who understood that the probability to live to a younger age should be larger than the probability to live to an older age; (2) and a question which we instructed participants to skip; we control for this in our regression analysis.

⁵ Several other researchers (e.g., Lee et al [21]) have used similar questions to assess life expectancy estimates.

⁶ We use U.S. Social Security Administration [22] cohort life tables to calculate the actual probability of living to each target age (by age, sex, and year of birth).

⁷ The consistent subgroup, where both measures were allowed to equal zero or 100%, represented 74% of the entire sample. We also controlled on whether the respondent did as advised when requested to skip a question, to determine whether he or she was devoting sufficient attention to the survey. 43% percent did not skip it as requested.

⁸ The use of vignettes has a long history in the medical field, and they have grown increasingly popular in social science applications [23-26] who displayed vignettes to survey participants and randomly assigning participants to different messages about the consequences of longevity risk.

1. *Withdraw the entire \$100,000 all at once from the retirement account, to use as he needs.*
2. *Receive a regular monthly sum of \$500 (equal to \$6,000 yearly) for the rest of his life.*

Just as before, Mr. Smith is still a single, 60-year-old man with no children who will retire and claim Social Security benefits at 65. When he retires, he will have \$100,000 saved for his retirement, and he will receive \$1,400 in monthly Social Security benefits. But now he has a third option that he can choose from. Please indicate which one of the three options you would recommend:

1. *Withdraw the entire \$100,000 all at once from the retirement account, to use as he needs.*
2. *Receive a regular monthly sum of \$500 (equal to \$6,000 yearly) for the rest of his life.*
3. *Withdraw a lump sum of \$50,000 at retirement, and receive a monthly sum of \$250 (equal to \$3,000) for the rest of his life.*

The baseline **savings vignette** was as follows:

Mr. Smith is a single, 40-year-old man with no children. He will retire and claim his Social Security benefits at 65. When he retires, he will have \$100,000 saved for his retirement, and he will receive \$1,400 in monthly Social Security benefits.

Please indicate which one of these options you would recommend:

1. *Maintain his current saving level.*
2. *Slightly increase his long-term savings by spending less.*
3. *Significantly increase his long-term savings by spending less.*
4. *Don't know.*

Some participants also received the following **additional information** about **life expectancy** (average survival probabilities): *Please note that American men, 65 years old, will survive 18.1 more years on average.* This informational intervention aimed to draw attention to the concept of life expectancy within a vignette focused on a financial decision. Specifically, our conjecture was that if people are capable of taking life expectancy information into consideration but were reluctant to do so due to avoid thinking about mortality, providing them with the information at the time they make relevant decisions might lead to better informed financial outcomes [4,5].

As we are also concerned with long-term savings and withdrawal decisions, the second informational intervention was structured to provide longevity information. Specifically, our aim was to draw attention to the possibility of living to a very old age and the attendant financial risk. In particular, these participants received the following additional information regarding longevity risk: *Please note that 22.3% of American men, 65 years old, will survive to the age of 90 or more.*

We randomized each respondent into one of the two vignettes using the Qualtrics⁹ randomizer; half of the participants were exposed to an **annuitization condition**, and the other half to the **saving condition** described above. Moreover, all participants in both treatments were exposed to *either* the life expectancy information, the longevity information, or none (control group). To test whether the informational intervention influenced peoples' subjective survival probabilities, 2,902 participants were asked about their survival probabilities *before* they saw the vignette, while 1,478 first saw the vignette and then received the additional information. We further asked each respondent several demographic questions, some financial literacy questions, time and risk preference questions, questions about their health, a few “brain teasers” to judge their numeracy skills, a question to ensure they were paying attention, and questions regarding COVID-19 as the survey was fielded in late spring of 2020 (see Online Appendix B).¹⁰ Overall, we conducted 12 manipulations in total.

Results

In order to insure that respondents devoted sufficient attention to the task, we first focus on the *consistent participants* as defined above. Our first two dependent variables of interest are (1) *SLE-LE*, the difference between each respondent's subjective versus life table (age/sex/cohort) survival probability; and (2) *Longevity+*, a variable taking the value of one if the participant's self-assessed chances of living to a target age exceed the respective (age/sex/cohort) probability from U.S. life tables.¹¹ In our data, the average difference between subjects' subjective and life table survival probabilities is 17% (median 10%) across all participants. Furthermore, the distribution of *SLE-LE* is positively skewed, suggesting that our

⁹ Qualtrics is a professional survey platform: <https://www.qualtrics.com>

¹⁰ Specifically, we asked, “*The coronavirus may cause economic challenges for some people regardless of whether they are actually infected. What is the percent chance you will run out of money because of the coronavirus in the next three months?*” On average, our respondents believed that there was a 20% chance they would run out of money due to COVID-19.

¹¹ Puri and Robinson [27] were among the earliest to relate the difference between self-reported life expectancy survey responses as well as statistical mortality tables, to household economic behaviors including work, marriage, saving, and investment decisions. Huffman et al. [28] and Maurer and Mitchell [29] have also employed this variable in modeling financial decisions.

respondents believe they will live longer than the life tables would predict.¹² The mean value of the *Longevity+* variable is 61% across all participants, and 56% for consistent participants. Figure 1 shows the mean of *SLE-LE* by treatment and order of the questions as well as the for the full sample. It suggests that merely thinking about financial decisions may alter subjective survival probabilities. It also provides evidence that information regarding longevity boosts subjective survival probabilities, compared to our control group.

Figure 1 here

To explore which respondents over- or under-estimate their survival probabilities as measured by these two variables, we next report estimates from multivariate models controlling on whether the respondent saw the vignette before or after answering the subjective survival probability questions. Results in Table 1 confirm that respondents who saw the vignette *before* being asked about survival probabilities were significantly less likely to overestimate their anticipated life expectancy. In fact, seeing the vignette first decreased respondents' *Longevity+* difference by about 7.8 percentage points, and the *SLE-LE* gap between their self-reported and life table survival by 6.2 percentage points. In other words, simply prompting people to think about a financial decision related to longevity risk can affect peoples' estimates of their own anticipated lifespan.

Table 1 here

Table 1 also reports the impact of our three vignette treatments: (1) the *life expectancy treatment* where participants received information on the life expectancy of a 65-year-old male/female (randomly assigned); (2) the *longevity condition* where participants were told of the probability of survival to age 90 of either a 65-year-old male/female; and (3) the control group (no information). Interestingly, Table 1 shows that being exposed to the longevity

¹² These results are consistent with prior evidence suggesting that people tend to overestimate their survival chances at much older ages [8,30-32].

treatment significantly increased the gap between the respondents' self-assessed survival expectations and the objective life tables. That is, *Longevity+* was 5.4 percentage points higher (or $9.5\% = .054/0.563$) for those receiving the longevity information, and the *SLE-LE* gap rose by 2.8 percentage points (or $21\% = 0.028/0.133$). Accordingly, though some people may have been familiar with the notion of longevity, the consistent respondents became more optimistic about living a long time after receiving additional information about survival tail risk. In other words, merely providing information about the probability of living to a very old age does influence peoples' subjective survival probabilities, suggesting that in the normal course of affairs, most people give little thought to these facts. Moreover, giving respondents the alternative information treatment about life expectancies was not significantly related to either *Longevity+* or *SLE-LE*. We also note from Table 1 that if a respondent was concerned about running short of money due to COVID, this had no significant impact on either survival measure.

Next, we turn to an examination of whether and how the information treatments influenced their recommended financial behaviors to the vignette individuals. Overall, only 14.6% of participants recommended that the vignette individual maintain his/her saving level; by contrast, 30.7% recommended slight increases, and 52.3% proposed significant increases in savings (only 2.4% said they did not know). A multivariate analysis of participants' propensity to recommend saving more and annuitizing (versus choosing a lump-sum option at retirement) after seeing the annuitization vignette appears in Table 2. Here, respondents are grouped into three subsamples, namely the "consistent" respondents (defined above), the "underestimators" who underestimated their life expectancy to begin with, and the underestimators who were also consistent in their survival probabilities. Results for the savings recommendations appear in columns (1-3) for, respectively, underestimators, consistent participants, and participants who

were both underestimators and consistent. Columns (4-6) present results for the annuitization recommendations for the same three subgroups.

Table 2 here

First, we see that neither the life expectancy nor the longevity treatment altered savings recommendations (columns 1-3). Second, giving people life expectancy information did increase respondents' recommendation to annuitize, particularly for those who underestimated their life expectancy to begin with (columns 4 and 6). Holding other variables at their means, underestimators receiving the life expectancy information were 15.58% more likely ($=0.118/0.757$) to recommend annuitization, whereas underestimators receiving the longevity information were 11.8% more likely ($=0.09/0.757$) to recommend annuitization (column 4). These results are consistent with recent evidence from Post and Bruine de Bruin [33]. Column 6 shows that the life expectancy result continues to hold when inconsistent participants are excluded.¹³

To broaden the external validity of our results, we also conducted a field study designed to measure the impact of providing additional longevity data on behavior in the field. Specifically, in the field study conducted in 2018, we randomized alternative sets of information regarding life expectancy in routine advertising material emailed to the 4,130 customers of an Israeli provident (pension) fund.¹⁴ We measured responses to these emails along with clients' requests to schedule meetings with the fund's pension advisors afterwards. We find that life expectancy information interventions significantly increased peoples' interest in long-term financial decisions, leading them to open emails seeking further information and undertake meetings with financial advisors.

Implications

¹³ We also tested for robustness in this subgroup of participants and found that the information provided to overestimators did not significantly decrease their annuitization recommendations.

¹⁴ Some who did not open the email received it again after a year. Our analysis includes both rounds.

Making good consumer financial decisions requires people to have a well-informed idea of their life expectancy and longevity risk, so they can save, invest, and decumulate thoughtfully, and avoid running out of money in old age. Nevertheless, there are still many open questions regarding how much people understand about these important factors, and whether providing information about survival risks makes a difference in the decisionmaking process. Additionally, it has been unclear as to what types of information can be usefully provided regarding life expectancy and the longevity tail. This paper employed an experimental survey with vignettes to determine not only whether individuals correctly estimate their own survival probabilities, but also whether providing them with information about life expectancy and the longevity tail can improve these estimates. We also show how respondents incorporate these estimates into advice regarding financial decisions.

Our contribution is to show that providing people who understand conditional probability information about their likely **longevity** *does* change their perceptions about life expectancy, but providing **life expectancy** information has no effect. This suggests that individuals are already reasonably aware of their mean survival chance, but they are less well-informed about the tails of the survival distribution. We also provide novel evidence that merely getting people to think about a long-term financial decision can alter their overestimation regarding survival probabilities. Accordingly, we conclude that future research on peoples' longevity perceptions will need to be linked to how they make financial decisions. We also document that providing underestimators with either life expectancy or longevity information significantly depresses the likelihood that they will recommend annuitization.

Our results contribute to the research literature on life expectancy, saving, annuitization decisions, and experimental household finance. Moreover, our results also can inform insurers and policymakers on how to encourage people to make better financial decisions relevant for later life. Finally, we have learned that peoples' perceptions of survival probabilities are being

altered by the COVID-19 pandemic, in turn, curtailing their interest in saving and annuitizing.

We leave for further research an investigation of whether perceptions and behavior revert after the pandemic is over.

Materials and Methods

To explore the characteristics of respondents who over- or under-estimated their survival probabilities we estimated two multivariate models using, in turn, the dependent variables *Optimistic* and *SLE-LE* (see text):

$$DepVar_i = \alpha + \beta_1 \mathbf{Vignette\ first}_i + \beta_2 age_i + \beta_3 male + \beta_4 Coll + \beta_5 Marital\ Status + \beta_6 Good\ Health + \beta_7 FinLit + \beta_8 Numeracy_i + \beta_9 Present\ Pref + \beta_{10} Income_i + \beta_{11} \# in\ HH + \beta_{12} SurveyAttn + \beta_{13} Covid .$$

Here, *Vignette first* indicates that the vignette was presented prior to asking the respondent the subjective survival probability questions.¹⁵ *Male* is equal to 1 if respondent was male (else 0); *Coll* is equal to 1 if the respondent had completed at least college (else 0); and *Good health* is equal to 1 if self-reported health was good/very good/excellent (else 0).¹⁶ *FinLit* refers to the total number of questions the respondent answered correctly based on Lusardi and Mitchell's [34-36] Big Three questions.¹⁷ We measure *Numeracy* as the sum of correct answers to a three-item numeracy measure derived from Lipkus et al. [37]¹⁸ *Present preferences* are calculated using four questions about preferences for winning versus losing various sums of money immediately versus a year later taken from Khwaja et al. [38] (i.e., win \$20 vs. \$30, lose \$20 vs. \$30, win \$1,000 vs. \$1,500, lose \$1,000 vs. \$1,500). Individuals who reported they would rather win less money now and lose more money later were considered to have higher present preferences and received higher scores on a 0–4 scale.¹⁹ To verify that participants were paying *attention* to the survey, one question asked that they skip that question.²⁰ Finally, since we fielded this study during the early part of the COVID-19 outbreak, we also included a question asking people's perceived chances of facing negative financial consequences from the outbreak.^{21,22} Results appear in Table 1.

To estimate whether alternative forms of information about longevity risks influenced people's recommendations to save more or annuitize more, we include an indicator for having received either the life expectancy (*life expectancy intervention_i*) or the longevity information (*longevity intervention_i*) condition (see text):

¹⁵ 33% of participants saw the vignette before the subjective survival questions.

¹⁶ 49% are male; 60% of participants completed at least college education; and good health was reported by 85% of participants. See Online Appendix A for variable descriptive statistics.

¹⁷ See Online Appendix B for the Big Three financial literacy questions (Q31, 32, and 78). On average, our respondents answered 2.4 out of 3 questions correctly.

¹⁸ See Online Appendix B for the numeracy questions (Q21, 22, 66, and 67). On average, they correctly answered 1.8 of these questions out of 4.

¹⁹ See Online Appendix B for the present preference questions (Q26-29 and Q77). The average present preferences score was 1.77.

²⁰ 57% skipped the question as requested; we control for this in our regressions.

²¹ Specifically, we asked, "The coronavirus may cause economic challenges for some people regardless of whether they are actually infected. What is the percent chance you will run out of money because of the coronavirus in the next three months?" On average, our respondents believe that there was a 20% chance they will run out of money. See Online Appendix B, Q 15-16 and 19.

²² Our research results regarding the relationship of potential financial consequences and life expectancy are consistent with the results of Polyakova et al. [39] who documented that, in the U.S during the outbreak of Covid-19, excess mortality was correlated with economic damage and age.

(2) $DepVar_i = \alpha + \beta_1 Vinette\ first_i + \beta_2 \mathbf{life\ expectancy\ intervention}_i + \beta_3 \mathbf{longevity\ intervention}_i + \beta_4 age_i + \beta_5 male + \beta_6 Coll + \beta_7 Marital\ Status + \beta_8 Good\ Health + \beta_9 FinLit + \beta_{10} Numeracy_i + \beta_{11} Present\ Pref + \beta_{12} Income_i + \beta_{13} \# in\ HH + \beta_{14} SurveyAttn + \beta_{15} Covid.$

All other variables are described as for equation (1).

Data Availability

We can share the data used for this paper from our Prolific experiment. The provident fund data for the additional field study is proprietary.

Acknowledgments

We have benefited from comments by Thomas Post and Martin Salm and participants of the 2020 Behavioral Research in Economic Workshop, India (BREW), the 2021 NETSPAR International Pension Workshop, and 2021 ZEW Aging and Financial Markets conference.

References

1. Benartzi, S. & R. H. Thaler, (2007). Heuristics and Biases in Retirement Savings Behavior. *Journal of Economic Perspectives* 21(3): 81–1042.
2. Hamermesh, D. S. (1985). Expectations, life expectancy, and economic behavior. *The Quarterly Journal of Economics* 100(2): 389-4083.
3. McGarry, K. M. (2020). Perceptions of mortality: Individual assessments of longevity risk. Wharton PRC Working Paper No. 2020-09.
4. Bloom, D. E., Canning, D., Moore, M., & Song, Y. (2007). The effect of subjective survival probabilities on retirement and wealth in the United States. In Clark, R., Ogawa, N., & Mason, A. (eds.), *Population Aging, Intergenerational Transfers and the Macroeconomy*. Cheltenham, U.K., and Northampton, MA: Elgar, pp. 67-100.
5. Hurd, M.D., Smith, J.P. & Zissimopoulos, J.M. (2004). The effects of subjective survival on retirement and Social Security claiming. *Journal of Applied Econometrics* 19(6): 761-775.
6. Elder, T. E. (2013). The predictive validity of subjective mortality expectations: Evidence from the health and retirement study. *Demography* 50(2): 569-589.
7. Abel, M., Byker, T., & Carpenter, J. (2020). Socially optimal mistakes? Debiasing COVID-19 mortality risk perceptions and prosocial behavior. IZA Working paper No. 13560.
8. Wu, S., Stevens, R., & Thorp, S. (2015). Cohort and target age effects on subjective survival probabilities: Implications for models of the retirement phase. *Journal of Economic Dynamics and Control*, 55: 39-56.

9. Hurwitz, A., & Sade, O. (2020a). An investigation of time preferences, life expectancy, and annuity versus lump-sum choices: Can smoking harm long-term saving decisions? *Journal of Economic Behavior & Organization*, 180: 812-825
10. Hurwitz, A., & Sade, O. (2020b). Smokers' life expectancy and annuitization decisions. In Itzhak, V. (ed.), *Behavioral Finance: A Novel Approach*. London: World Scientific Publishers, pp. 349-364.
11. Ayanian, J.Z., & Cleary, P.D. (1999). Perceived risks of heart disease and cancer among cigarette smokers. *JAMA* 281(11): 1019-1021.
12. Salisbury, L. C., & Nenkov, G. Y. (2016). Solving the annuity puzzle: The role of mortality salience in retirement savings decumulation decisions. *Journal of Consumer Psychology*, 26(3), 417-425.
13. Becker, E. (1973). *The Denial of Death*. New York: Free Press.
14. Dor-Ziderman, Y., Lutz, A., & Goldstein, A. (2019). Prediction-based neural mechanisms for shielding the self from existential threat. *NeuroImage*, 202: 116080.
15. Greenberg, J., Pyszczynski, T., & Solomon, S. (1986). The causes and consequences of a need for self-esteem: A terror management theory. In Baumeister, R.E. (ed.) *Public Self and Private Self*. New York: Springer, pp. 189-212.
16. United States Census Bureau. (2020). 2018-2019, Population and Housing Unit Estimates. <https://www.census.gov/programs-surveys/popest.html>.
17. Salm, M. (2010). Subjective mortality, expectations and consumption, and saving behaviours among the elderly. *Canadian Journal of Economics/Revue Canadienne d'économique* 43(3): 1040-1057.
18. Teppa, F., & Lafourcade, P. (2014). Can longevity risk alleviate the annuitization puzzle? Empirical evidence from survey data. De Nederlandsche Bank (DNB) Working Paper 302. <https://archivo.alde.es/encuentros.alde.es/antiores/xviieea/trabajos/t/pdf/85.pdf>.
19. Peer, E., Brandimarte, L., Samat, S., & Acquisti, A. (2017). Beyond the Turk: Alternative platforms for crowdsourcing behavioral research. *Journal of Experimental Social Psychology*, 70: 153-163.
20. Palan, S., & Schitter, C. (2018). Prolific. Ac: A subject pool for online experiments. *Journal of Behavioral and Experimental Finance*, 17, 22-27.
21. Lee, L. O., James, P., Zevon, E. S., Kim, E. S., Trudel-Fitzgerald, C., Spiro, A., ... & Kubzansky, L. D. (2019). Optimism is associated with exceptional longevity in 2

- epidemiologic cohorts of men and women. *Proceedings of the National Academy of Sciences*, 116(37), 18357-18362.
22. United States Social Security Administration, 2013 Cohort Life Tables. <https://www.ssa.gov/OACT/NOTES/as116/as116LOT.html>.
 23. Van Soest, A., Delaney L., Harmon, C., Kapteyn, A., & Smith, J. (2011). Validating the use of vignettes for subjective threshold scales. *Journal of the Royal Statistical Society: Series A*. 174(3).
 24. Brown, J.R., Kapteyn, A., Luttmer, E.F.P., & Mitchell, O.S. (2017). Cognitive constraints on valuing annuities. *Journal of the European Economic Association* 15, (2): 429-462.
 25. Brown, J. R., Kapteyn, A., Luttmer, E. F., Mitchell, O. S., & Samek, A. (2019). Behavioral impediments to valuing annuities: Complexity and choice bracketing. *Review of Economics and Statistics*, 1-45.
 26. Samek, A., Kapteyn, A., & Gray, A. (2019). Using vignettes to improve understanding of Social Security and annuities. NBER WP 26176.
 27. Puri, M., & Robinson, D. T. (2007). Optimism and economic choice. *Journal of Financial Economics*. 86(1): 71-99.
 28. Huffman, D., Mitchell, O.S., & Maurer, R. (2017). Time discounting and economic decision making among the elderly. *Journal of the Economics of Aging*, 14(19): 100-121.
 29. Maurer, R. & Mitchell, O. S. (2020). Older peoples' willingness to delay Social Security claiming. *Journal of Pension Economics and Finance*. 1-16: doi: 10.1017/S1474747219000404.
 30. Ludwig, A., & Zimmer, A. (2013). A parsimonious model of subjective life expectancy. *Theory and Decision*, 75(4): 519-541.
 31. Heimer, R. Z., Myrseth, K. O. R., & Schoenle, R. S. (2019). YOLO: Mortality beliefs and household finance puzzles. *The Journal of Finance*, 74(6): 2957-2996.
 32. O'Dea, C., & Sturrock, D. (2020). Survival pessimism and the demand for annuities. IFS Working Paper No. 19/02.
 33. Post, T., & Bruine de Bruin, W. (2021). Eliciting Individuals' Financial Decision-Making Approaches with Verbal Protocols. Available at SSRN.
 34. Lusardi, A., & Mitchell, O. S. (2008). Planning and financial literacy: How do women fare? *American Economic Review*, 98(2): 413-17.

35. Lusardi, A., & Mitchell, O. S. (2011). Financial literacy and planning: Implications for retirement well-being. In Mitchell, O.S. & Lusardi, A. (eds) *Financial Literacy: Implications for Retirement Security and the Financial Marketplace*. Oxford: Oxford University Press, pp. 17-39.
36. Lusardi, A. & Mitchell, O. S. (2014). The economic importance of financial literacy: Theory and evidence. *Journal of Economic Literature*, 52(1): 5-44.
37. Lipkus, I. M., Samsa, G., & Rimer, B. K. (2001). General performance on a numeracy scale among highly educated samples. *Medical Decision Making*, 21: 37-44.
38. Khwaja, A., Silverman, D., & Sloan, F. (2007). Time preference, time discounting, and smoking decisions. *Journal of Health Economics*, 26(5): 927-949.
39. Polyakova, M. Kocks, G. Udalova, V & Finkelstein A., (2020) Initial economic damage from the COVID-19 pandemic in the United States is more widespread across ages and geographies than initial mortality impacts. *Proceedings of the National Academy of Sciences* Nov 2020, 117 (45) 27934-27939

Figure 1. Mean SLE_{LE} : By Treatment and Question Order in Prolific sample

Note: Half of the participants were exposed to the annuitization condition and the other half to the saving condition (see text). All participants were exposed to either no treatment (the control group,); the life expectancy information treatment; or the longevity information treatment. Respondents who saw the vignette *before* they estimated their survival probabilities are represented in the left bar, and those who saw the vignette *afterwards* are represented in the middle bar, full sample is represented in the right bar. Seeing the vignette first significantly decreased respondents' self-assessed chances of living longer than the life table. The longevity treatment significantly increased subjective survival assessments for the full sample. Sample includes only consistent participants (see text).

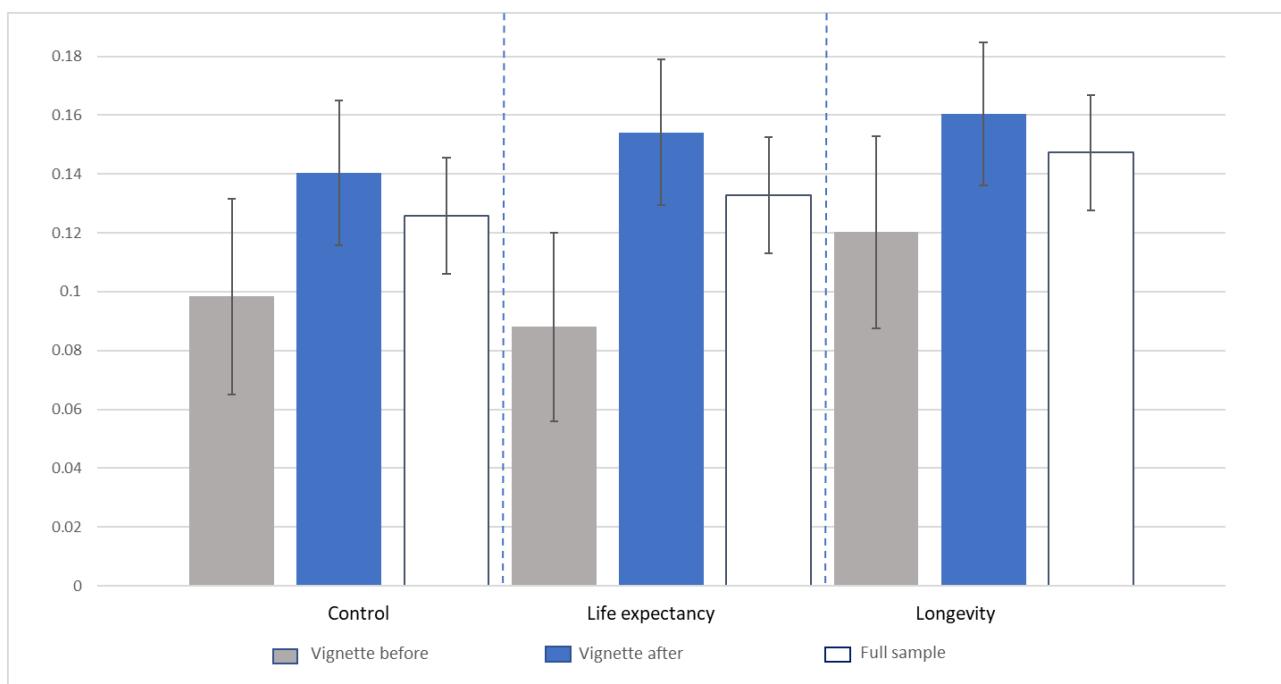


Table 1. Framing Survival: Logit (average marginal effects) and OLS Models, Prolific Sample

	<i>Longevity+</i>	<i>SLE-LE: (OLS)</i>
Vignette 1st	-0.078*** (0.021)	-0.062*** (0.012)
Life expec. Trt.	0.020 (0.024)	0.012 (0.014)
Longevity Trt.	0.054** (0.024)	0.028** (0.014)
Observations	2,396	2,396
Pseudo R-sq/R-sq	0.067	0.089
Dep. Var. Mean	0.563	0.133
Dep. Var. St. Dev.	0.496	0.292

Note: *Longevity+* is equal to 1 if the respondent's self-reported life expectancy exceeds the respondent's objective life expectancy from the relevant age/sex life table. *SLE-LE* measures the difference between the respondent's subjective versus objective survival probabilities. Key control variables of interest include an indicator of having received the Vignette First (before the survival probability questions), and treatment information provided (Life Expectancy Trt. vs. Longevity Trt. In addition, we control on age, sex, education, marital status, self-reported health, financial literacy and numeracy scores, present preference score, income, the number of people living in household attention to the survey and for COVID financial vulnerability. Results here are for consistent participants (those who understood the survival probability questions; see text) (N = 2,161). Standard errors in parentheses. *** p < 0.01. ** p < 0.05

Table 2: Framing Longevity and Financial Decisions: Logit Models, Prolific Sample

	<i>Save More</i>			<i>Annuitize More</i>		
	(1) Logit Ave. Marg. Effects: under estimators	(2) Logit Ave. Marg. Effects: Consistent	(3) Logit Ave. Marg. Effects: Consistent & under estimators	(4) Logit Ave. Marg. Effects: under estimators	(5) Logit Ave. Marg. Effects: Consistent	(6) Logit Ave. Marg. Effects: Consistent & under estimators
Vignette 1st	0.038 (0.040)	0.009 (0.027)	0.029 (0.044)	0.009 (0.036)	0.007 (0.025)	0.037 (0.042)
Life Expec. Trt.	0.018 (0.044)	-0.006 (0.031)	0.036 (0.048)	0.118*** (0.040)	0.046 (0.029)	0.123*** (0.047)
Longevity Trt.	-0.006 (0.045)	-0.003 (0.031)	0.024 (0.050)	0.090** (0.039)	0.014 (0.028)	0.054 (0.045)
Observations	670	1,389	562	645	1,312	483
Pseudo R-sq/R-sq	0.092	0.088	0.076	0.053	0.036	0.052
Dep. Var. Mean	0.560	0.564	0.577	0.757	0.758	0.758
Dep. Var. St. Dev.	0.497	0.496	0.495	0.429	0.428	0.429

Note: Table 2 presents multivariate regression estimates of participants' propensity to recommend saving more or annuitizing more (versus choosing a lump-sum option at retirement) after seeing the annuitization vignette. Key control variables of interest include an indicator of having received the Vignette First (before the survival probability questions), and treatment information provided (Life Expectancy Trt. vs. Longevity Trt. vs control). In addition, we control on age, sex, education, marital status, self-reported health, financial literacy and numeracy scores, present preference score, income, a control for devoting sufficient attention to the survey, and the number of people living in household and for COVID financial vulnerability. Results provided for the full sample and pessimistic respondents (as indicated), and include only consistent participants (see text). ($N_1 = 1,389$; $N_2 = 562$; $N_3 = 1,312$; $N_4 = 483$). Standard errors in parentheses. *** $p < 0.01$. ** $p < 0.05$

Competing Interest Information for All Authors

Abigail Hurwitz declares she has no competing interests on this project.

Olivia S. Mitchell also declares she has no competing interests on this project.

Orly Sade also declares she has no competing interests on this project.

Data Sharing Plans (data, documentation, code)

We will be able to share the data used for this paper from our Prolific experiment. The provident fund data for the additional field study is proprietary.

Funding Information:

The authors acknowledge research support for this work from the TIAA Institute and the Pension Research Council/Boettner Center at The Wharton School of the University of Pennsylvania. All findings and conclusions expressed are those of the authors and not the official views of the TIAA Institute or any of the other institutions with which the authors are affiliated. This research is part of the NBER Aging program and the Household Portfolio workshop.

An Open Access License will be selected.

List of Appropriate Editorial Board, NAS members, and qualified reviewers experts in the papers scientific area;

- Editorial Board, Economic Sciences: Anne C. Case
- NAS members: David Laibson, Robert Moffitt, Janet Currie

Qualified Reviewers:

Anya Samek, UCSD (anyasamek@gmail.com) – experimentalist and has published on longevity topics

Kathleen McGarry, UCLA (mcgarry@econ.ucla.edu) – extensive expertise with survival probabilities and economic decisionmaking

David Huffman, Univ. of Pittsburg (huffmand@pitt.edu) – experimental economist who has published on economic decisionmaking

Arie Kapteyn, USC (kapteyn@usc.edu) - expert on surveys and vignettes

David Bloom, Harvard (dbloom@hsph.harvard.edu) – eminent labor and health economist with deep expertise in population aging

Online Appendix A: Descriptive Statistics

Table A1. Experimental Design: Number of Participants by Treatment Group and Vignette Presentation, Prolific Sample

	Life expectancy	Longevity	Control	Total
Savings	725	728	730	2,183
Annuity	734	731	723	2,188
Total	1,459	1,459	1,453	4,371

Note: Respondents were randomly allocated to a savings or an annuity vignette. In each case, respondents received either *life expectancy information* (condition 1), *longevity information* (condition 2), or no additional information (Control); see text.

Table A2. Descriptive Statistics: Prolific Study

Variable	Obs	Mean	Std.Dev.	Min	Max
Longevity+	3836	.611	.488	0	1
SLE_LE	3835	.172	.304	-.339	.915
Sig. increase savings	2183	.523	.5	0	1
Recommend annuity	2188	.743	.437	0	1
Vignette first	4380	.337	.473	0	1
Life exp. grp	4380	.333	.471	0	1
Longevity grp	4380	.333	.471	0	1
Age	4380	49.203	9.586	35	83
Male	4380	.435	.496	0	1
Coll	4380	.603	.489	0	1
Married	4380	.578	.494	0	1
Widowed	4380	.025	.157	0	1
Never married	4380	.225	.418	0	1
Good health	4380	.851	.356	0	1
FinLit	4380	2.413	.836	0	3
Numeracy	4380	1.804	1.072	0	3
Present Prefs	4380	1.775	1.406	0	4
Income/10000	4063	1.259	2.858	0	40
# in household	4326	2.615	1.44	0	20
Survey Attention	4380	.57	.495	0	1
Covid consistent	3897	20.966	29.487	0	100
	4380	.741	.438	0	1

Note: Longevity is equal to 1 if the respondent's self-reported life expectancy exceeded the respondent's objective life expectancy from the relevant age/sex life table. *SLE-LE* measures the difference between the respondent's subjective versus objective survival probabilities. *Sig. increase savings* takes the value of 1 if the respondent recommended the vignette individual significantly increase savings, and *Recommend annuity* is an indicator variable recommending that the vignette individual annuitize. Other variables include an indicator of having received the vignette before the survival probability questions, treatment condition (life expectancy vs. longevity), age, male, college +, marital status dummy variables, self-reported health good/very good/excellent, financial literacy score, numeracy score, present preference score, income, number of people living in household, attention to survey, COVID financial vulnerability.

Online Appendix B

Table B1. Prolific Survey of Financial Decision-making

Q1 Welcome to the research study!

This survey asks you some questions about how you think about your financial matters, including retirement planning and financial risks. The survey is aimed at people age 50 and over.

If you choose to participate in this study you will be asked to answer questions about financial terms, planning, risk, and related topics. You do not need any special financial information to take part in this study. We will also ask you a few general questions. You will not be asked to provide any identifying information about yourself. The survey will take approximately 20 minutes for which you will receive GBP 2.5 for participating.

Participation is voluntary and you have the right to withdraw from the study at any time without penalty. If you withdraw, you have the right to request that any information you supplied be erased. Once you have completed the survey, your data cannot be destroyed, as we store no personally identifiable information to ensure complete anonymity and confidentiality.

If you have any questions regarding the study, please contact the research staff:

Dr. Abigail Hurwitz

abigail.mimun@gmail.com

By selecting the checkbox you are giving your consent to participate in this study.

I consent, begin the study

I do not consent, I do not wish to participate

Q58 Please tell us a little about yourself:

Q4 What is your current age?

Q6 What is your gender?

- Male
- Female
- Prefer not to say

Q8 What is the HIGHEST level of education that you have completed?

- Less than high school
- High school or GED
- some college (including Associate degree)
- Vocational or technical school
- Completed College (Bachelor's degree)
- Graduate school

Q9 Is English the main language that you speak at home?

- Yes
- Maybe
- No

Q10 What is your marital status?

- Married
- Widowed
- Divorced
- Separated
- Never married

Q7 Which of the following terms would you use to describe yourself?

- White, Non-Hispanic
- Hispanic or Latino
- African American
- Asian or Pacific Islander
- Other (please specify) _____

Q11 The following questions relate to your health and expected longevity. Please answer them as best you can:

Q59 In general, would you say your health is:

- Excellent
- Very Good
- Good
- Fair
- Poor

Q12 What is the percent chance [0-100] that you think you will live at least $\{e://Field/AgeDeath\}$ more years?

- Percent chance _____
- Don't know
- Refuse

Q14 And what is the percent chance [0-100] that you think you will live at least $\{e://Field/AgeDeath2\}$ more years?

- Percent chance _____
- Don't know

Refuse

Q15 The next few questions are about your health care visits in the last 12 months:

Q60 (Not counting overnight hospital or nursing home stays) During the last 12 months, since January of 2019, how many times have you seen or talked to a medical doctor about your health, including emergency room or clinic visits?

- 0
- 1
- 2-3
- 4-5
- 6-9
- 10+

Q16 Did you take any prescription medications in the past 12 months, since January of 2019?

- Yes
- No
- Don't know
- Refuse

Q17 Over the last year, about how many different prescription medications did you take per month on average?

- Prescriptions: _____
- Don't know
- Refuse

Q18 Over the last year, about how much money did you spend on prescription medication per month on average?

- \$ on prescription medications per month over the last year:
- Don't know
- Refuse

Q38 Next we will describe a financial decision facing Mrs. Smith and then we will ask you what you would recommend to this person:

Q62 Mrs. Smith is a single, 60-year-old woman with no children. She will retire and claim her Social Security benefits at 65. When she retires, she will have \$100,000 saved for her retirement, and she will receive \$1,400 in monthly Social Security benefits. Imagine that Mrs. Smith asks you about how to manage her \$100,000 retirement savings. Please indicate which one of the two options you would recommend:

- Withdraw the entire \$100,000 all at once from the retirement account, to use as she needs.
- Receive a regular monthly sum of \$500 (equal to \$6,000 yearly) for the rest of her life.

Q39 Just as before, Mrs. Smith is still a single, 60-year-old woman with no children who will retire and claim Social Security benefits at 65. When she retires, she will have \$100,000 saved for her retirement, and she will receive \$1,400 in monthly Social Security benefits.

But now she has a third option that she can choose from. Please indicate which one of the three options you would recommend:

- Withdraw the entire \$100,000 all at once from the retirement account, to use as she needs.
- Receive a regular monthly sum of \$500 (equal to \$6,000 yearly) for the rest of her life.
- Withdraw a lump sum of \$50,000 at retirement, and receive a regular monthly sum of \$250 (equals to \$3,000 yearly) for the rest of her life.

Q46 Next we will describe a financial decision facing Mr. Smith and then we will ask you what you would recommend to this person:

Q70 Mr. Smith is a single, 60-year-old man with no children. He will retire and claim his Social Security benefits at 65. When he retires, he will have \$100,000 saved for his retirement, and he will receive \$1,400 in monthly Social Security benefits. Imagine that Mr. Smith asks you about how to manage his \$100,000 retirement savings. Please indicate which one of the two options you would recommend:

- Withdraw the entire \$100,000 all at once from the retirement account, to use as he needs.
- Receive a regular monthly sum of \$500 (equal to \$6,000 yearly) for the rest of his life.

Q47 Just as before, Mr. Smith is still a single, 60-year-old man with no children who will retire and claim Social Security benefits at 65. When he retires, he will have \$100,000 saved for his retirement, and he will receive \$1,400 in monthly Social Security benefits.

But now he has a third option that he can choose from. Please indicate which one of the three options you would recommend:

- Withdraw the entire \$100,000 all at once from the retirement account, to use as he needs.
- Receive a regular monthly sum of \$500 (equal to \$6,000 yearly) for the rest of his life.
- Withdraw a lump sum of \$50,000 at retirement, and receive a monthly sum of \$250 (equal to \$3,000) for the rest of his life.

Q64 Next we will describe a financial decision facing Mrs. Smith and then we will ask you what you would recommend to this person:

Q48 Mrs. Smith is a single, 60-year-old woman with no children. She will retire and claim her Social Security benefits at 65. When she retires, she will have \$100,000 saved for her retirement, and she will receive \$1,400 in monthly Social Security benefits.

Please note that an American woman, 65 years old, will survive 20.6 more years on average. Imagine that Mrs. Smith asks you about how to manage her \$100,000 retirement savings. Please indicate which one of the two options you would recommend:

- Withdraw the entire \$100,000 all at once from the retirement account, to use as she needs.
- Receive a regular monthly sum of \$500 (equal to \$6,000 yearly) for the rest of her life.

Q49 Just as before, Mrs. Smith is still a single, 60-year-old woman with no children who will retire and claim Social Security benefits at 65. When she retires, she will have \$100,000 saved for her retirement, and she will receive \$1,400 in monthly Social Security benefits.

Please note that an American woman, 65 years old, will survive 20.6 more years on average.

But now she has a third option that she can choose from. Please indicate which one of the three options you would recommend:

- Withdraw the entire \$100,000 all at once from the retirement account, to use as she needs.
- Receive a regular monthly sum of \$500 (equal to \$6,000 yearly) for the rest of her life.
- Withdraw a lump sum of \$50,000 at retirement, and receive a regular monthly sum of \$250 (equals to \$3,000 yearly) for the rest of her life.

Q61 Next we will describe a financial decision facing Mr. Smith and then we will ask you what you would recommend to this person:

Q71 Mr. Smith is a single, 40-year-old man with no children. He will retire and claim his Social Security benefits at 65. When he retires, he will have \$100,000 saved for his retirement, and he will receive \$1,400 in monthly Social Security benefits.

Please note that 22.3% of American men, 65 years old, will survive to the age of 90 or more.

Please indicate which one of these options you would recommend:

- Maintain his current saving level.
- Slightly increase his long-term savings by spending less.
- Significantly increase his long-term savings by spending less.
- Don't know

Q65 Next we will describe a financial decision facing Mrs. Smith and then we will ask you what you would recommend to this person:

Q52 Mrs. Smith is a single, 60-year-old woman with no children. She will retire and claim her Social Security benefits at 65. When she retires, she will have \$100,000 saved for her retirement, and she will receive \$1,400 in monthly Social Security benefits.

Please note that 33.2% of American women, 65 years old, will survive to the age of 90 or more. Imagine that Mrs. Smith asks you about how to manage her \$100,000 retirement savings. Please indicate which one of the two options you would recommend:

- Withdraw the entire \$100,000 all at once from the retirement account, to use as she needs.
- Receive a regular monthly sum of \$500 (equal to \$6,000 yearly) for the rest of her life.

Q53 Just as before, Mrs. Smith is still a single, 60-year-old woman with no children who will retire and claim Social Security benefits at 65. When she retires, she will have \$100,000 saved for her retirement, and she will receive \$1,400 in monthly Social Security benefits.

Please note that 33.2% of American women, 65 years old, will survive to the age of 90 or more.

But now she has a third option that she can choose from. Please indicate which one of the three options you would recommend:

- Withdraw the entire \$100,000 all at once from the retirement account, to use as she needs.
- Receive a regular monthly sum of \$500 (equal to \$6,000 yearly) for the rest of her life.
- Withdraw a lump sum of \$50,000 at retirement, and receive a regular monthly sum of \$250 (equals to \$3,000 yearly) for the rest of her life.

Q59 Next we will describe a financial decision facing Mr. Smith and then we will ask you ask what you would recommend to this person:

Q72 Mr. Smith is a single, 40-year-old man with no children. He will retire and claim his Social Security benefits at 65. When he retires, he will have \$100,000 saved for his retirement, and he will receive \$1,400 in monthly Social Security benefits.

Please note that an American man, 65 years old, will survive 18.1 more years on average.

Please indicate which one of these options you would recommend:

- Maintain his current saving level.
- Slightly increase his long-term savings by spending less.
- Significantly increase his long-term savings by spending less.
- Don't know.

Q50 Next we will describe a financial decision facing Mr. Smith and then we will ask you ask what you would recommend to this person:

Q73 Mr. Smith is a single, 60-year-old man with no children. He will retire and claim his Social Security benefits at 65. When he retires, he will have \$100,000 saved for his retirement, and he will receive \$1,400 in monthly Social Security benefits.

Please note that an American man, 65 years old, will survive 18.1 more years on average. Imagine that Mr. Smith asks you about how to manage his \$100,000 retirement savings. Please indicate which one of the two options you would recommend:

- Withdraw the entire \$100,000 all at once from the retirement account, to use as he needs.
- Receive a regular monthly sum of \$500 (equal to \$6,000 yearly) for the rest of his life.

Q51 Just as before, Mr. Smith is still a single, 60-year-old man with no children who will retire and claim Social Security benefits at 65. When he retires, he will have \$100,000 saved for his retirement, and he will receive \$1,400 in monthly Social Security benefits.

Please note that an American man, 65 years old, will survive 18.1 more years on average.

But now he has a third option that he can choose from. Please indicate which one of the three options you would recommend:

- Withdraw the entire \$100,000 all at once from the retirement account, to use as he needs.
- Receive a regular monthly sum of \$500 (equal to \$6,000 yearly) for the rest of his life.
- Withdraw a lump sum of \$50,000 at retirement, and receive a monthly sum of \$250 (equal to \$3,000) for the rest of his life.

Q54 Next we will describe a financial decision facing Mr. Smith and then we will ask you ask what you would recommend to this person:

Q75 Mr. Smith is a single, 60-year-old man with no children. He will retire and claim his Social Security benefits at 65. When he retires, he will have \$100,000 saved for his retirement, and he will receive \$1,400 in monthly Social Security benefits.

Please note that 22.3% of American men, 65 years old, will survive to the age of 90 or more. Imagine that Mr. Smith asks you about how to manage his \$100,000 retirement savings. Please indicate which one of the two options you would recommend:

- Withdraw the entire \$100,000 all at once from the retirement account, to use as he needs.
- Receive a regular monthly sum of \$500 (equal to \$6,000 yearly) for the rest of his life.

Q55 Just as before, Mr. Smith is still a single, 60-year-old man with no children who will retire and claim Social Security benefits at 65. When he retires, he will have \$100,000 saved for his retirement, and he will receive \$1,400 in monthly Social Security benefits.

Please note that 22.3% of American men, 65 years old, will survive to the age of 90 or more.

But now he has a third option that he can choose from. Please indicate which one of the three options you would recommend:

- Withdraw the entire \$100,000 all at once from the retirement account, to use as he needs.
- Receive a regular monthly sum of \$500 (equal to \$6,000 yearly) for the rest of his life.
- Withdraw a lump sum of \$50,000 at retirement, and receive a monthly sum of \$250 (equal to \$3,000) for the rest of his life.

Q57 Next we will describe a financial decision facing Mr. Smith and then we will ask you ask what you would recommend to this person:

Q74 Mr. Smith is a single, 40-year-old man with no children. He will retire and claim his Social Security benefits at 65. When he retires, he will have \$100,000 saved for his retirement, and he will receive \$1,400 in monthly Social Security benefits.

Please indicate which one of these options you would recommend:

- Maintain his current saving level.
- Slightly increase his long-term savings by spending less.
- Significantly increase his long-term savings by spending less.
- Don't know.

Q50 Next we will describe a financial decision facing Mrs. Smith and then we will ask you ask what you would recommend to this person:

Q67 Mrs. Smith is a single, 40-year-old woman with no children. She will retire and claim her Social Security benefits at 65. When she retires, she will have \$100,000 saved for her retirement, and she will receive \$1,400 in monthly Social Security benefits.

Please indicate which one of these options you would recommend:

- Maintain her current saving level.
- Slightly increase her long-term savings by spending less.
- Significantly increase her long-term savings by spending less.
- Don't know.

Q58 Next we will describe a financial decision facing Mrs. Smith and then we will ask you ask what you would recommend to this person:

Q68 Mrs. Smith is a single, 40-year-old woman with no children. She will retire and claim her Social Security benefits at 65. When she retires, she will have \$100,000 saved for her retirement, and she will receive \$1,400 in monthly Social Security benefits.

Please note that an American woman, 65 years old, will survive 20.6 more years on average. Please indicate which one of these options you would recommend:

- Maintain her current saving level.
- Slightly increase her long-term savings by spending less.
- Significantly increase her long-term savings by spending less.
- Don't know.

Q60 Next we will describe a financial decision facing Mrs. Smith and then we will ask you what you would recommend to this person:

Q69 Mrs. Smith is a single, 40-year-old woman with no children. She will retire and claim her Social Security benefits at 65. When she retires, she will have \$100,000 saved for her retirement, and she will receive \$1,400 in monthly Social Security benefits.

Please note that 33.2% of American women, 65 years old, will survive to the age of 90 or more. Please indicate which one of these options you would recommend:

- Maintain her current saving level.
- Slightly increase her long-term savings by spending less.
- Significantly increase her long-term savings by spending less.
- Don't know.

Q61 Now we will ask you some questions about chances and probabilities. Please answer the following questions to the best of your ability and type your answer in numerals, not words (i.e., 12, not "twelve"):

Q66 Imagine that we rolled a fair six-sided die 1,000 times. Out of 1,000 rolls, how many times do you think the die will come up even (2, 4, or 6)?

- Number of times: _____
- Don't know
- Refuse

Q20 Imagine that we rolled a five-sided die 50 times. On average, out of these 50 throws how many times will this five-sided die show an odd number (1, 3, or 5)?

- Number of times: _____
- Don't know
- Refuse

Q21 In BIG BUCK LOTTERY, the chance of winning a \$10 prize is 1%. What is your best guess about how many people would win a \$10 prize if 1,000 people each bought a single ticket from BIG BUCKS?

- Number of people: _____
- Don't know
- Refuse

Q23 Please tell us a little more about yourself:

Q76 Are you currently working for pay?

- Yes
- No

Q24 Do you currently have a bank saving or checking account?

- Yes
- No
- Don't know
- Refuse

Q24 What is your best estimate of your household total monthly income?

- \$ per month: _____
- Don't know
- Refuse

Q25 Including yourself, how many people living in your household are supported by this income?

- Number of people: _____
- Don't know
- Refuse

Q26 The next few questions ask you about your feelings about money now versus later

Q77 Would you rather win \$20 now or \$30 a year from now?

- Win \$20 now
- Win \$30 a year from now

Q27 Would you rather lose \$20 now or \$30 a year from now?

- Lose \$20 now
- Lose \$30 a year from now

Q28 Would you rather win \$1,000 now or \$1,500 a year from now?

- Win \$1,000 now
- Win \$1,500 a year from now

Q29 Would you rather lose \$1,000 now or \$1,500 a year from now?

- Lose \$1,000 now
- Lose \$1,500 a year from now

Q30 In the next few questions we ask you a few brain teasers and some factual questions. Please answer them to the best of your ability:

Q78 Suppose you had \$100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow:

- More than \$102
- Exactly \$102
- Less than \$102
- Don't know
- Refuse

Q31 Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, with the money in this account, would you be able to buy:

- More than today
- Exactly the same as today
- Less than today
- Don't know
- Refuse

Q32 Do you think that the following statement is true or false? "Buying a single company stock usually provides a safer return than a stock mutual fund."

- True
- False
- Don't know
- Refuse

Q111 Which of the following statements comes closest to describing the amount of financial risk that you are willing to take when you save or make investments? **Please skip this question.**

- I am willing to take substantial financial risks expecting to earn substantial returns
- I am willing to take above average financial risks expecting to earn above-average returns
- I am willing to take average financial risks expecting to earn average returns
- I am willing to take below average financial risks expecting to earn below-average returns
- I am not willing to take any risk, knowing I will earn a small but certain return

Q33 A bat and a ball cost \$1.10 in total. The bat costs \$1.00 more than the ball. How much does the ball cost?

- \$: _____
- Don't know
- Refuse

Q34 If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?

- Minute(s): _____
- Don't know
- Refuse

Q37 Using the scale below, mark the box to the right that best describes how likely you would do the activities in the following statements:

	Very likely	Somewhat likely	Not Sure	Somewhat unlikely	Very unlikely
Eating 'expired' food products that still 'look okay'	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Frequent binge drinking (more than two drinks per day)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ignoring a persistent physical pain by not going	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Taking a prescription drug that has a high likelihood of negative side effects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Engaging in unprotected sex	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Never wearing a seatbelt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Not having a smoke alarm in or outside of your bedroom	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Regularly riding your bicycle without a helmet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Smoking a pack or more of cigarettes per day	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q108 Using the scale below, mark the box to the right that best describes how likely you would do the activities in the following statements:

	Very likely	Somewhat likely	Not Sure	Somewhat unlikely	Very unlikely
Investing 10% of your annual income in a moderate growth mutual fund (like a 401(k) or other retirement plan)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Betting a day's income at a high-stakes poker game	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Investing 5% of your annual income in a very speculative stock (like a stock with high risk relative to any potential positive returns)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Betting a day's income on the outcome of a sporting event	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Betting a day's income at the horse races	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Investing 10% of your annual income in a new business venture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q114 The coronavirus (COVID-19) is a new disease with flu-like symptoms that is spreading across the world. Have you heard of the coronavirus (COVID-19)?

- Yes
- No
- Don't know

Q115 The coronavirus may cause economic challenges for some people regardless of whether they are actually infected. What is the percent chance you will run out of money because of the coronavirus in the next three months?

- Percent chance: _____
- Don't know
- Refuse

Q119 On a scale of 0 to 100 percent, what is the chance that you will get the coronavirus in the next three months? If you're not sure, please give your best guess.

- Percent chance: _____
- Don't know
- Refuse

Q116 If you do get the coronavirus, what is the percent chance you will die from it? If you're not sure, please give your best guess.

- Percent chance: _____
- Don't know
- Refuse

Q36 Could you tell us how interesting or uninteresting you found the questions in this interview?

- Very interesting
- Interesting
- Neither interesting nor uninteresting
- Uninteresting
- Very uninteresting