

Evaluating the Effects of a Low-Cost, Online Financial Education Program

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Abstract

This paper provides evidence on how a low-cost, online, and scalable financial education program influences older participants' financial knowledge. We tested the program using a field experiment that included short stories covering three fundamental financial education topics: compound interest, risk diversification, and inflation. Two surveys were administered eight months apart to measure the effects of those stories on participants' short-term and longer-term knowledge and financial distress indicators. We show that the risk diversification story was the most effective at improving participants' knowledge, in both the short and longer term. The compound interest and inflation stories significantly increased participants' knowledge in the short term, but the gain in financial literacy declined over time.

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JEL codes: G53, D1, I3

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Americans face a myriad of important financial decisions that determine their economic wellbeing over the normal course of their lives. Decisions that shape lifetime patterns of income and wealth begin early in life. In high school, students must determine how to finance college enrollment or even whether college attendance is a feasible investment. Digital financial innovations demand that people adapt to a rapidly changing financial landscape and increase the importance of financial literacy. Later in life, individuals often must decide how to first build and then access pension wealth from retirement plan designs that require them to manage their saving and spending. Essential to making good choices when facing these decisions is a satisfactory level of financial literacy: financial knowledge is needed for people to thrive economically in today's society.

Unfortunately, many Americans are not financially literate, meaning they lack a basic understanding of fundamental financial concepts. The importance of financial literacy has been documented in a large and growing literature (for an overview see Lusardi and Mitchell 2014, 2023). Data from 2023 shows that, on average, U.S. adults can correctly answer only half of 28 financial literacy questions, which are related to common financial situations that individuals encounter (Yakoboski et al. 2023). Poor financial knowledge is of concern since lower financial literacy tends to lead to lower financial well-being that follows from suboptimal choices (van Rooij et al. 2012; Lusardi et al. 2017; Hasler et al. 2022; Lusardi and Mitchell 2023). Consequently, promoting financial literacy through effective financial education is important to improving financial well-being.

This paper analyzes whether a low-cost, online, and scalable financial education program enhances older participants' financial knowledge and distress, using information from two Understanding America Study (UAS) surveys. The experiment presented people with short stories covering three fundamental financial education topics identified as important basic knowledge and called the 'Big Three' in prior literature (Lusardi and Mitchell 2011): compound interest, risk diversification, and inflation. Each of these stories took around three minutes to read. Participants were randomly assigned to four groups: a control group not exposed to any story, and three treated groups, each of which received a different story. We assessed the interventions' short- and longer-term effects with a difference-in-difference approach which compares the changes in the treated group's knowledge and financial distress indicators to those of the control group.

We find that all three stories had sizeable positive short-term effects on participants' financial knowledge as measured by correct answers to survey knowledge questions. Across all interventions, the risk diversification story had the largest effect; leading to correctly answering the related knowledge questions by 17-18 percentage points, compared to the control group. The inflation story also produced positive and statistically significant treatment effects, with the treated group being 6-8 percentage points more likely to answer the related knowledge questions correctly. The compound interest story produced the smallest gains in knowledge, such that the treated group was 16.6 percentage points more likely to correctly answer one of the two related knowledge questions compared to the control group. Hence, our findings provide evidence that short educational stories can boost knowledge, and the results are robust to several alternative econometric specifications.

In a follow-up survey conducted eight months after the initial wave, the same participants were again asked to answer the knowledge questions: hence, the follow-up survey permits us to assess the longer-term effects of the intervention. Our results show that the risk diversification story still had a sizeable and positive treatment effect even after eight months. People exposed to the inflation and compound interest stories demonstrated smaller and less statistically significant longer-term treatment effects, compared to the short-term effects.

Additionally, we explored whether these treatment effects differed across gender, educational levels, age, and income. Overall, the analysis confirms that the risk diversification story had a particularly strong short-term impact on those respondents with lower educational attainment and lower income. In the longer term, the inflation story improved knowledge most for the higher-income and the better-educated respondents.

Further, we explored whether the intervention shaped four financial distress indicators reported by survey participants: financial fragility (being unable to come up with \$2,000 in a month's time), over-indebtedness (having too much debt), financial dissatisfaction (being unsatisfied with their current financial situation), and difficulty making ends meet (having difficulty covering all expenses and paying their bills right now). Results show that the financial education intervention tested and/or the timespan of the follow-up survey were likely too short, as we did not see any significant changes in participants' financial distress indicators eight months after being exposed to the stories.

Finally, we analyzed timestamp data from both surveys to gauge the effect of the financial education intervention on participants' time spent on the knowledge questions in the initial as well as the follow-up surveys. Results show that the inflation story increased the time participants spent answering questions on the effect of inflation on real income. This finding suggests that exposure to our story increases participants' attentiveness and interest in the topics.

In Section I, we provide a brief literature review of the evidence showing the importance of financial literacy. Section II discusses the design of the field experiment, the key survey questions, and the data from the two surveys. Section III presents the empirical strategy used to examine the data. Finally, Section IV presents results.

I. Overview of the Literature

In view of the importance of improving financial literacy, it is critical to evaluate the effectiveness of financial education programs. Previous researchers have sought to assess how financial education can shape financial knowledge and financial behavior, using both randomized control trials (RCTs) and quasi-experiments. A recent meta-analysis of RCTs by Kaiser et al. (2022) examined 76 randomized experiments across 33 countries to analyze the short- and medium-term effects of financial education programs on respondents' knowledge and downstream behaviors. It provided strong evidence that financial education improves both financial knowledge and behaviors, especially when it comes to budgeting, saving, and credit. Overall, the authors concluded that the effects of financial education were three to five times greater than reported in prior research. Additional studies focusing on high school personal finance graduation requirements in the United States have concluded that financial education reduces non-student debt, leads to better credit scores, reduces default rates (Brown et al. 2016; Urban et al. 2020), shifts student loan borrowing from high- to low-interest methods (Stoddard and Urban 2020), increases student loan repayment rates (Mangrum 2021), reduces payday loan borrowing for young adults (Harvey 2019), and increases bank account ownership for those with only a high school education (Harvey 2020). Moreover, Clark (2023) provides an extensive summary of the findings from studies analyzing the effectiveness of employer-provided financial education programs across the past 20 years, highlighting the importance of company-provided retirement planning programs to employees.

Despite the demonstrated positive effects of financial education, such programs are often costly, requiring training and paying full-time instructors and offering incentives to recruit participants into these programs. In addition, Meier and Sprenger (2013) showed that those who needed financial knowledge the most were also less likely to seek out these programs. Accordingly, the present study seeks to investigate the effectiveness of a financial education program that is easy to set up, cost-effective, and scalable. To this end, we designed and fielded a simple intervention that provided short stories on three fundamental financial concepts: compound interest, risk diversification, and inflation. These are core concepts identified in the literature as critically important for retirement planning and other financial decision making (Lusardi and Mitchell 2014). Endorsing these, we built on two prior studies. First, Heinberg et al. (2014) conducted a field experiment that exposed participants to five educational interventions, three of which included our topics of special interest.² The main goal of that study was to test the effectiveness of alternative ways to present the information (videos, narratives, or both). Despite the fact that their study was conducted a decade ago, our main results are largely consistent with theirs, in that we find sizeable short-term effects of financial education, while longer-term effects are smaller. Our work is also related to Lusardi et al. (2017), which focused on a single topic—risk diversification—while evaluating four delivery approaches: an informational brochure, an interactive visual tool, a written narrative, and a video. That study concluded that the narrative format improved self-efficacy but had no effect on risk literacy. Our results in the present paper add to these findings, as we document that the risk diversification story improves knowledge, not only in the short term but also in the longer term.

Our paper is also broadly related to studies that utilize vignettes (i.e., short stories about a hypothetical person/situation used for research purposes) to deliver information to target participants. For example, Samek et al. (2019) used vignettes to improve peoples' understanding of social security and annuities, and they reported that vignettes increased financial literacy about those topics by 10-15 percentage points. Seligman (2014) found that vignettes helped address critiques that self-reports of health status in the Health and Retirement Study (HRS) data were based on subjective scales and, thus, prone to justification bias. Therefore, short stories have a precedent and this paper adds to the literature by focusing on fundamental financial concepts.

² The other two topics covered tax-favored assets and employer matches in retirement plans.

Finally, our paper is also linked to studies that utilize response time data in online surveys (e.g., Börger 2016; Lundgren and Eklöf 2023; Read et al. 2021). Previous studies showed that survey response time is correlated with response quality. For example, Börger (2016) found that a longer response time reduced randomness in answering questions. Lundgren and Eklöf (2023) showed that the response time in the Programme for International Student Assessment (PISA) data serves as a proxy for test-taking motivation. Read et al. (2021) used response time data to measure survey respondents' attentiveness. Extending these studies, our paper utilizes response time data for the story-related knowledge questions to gauge the effect of our intervention on participants' interest in and motivation to make financial decisions.

In what follows, we extend prior studies in five ways. First, we use a simple online written format to deliver the content, which has the advantage to be scalable and inexpensive. Second, we use a recent dataset covering a middle-aged and older (45+) population, a group unlikely to have received financial education in school. Third, our experimental design allows us to test for the existence of spillover effects. Since each treatment group in our experiment was exposed to a single topic rather than all three, we can evaluate whether people who read a story on one topic were more likely to answer questions correctly on other topics not covered by their story. Fourth, we explore the heterogeneity of the treatment effects across people with different socio-demographic characteristics. Finally, we also investigate the effect of our program on participants' attentiveness as measured by their question response times.

II. Experimental Design and Data

The present research seeks to determine the effectiveness of a simple and low-cost financial education program on participants' knowledge and financial distress indicators. If low-cost educational methods can enhance financial literacy and improve financial decision making, employers are more likely to adopt such programs as a regular component of their human resource practices. We begin by describing the design of our UAS surveys and discuss the three stories that provide practical applications of the three economic concepts. Next, we provide background information on the survey respondents.

Survey Design

Our brief stories each cover one of three key personal finance concepts, accompanied by questions used to measure financial knowledge. These were fielded via an online survey using the Understanding America Study (UAS), a nationally representative internet panel study managed by the University of Southern California.³ The first module, UAS378, was fielded between May and June of 2021. Here we randomly assigned participants into three different treatment groups plus a control group (and people could not choose their group nor switch groups). Each treatment group was assigned one story, whereas the control group received no story. Group 1 read a story related to compound interest, group 2 read a story about risk diversification, group 3 read a story on inflation, and group 4 (the control group) received no story. The average time spent reading story 1 (compound interest) was 2.25 minutes and the times spent reading story 2 (risk diversification) and 3 (inflation) were 1.86 minutes and 1.85 minutes, respectively (Appendix Table A.1). Before exposing respondents to their assigned stories, we first asked each participant a set of questions to gauge baseline financial knowledge and financial distress indicators. To measure financial knowledge, we designed six questions, with two related to each of the three financial concepts covered in the stories (compound interest, risk diversification, and inflation). To capture financial distress, we asked four questions on financial fragility, over-indebtedness, financial dissatisfaction, and difficulty making ends meet. We were interested in respondents' levels of knowledge and financial distress prior to the intervention, which we then used to compare to after the intervention.

After answering the baseline questions, participants then received assigned stories based on their randomly-assigned groups. Next, they were asked to again answer the knowledge questions asked prior to the story.⁴ To test for spillover effects, each treatment group was asked not only questions related to the story they saw, but also one question related to each of the other two stories. Thus, each group received at least one question on each topic. The control group was asked to answer the full set of six questions during the baseline assessment (pre-intervention) and once again after the treated groups read their stories (post-intervention) (see Table 1). Questions related to respondents' financial distress were also asked before the intervention in the first survey.

[Insert Table 1 here]

³ Access to the data and questionnaires is available upon registration here: [Understanding America Study \(usc.edu\)](https://www.usc.edu/understanding-america-study)

⁴ The knowledge questions used in this project appear in the Appendix. Pre- versus post-intervention questions were almost identical, with minor differences in the characters' names to make it less obvious that the questions were the same.

The follow-up survey, UAS441, was fielded between February and March 2022, eight months after the initial wave. Figure 1 summarizes the survey timeline. In the second wave, participants received the same set of questions on financial knowledge and distress. Additionally, this time around, all participants received the full set of knowledge questions, including those not related to the story seen in the first wave (see Table 1). The three treatment groups did not receive the story again in the second wave, so they had to depend on what they remembered from the earlier survey. A list with the definition and descriptive statistics of all variables used in this study can be found in Appendix Table A.2.

[Insert Figure 1 here]

The Intervention Stories

Next, we provide an overview of the stories and related knowledge questions; the exact wording appears in the Appendix.

Compound interest. The first story was about a couple discussing saving and compound interest. It sought to help participants understand that interest accumulates quickly and that it is important to start saving early. The story also contained an example showing how to use the “Rule of 72,” a rule of thumb often used to calculate the approximate number of years needed to double an initial investment. There were two questions related to this story: an “earning” question asked participants to compare two individuals’ savings accounts, where one person started saving their money 20 years before the other; and the “double” question requiring respondents to directly apply the “Rule of 72” to calculate the number of years needed for the principal to double, given a constant rate of return.

Risk diversification. The second story was about a couple planning to invest and discussing how to minimize risk by diversifying their investments. It sought to help participants understand that they should not “put all their eggs in one basket” and explained how to choose well-diversified portfolios instead of investing in a single asset, particularly if that asset was their employer’s company stock. The two related knowledge questions included a “stock” question, asking if it was better to invest in multiple or single stocks for a risk-averse individual; and a “bonus” question asking participants to choose between investing their annual bonus in index funds versus investing it in their own company. Both questions asked respondents to select the safest investment strategy in different scenarios to see if they understood the concept of risk diversification.

Inflation. The third story was about two friends going shopping and discussing how the price of shirts had risen over time. It aimed at helping participants understand that purchasing power can fall over time due to inflation, so it is important to assess financial decisions in real rather than nominal terms. There were again two related questions: the “job” question asked participants to choose the better job and city to live in, given the two cities’ different inflation and wage growth rates; and the “friend” question asked participants to select a better investment strategy given a particular inflation rate. Both questions tested whether respondents understood the effects of inflation.

Data

Our dataset comprised responses gathered from the two UAS waves linked via an individual identifier. Of the 2,524 initial respondents older than age 45 in UAS378, 2,316 completed the follow-up survey (UAS441) for a 91.76% response rate. Our final sample then consisted of 2,271 respondents after deleting observations with inconsistent or incomplete demographic information. Descriptive statistics including information about participants’ age, gender, education, and income appear in Table A.2 of the Appendix. Over 60% of survey respondents were age 60 and older, predominantly married (62%), and 40% had at least a Bachelor’s degree.

To ensure that participants were randomly assigned to treatment versus control groups, we undertook a balance check on participant characteristics (see Appendix Table A.3) and show that the socio-demographic characteristics of respondents in the treatment (groups 1, 2, 3) and control groups (group 4) were very similar, with only marital status being marginally significantly different. This confirms that the randomization into the three treatment and one control group was successful. We also conducted a balance test on pre-intervention questions (see Appendix Table A.4), which confirms that for most questions, there were no significant differences in responses to the pre-intervention questions across groups (except group 2 had a slightly lower proportion of correct answers to the risk questions). To address this, in our empirical analyses, we include individual fixed effects to control for observed and unobserved differences between treatment and control groups.

Next, we report respondents’ average knowledge levels for the six financial knowledge questions. For five out of six questions, between 56% and 68% of respondents correctly answered a particular question. The exception was the double question with only 37% correctly answering

that question (see Appendix Table A.2.). It is assumed that this low percentage is related to the fact that the double question required the use of some arithmetic or knowledge of the “Rule of 72,” making the question more complex.

The proportion of respondents answering “do not know” to the different questions was also analyzed. The double question had the highest proportion of “do not know” responses (27%), illustrating that remembering and applying a formula may have been too difficult for respondents. The two questions related to the risk diversification story (stock and bonus) had large proportions of “do not know” responses as well, in line with other work reporting that people struggle most with concepts related to risk and uncertainty (Yakoboski et al. 2023) (see Appendix Table A.2.).

In addition, we obtained response time data for each individual and each survey question.⁵ Table 2 shows regression estimates of the response time for each pre-intervention question on participant characteristics. We find that higher financial literacy (i.e., answering all Big Three financial literacy questions correctly) was associated with higher response times on some knowledge questions, suggesting that individuals with higher financial literacy were more attentive toward these kinds of questions. Given their knowledge, they could also have been more eager in and motivated to try answer these questions correctly. In addition, respondents who chose the “do not know” answer had a shorter response time (roughly 50% less) compared to those that did not answer correctly. Participants who answered correctly spent a similar time answering the question, compared to those that did not answer correctly. Overall, these results suggest that response time could be a measure of attentiveness, interest, and motivation in the topic, in line with previous literature.

[Insert Table 2 here]

A final group of questions we posed assessed respondents’ financial distress. We measure financial fragility with the question “How confident are you that you could come up with \$2,000 if an unexpected need arose within the next month?” Respondents were deemed financially fragile if they responded that they “could probably not” or “certainly not” come up with that amount. To measure indebtedness, we used responses to the question asking “As of today, which of the following statements describes how manageable your household debt is?” and individuals were classified as having too much debt if they said they had “a bit more debt than is manageable” or

⁵ Summary statistics about average response times per question can be found in Table A.2 of the Appendix.

“much more debt than is manageable.” We measure financial dissatisfaction with responses to the question “Overall, how satisfied are you with your current financial situation?” and we classified as financially dissatisfied those who reported they were “not very satisfied” or “not at all satisfied.” Lastly, we used responses to the question “How difficult is it for you to cover your expenses and pay all your bills right now?” to classify people having difficulty making ends meet as those stating that it is “very difficult” or “somewhat difficult” to make ends meet. Over the period of the experiment, 18% of respondents on average were identified as financially fragile, 19% reported they had too much debt, 18% reported they were financially dissatisfied, and 25% said they had difficulties making ends meet (see Appendix Table A.2.).

III. Multivariate Analysis

To examine the effects of our educational program on participants’ financial knowledge, we estimated difference-in-difference models comparing financial knowledge of individuals in the treatment and control groups, both before and after reading the three interventional stories. The identification assumption is that, in the absence of the intervention, any changes in financial knowledge for the treated group would be the same as those for the control group (group 4). To test for possible interaction effects, we also included a full set of interaction terms between the time and group dummies for questions answered by all four groups:

$$y_{it} = \lambda_i + \kappa_t + \sum_{j \in J} \gamma_j 1(t = 1) * G_j + \sum_{j \in J} \theta_j 1(t = 2) * G_j + e_{it} \quad (1)$$

where y_{it} is a dummy equal to one if the respondent i answered the question correctly at time t ($t = 0, 1, 2$ indexes the baseline pre-intervention, immediate post-intervention, and the longer-term post-intervention responses, as depicted in Figure 1). A total of six financial knowledge questions were asked in the survey, which we label as: *earning*, *double*, *stock*, *bonus*, *job*, and *friend*. The λ_i represents individual fixed effects and the κ_t are time fixed effects.

Parameters of key interest are γ_j and θ_j , which measure the short- and longer-term effects of financial education for group j respectively. The term J refers to the set of all groups that answered the questions. G_j is the group indicator equal to one if the individual was in group j . Interactions between the post-intervention and group indicator variables are included to test whether there were spillover effects. For example, for the stock question, γ_1 and θ_1 measure the short- and longer-term effects of reading the compound interest story, γ_2 and θ_2 measure the

effects of reading the risk diversification story, and γ_3 and θ_3 measure the effects of the inflation story. Because the stock question was directly designed to test for the understanding of risk diversification, γ_2 and θ_2 captures the learning effects, while the other γ and θ test for spillover effects.

In addition, we included control variables to explore heterogeneity across respondents and how these socio-demographic characteristics relate to knowledge outcomes:

$$y_{it} = \mu_g + \kappa_t + X_{it} + \sum_{j \in J} \gamma_j 1(t = 1) * G_j + \sum_{j \in J} \theta_j 1(t = 2) * G_j + e_{it} \quad (2)$$

Here, individual fixed effects are replaced with group indicators and measures of participant characteristics, X_{it} . We estimate both equations using linear regression.⁶ Finally, to test if our interventions affect participants' experienced financial distress eight months after the intervention, we estimate the following equation, similar to equation (1):

$$y_{it} = \lambda_i + \kappa_t + \sum_{j \in J} \theta_j 1(t = 2) * G_j + e_{it} \quad (3)$$

where y_{it} is a binary variable equal to 1 if the respondent's response indicated she was financially fragile, over indebteded, financially dissatisfied, or had difficulty making ends meet.

IV. Results

The primary objective of the statistical analysis is to determine whether reading a short story highlighting the importance of a key financial concept led to an immediate short-term increase in financial literacy, and also whether this knowledge gain persisted over time. First, we report the effects of reading each short story on knowledge gain of the target concept. Next, we report whether there was a difference if respondents initially did not know the answer to the knowledge questions, or answered incorrectly. Third, we estimate whether the time spent reading the stories and answering the financial questions provides useful information about the learning process. Finally, we discuss the effects of the short stories on financial distress indicators.

⁶ For a robustness check, we also estimated equations using logit models, and the results, which are qualitatively similar, are available upon request.

Effects of Educational Stories on Chance of Selecting the Correct Answer

Table 3 reports the results from estimating equation 1, where the dependent variable equals one if the respondent answered the question correctly. Each column reports results for a single question. The table reports only estimated coefficients of the interactions between the time dummies and the group dummies, which measure the short-term and longer-term effects of the stories.

[Insert Table 3 here]

In the short term, we learn that all three treated groups demonstrated improved knowledge after being exposed to their story. For example, the coefficients of “short term \times Group 2” in columns 3 and 4 indicate that, for group 2, reading the risk diversification story increased the likelihood of answering the stock question correctly by 18.7 percentage points, and the bonus question by 17.8 percentage points. The two short-term interactions for the stock question with groups 1 and 3 were not statistically significant, indicating there were no short-term spillover effects of having read a different financial education story unrelated to the question. This is not surprising, since each story narrowly focused on a single financial concept, so no additional information was provided.

Reading the risk diversification story had the largest impact on knowledge gain (i.e., largest percentage point increase compared to the control group) in the short term, and the inflation story also had positive though smaller short-term effects. Group 3 respondents were 6.1 percentage points more likely to answer the job question correctly, and 7.8 percentage points more likely to answer the friend question correctly, compared to the control group. Even though smaller in magnitude, the inflation story still had a significant impact on short-term knowledge gain. The compound interest story did significantly increase the likelihood for group 1 respondents to correctly answer the double question by 16.6 percentage points versus the control group, in line with the evidence for the other two stories. In fact, compared to the pre-intervention proportion of correct answers for group 1, the 16.6 percentage point increase is equivalent to a 52% increase in the proportion of correct answers. This is the highest percentage gain across all groups and knowledge questions. Nevertheless, the compound interest story was significant only for the double question; the improvement in the earnings question responses was not statistically significant. A possible explanation for this slightly weaker finding might lie in the fact that the double question was the exact application of the “Rule of 72” discussed in the story. The earnings

question, however, was not a direct application, making it potentially more difficult for respondents to answer this question even after being exposed to the story. Overall, though, these results strongly confirm that all three short stories enhanced financial knowledge in the short term.

Turning next to the longer-term effects of the educational stories, Table 3 shows that the estimated effects are more muted overall than for the short-term results, and several become statistically insignificant. For example, it seems that respondents could not remember the “Rule of 72,” perhaps because it was harder to recall and conceptualize compared to understanding the consequence of putting all one’s eggs in one basket. More interesting is the finding that the risk diversification story continued to have a positive effect even after eight months: group 2 individuals were still 8.5 percentage points more likely to answer the stock questions correctly, and 7.8 percentage points more likely to answer the bonus question correctly compared to the control group. Therefore, close to half (43-45%) of the gains in the short term were retained after eight months. This is promising since the educational intervention was so short in nature. Interestingly, we also detect a positive longer-term spillover effect from the inflation story, resulting in a 6.7 percentage point increase in group 3 individuals’ likelihood of answering the stock question correctly after eight months. It could be that the inflation story piqued people’s interest in financial topics, so group 3 respondents became more attentive to financial news after the first survey, which then helped improve their knowledge related to risk diversification.

Overall, our findings support the claim that the risk diversification story was the most effective in the longer term, perhaps because it conveyed a powerful message in a relatable way that participants retained. It could also be that the investment topic was more interesting, compared to saving and inflation. Moreover, the questions and stories related to compound interest and inflation required some arithmetic, potentially making them more challenging to remember and implement later in time. Additionally, financial knowledge, just like other knowledge, appears to depreciate over time. For this reason, it is necessary to continue providing financial education on a regular basis.

Next, we added socio-demographic controls instead of person-fixed effects (equation 2). As expected, the estimated short- and longer-term treatment coefficients are qualitatively and quantitatively similar to those reported in Table 3.⁷ In addition, the coefficients on the demographic

⁷ The results can be found in Table A.5 of the Appendix.

factors tell us which individuals were more likely to answer the baseline questions correctly. In many cases, men, the college-educated, and individuals with higher incomes and working full-time were more likely to answer the questions correctly. We also see that, compared to Whites, Black and Hispanic Americans were significantly less likely to answer these questions correctly. These findings are in line with research on various other financial literacy measures (Lusardi and Mitchell 2023; Yakoboski et al. 2022).

To explore whether the intervention effects varied across different population subgroups, we also interacted the treatment variables (post-intervention \times group) with income, age, education, and gender; results appear in Tables A.6-A.9 of the Appendix. There is some heterogeneity for two of the three financial education stories, namely risk diversification and inflation. In the short term, the risk diversification story had a larger effect on the lower income and less educated. Longer term, the inflation story substantially improved knowledge of higher-income and better-educated respondents. Finally, the age 60+ benefited more by seeing the risk diversification story in the short term, and the inflation story in the longer term.

Effects of Educational Stories on the Chance of “Do not Know” and Incorrect Responses

The previous subsection showed that all three stories had sizable short-term effects, while the risk diversification story also had a longer-term effect. To investigate further the source of these knowledge gains, we next analyze how the three stories changed the proportion of respondents who either responded with “do not know” or selected incorrect responses. Responding “do not know” indicates either a lack of confidence or a lack of knowledge, and prior literature has shown that people who select that answer tend to be less financially literate than those who choose incorrect responses (Lusardi and Mitchell, 2014). Table 4 presents our results where the dependent variable is an indicator equal to one if the respondent chose “do not know.” Interestingly, the risk diversification story reduced the likelihood of people responding “do not know” by 16.4 percentage points for the stock question, and 8.4 percentage points for the bonus question. We also see that the compound interest story reduced the likelihood of responding with “do not know” to the double question by 9.3 percentage points. Consistent with Table 3, the risk diversification story significantly decreased the likelihood of choosing “do not know” even after eight months. Therefore, the short story improved participants’ risk knowledge, and the knowledge proved to be ‘sticky’ over time.

[Insert Table 4 here]

Table 5 reports how the three stories influenced respondents' likelihood of answering the knowledge questions incorrectly; here, the dependent variable is a binary variable equal to one if the respondent chose a wrong answer. Our results show that all three stories reduced the proportion of incorrect answers in at least one of the related questions. When comparing Tables 8 and 9, the risk diversification story mostly informed those who chose "do not know." This is probably because risk diversification is one of the most difficult concepts for participants to grasp. By comparison, the inflation story improved respondents' knowledge for those who may have known something about inflation yet selected the incorrect answer in the first place.

[Insert Table 5 here]

Effects of Educational Stories on Response Time

As discussed earlier and shown in Table 2, we find that respondents' electing the "do not know" response to the knowledge questions tend to have much lower response times. Response times on answering questions could be a measure of participants' attentiveness, interest, and motivation (Read, Wolters, and Berinsky 2021; Lundgren and Eklöf 2023; Börger 2016). To investigate this further, Table 6 reports the results of our educational stories on participants' response time (measured in seconds) on different questions. The coefficients of the *short term* and *longer term* variables capture the overall changes in response time when participants were asked the same questions immediately after the intervention, and 8 months later, respectively. Unsurprisingly, the coefficients for *short term* are negative, as participants had just answered the same question not too long ago and likely still remembered it.

[Insert Table 6 here]

Also, participants exposed to the inflation story spent more time answering inflation-related questions (job and friend) in the short term, suggesting that the story could have increased participants' interest in the topic and attentiveness to the related questions. Similarly, the risk diversification story increased the time spent on the related knowledge question (bonus), even though the effect was smaller. Overall, being exposed to educational stories, even if short ones, appears to boost participant interest in the topic and motivation to correctly answer the related knowledge questions. We also used the percentage of total survey response time as alternative dependent variable to gauge the effects on relative time spent, results are qualitatively and

quantitatively consistent (see Appendix Table A.10). Further, when we restrict the same analysis to different subsamples, we show that these increases in response time were driven by participants who answered the questions correctly pre-intervention (see Appendix Tables A.11 and A.12).

Financial Literacy Effects on Financial Distress Indicators

Finally, we examine the connection between financial literacy and financial distress indicators: financial fragility, indebtedness, financial dissatisfaction, and difficulty making ends meet, with results shown in Table 7. Financial literacy is measured as a binary variable equal to one if the respondent answered all Big Three questions correctly, and zero otherwise. Overall, greater financial literacy is associated with a lower respondent reporting probability to all four financial distress indicators. For instance, someone who correctly answered all three questions was 11.4 percentage points less likely to be financially fragile, compared to those who missed at least one question. Getting all three financial literacy questions correct also reduced the probability of having too much debt, being financially dissatisfied, and having difficulty making ends (by 9.9, 4.7, and 11.8 percentage points, respectively). Thus, financial literacy is strongly related to people's financial distress outcomes pre-intervention, which is consistent with prior literature.

[Insert Table 7 here]

Next, we report results of the short educational stories on the same distress indicators by testing whether the educational stories improved self-reported distress outcomes of those in the treatment versus control groups after eight months (Table 8). Unfortunately, none of the estimated coefficients was statistically significant, suggesting that the interventions did not markedly change participants' longer-term financial situations. This could arise because the educational interventions were too short (only taking three minutes, by design), so they were not powerful enough to alter longer-term behavior. Table 3 does show that knowledge can be sticky, yet the effects fade with time. Also, the educational interventions focused on a single topic, while a change in complex financial behaviors would require understanding of all three concepts, rather than just one. This is confirmed in Table 7, which shows that an understanding of all three concepts was positively correlated with the distress outcomes. It could also be that behavior change takes more time than just eight months to be reflected in our financial distress indicators. Accordingly, people may have initiated behavioral change in the eight months post intervention, yet might not have

been long enough to make them less financially distressed. Longer panels could help assess this connection.

[Insert Table 8 here]

V. Conclusion

Previous studies show that greater financial literacy is associated with more financial well-being. This paper evaluated a short, low-cost, and scalable financial education intervention delivered through three stories covering essential financial concepts on compound interest, risk diversification, and inflation. The aim was to test these stories' effects on participants' short- and longer-term knowledge, as well as on respondents' self-reported financial distress.

We summarize the main results as follows: First, the risk diversification story was the most effective at improving participant knowledge, both in the short and longer terms. Moreover, the learning effects were strongest for those with lower incomes and lower education. Second, the compound interest and inflation stories increased participants' knowledge in the short term, but these effects faded after eight months. Overall, even such a short intervention (2-minute read) can improve readers' financial knowledge. These findings are in line with previous work done by Heinberg et al. (2014), which provided evidence of sizeable short-term effects of a similar financial education intervention, while longer-term effects were smaller. Third, the inflation story increased the time participants spent answering inflation-related questions in the short term, which can be interpreted as an increase in interest in and motivation to think about the topic. Thus, besides knowledge gain, exposing people to financial education initiatives could increase their interest in the topic in the long term. Last, we document the connection between financial literacy and financial distress indicators, though we see no change in the treated groups' financial distress after eight months. This could be because eight months may be insufficient time to significantly change financial behaviors and ultimately distress indicators.

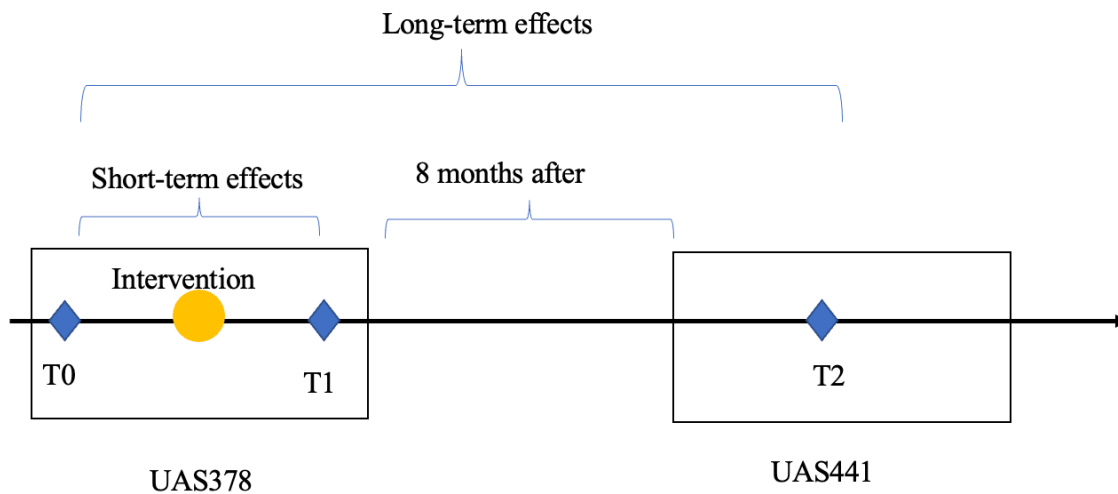
Overall, this paper provides important evidence that even short and low-cost financial education interventions can improve peoples' financial knowledge, supportive of financial education programs. Also, while these gains can depreciate over time, it appears that refresher programs and continued education would help enhance and retain financial knowledge. Financial knowledge is needed for people to thrive economically in today's society. Thus, promoting

financial literacy through effective financial education is important to improving financial well-being.

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Figure 1. Timeline of Experiment

T0: Baseline (pre-intervention UAS 378)

T1: Post-intervention (UAS378)

T2: Follow up survey (UAS441)

Notes: This figure illustrates the timeline of our experiment.

Table 1. Stories and Question Assignments by Group

Assigned story		Group 1 Compound interest	Group 2 Risk Diversification	Group 3 Inflation	Control Group No story
Pre- Intervention (UAS378)	Knowledge questions	Earning, Stock, Job	Earning, Stock, Job	Earning, Stock, Job	Earning, Stock, Job
		Double	Bonus	Friend	Double, Bonus, Friend
	Financial distress indicators	Fragility, over-indebtedness, financial dissatisfaction, and difficult ends meet questions given to all groups			
Intervention – Reading of Stories					
Post- Intervention (UAS378)	Knowledge questions	Earning, Stock, Job	Earning, Stock, Job	Earning, Stock, Job	Earning, Stock, Job
		Double	Bonus	Friend	Double, Bonus, Friend
8 months after the intervention					
Post- intervention (UAS441)	Knowledge questions	Earning, double, stock, bonus, job, and friend questions given to all groups			
	Financial distress indicators	Fragility, over-indebtedness, financial dissatisfaction, and difficult ends meet questions given to all groups			

Notes: This table provides an overview of the knowledge and financial distress questions asked to the various groups pre-, post- and 8 months after the intervention.

Table 2. Regression of Time Spent in Answering Knowledge Questions on Demographics and Financial Literacy

	Dep Var: time spent answering question (seconds)					
	(1) Earning	(2) Double	(3) Stock	(4) Bonus	(5) Job	(6) Friend
Answer correctly	-3.101 (2.531)	-4.638 (4.366)	-3.161* (1.893)	-4.044* (2.375)	-2.875 (2.205)	-1.063 (3.701)
Answer “don’t know”	-26.048*** (3.191)	-32.209*** (4.159)	-10.634*** (2.133)	-17.102*** (2.787)	-32.008*** (3.571)	-19.532*** (4.384)
Financial literacy	0.724 (2.276)	11.378*** (4.306)	-0.019 (1.547)	3.162 (2.020)	7.325*** (2.233)	8.225** (3.732)
Male	-1.789 (1.809)	0.964 (3.485)	-0.916 (1.135)	0.604 (1.577)	1.336 (1.888)	-1.698 (3.010)
Bachelor or higher	-2.093 (1.999)	12.092*** (4.105)	-2.218* (1.277)	-5.181*** (1.581)	-0.757 (1.962)	-6.801** (3.090)
Age≥60	5.704** (2.256)	12.397*** (4.255)	2.529* (1.477)	4.089* (2.089)	7.137*** (2.206)	6.839* (3.578)
Income≥75k	-1.784 (2.130)	-5.262 (4.137)	-2.389* (1.348)	-1.294 (1.947)	-2.174 (2.115)	-5.175* (3.019)
Black non-Hispanic	12.873*** (4.692)	-1.141 (6.630)	3.726 (2.441)	7.941* (4.149)	6.708 (4.199)	6.858 (5.733)
Hispanic (any race)	8.983** (4.279)	-1.891 (6.600)	1.094 (2.248)	5.802 (4.594)	16.544*** (4.926)	0.519 (5.323)
Other non-Hispanic	5.808* (3.461)	1.055 (6.192)	2.884 (2.412)	8.569** (3.686)	5.010 (3.656)	5.468 (5.889)
Divorced or separated	-0.139 (2.330)	0.489 (4.374)	4.648*** (1.763)	2.725 (2.482)	0.325 (2.463)	2.146 (3.615)
Widowed	-2.705 (3.495)	-1.565 (8.202)	-0.255 (1.912)	1.518 (3.015)	1.290 (4.026)	-3.681 (5.614)
Never Married	5.348 (3.631)	10.817 (6.919)	-0.834 (1.941)	3.518 (3.258)	7.341* (4.018)	12.785** (5.643)
Unemployed	5.781 (4.955)	-9.497 (8.495)	6.604 (4.698)	5.299 (6.220)	-4.910 (4.791)	-8.991 (6.943)
Retired	4.418* (2.359)	1.406 (4.773)	2.145 (1.379)	3.059 (2.163)	7.567*** (2.278)	5.620 (3.564)
Not in labor force	1.572 (2.699)	-6.519 (4.935)	0.355 (1.818)	-1.048 (2.524)	-1.588 (2.827)	-6.169 (4.563)

Number of household members	-0.553 (0.814)	0.760 (1.619)	0.122 (0.609)	0.107 (0.769)	-1.504* (0.909)	1.082 (1.396)
Dep Var Mean	52.4	64.4	32.4	38.4	68.7	62.5
Observations	2,168	1,020	2,181	1,123	2,159	1,093
R squared	.0488	.122	.0339	.0757	.0913	.0707

Source: Authors' calculations using the Understanding America Study module 378.

Notes: For definitions of all variables see Table A.2 of the Appendix. The dependent variable is time spent in answering the respective knowledge question pre-intervention in UAS378. The reference group for variable *male* is *female*. The reference group for variable *Bachelor* are those without a bachelor's degree. The reference group for *Age≥60* is the group younger than age 60. The reference group for *Income≥75k* are those who earn income less than 75k. The reference group for race/ethnicity (*Black, Hispanic, and Other non-Hispanic*) is white. The reference group for marital status (*divorced or separated, widowed, and never married*) are those who are married. The reference group for employment status (*unemployed, retired, and not in labor force*) are those who are employed. The variable *answer correctly* is a dummy equal to 1 if the participants answered the knowledge question correctly. The variable *answer "don't know"* is a dummy equal to 1 if participants choose the "do not know" response to the knowledge question. The reference group for *answer correctly* and *answer "don't know"* are those who answered the question incorrectly. All regressions are estimated with OLS. Robust standard errors in parentheses. *p < 0.10, **p < 0.05, ***p < 0.01.

Table 3. Short- and Longer-term Effects of Treatment on Chance of Choosing Correct Answer

	(1) <i>Compound interest</i> Earning	(2) <i>Double</i>	(3) <i>Risk diversification</i> Stock	(4) <i>Bonus</i>	(5) <i>Inflation</i> Job	(6) <i>Friend</i>
Short term × Group 1	0.029 (0.034)	0.166*** (0.040)	-0.024 (0.025)		0.012 (0.027)	
Longer term × Group 1	-0.015 (0.034)	-0.038 (0.043)	0.023 (0.033)		0.008 (0.040)	
Short term × Group 2	-0.030 (0.033)		0.187*** (0.028)	0.178*** (0.033)	-0.009 (0.027)	
Longer term × Group 2	-0.001 (0.035)		0.085** (0.034)	0.078** (0.035)	-0.002 (0.039)	
Short term × Group 3	0.015 (0.032)		0.035 (0.023)		0.061** (0.030)	0.078** (0.031)
Longer term × Group 3	-0.021 (0.035)		0.067** (0.032)		0.022 (0.040)	-0.016 (0.036)
Short term	-0.107*** (0.024)	0.026 (0.024)	-0.021 (0.016)	-0.017 (0.022)	0.016 (0.017)	0.009 (0.019)
Longer term	-0.033 (0.024)	0.041 (0.030)	-0.016 (0.022)	-0.017 (0.024)	0.007 (0.027)	-0.010 (0.025)
Dep Var Mean	.634	.380	.686	.660	.627	.575
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,759	3,354	6,759	3,453	6,753	3,429
R squared	.664	.525	.714	.654	.645	.687

Source: Authors' calculations using the Understanding America Study modules 378 and 441.

Notes: For definitions of all variables see Table A.2 of the Appendix. *Group 1* was exposed to the compound interest story, *Group 2* to the risk diversification story, and *Group 3* read the inflation story. The variable *short term* measures the effect of the story right after the intervention. The variable *longer term* measures the effect 8 months after respondents were exposed to the stories. Regressions are estimated with OLS. Robust standard errors in parentheses are clustered by individuals. All models include individual and time fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4. Short- and Longer-term Effects on Chance of Choosing ‘Do Not Know’

	(1) <i>Compound interest</i> Earning	(2) <i>Double</i>	(3) <i>Risk diversification</i> Stock	(4) <i>Bonus</i>	(5) <i>Inflation</i> Job	(6) Friend
Short term × Group 1	-0.008 (0.023)	-0.093*** (0.029)	0.010 (0.023)		-0.023 (0.018)	
Longer term × Group 1	0.006 (0.024)	0.052 (0.035)	0.011 (0.029)		0.002 (0.024)	
Short term × Group 2	-0.048** (0.021)		-0.164*** (0.026)	-0.084*** (0.024)	-0.012 (0.018)	
Longer term × Group 2	-0.031 (0.026)		-0.089*** (0.031)	-0.049* (0.029)	-0.017 (0.024)	
Short term × Group 3	-0.011 (0.022)		-0.018 (0.022)		-0.001 (0.019)	-0.011 (0.025)
Longer term × Group 3	0.001 (0.025)		-0.033 (0.028)		0.031 (0.025)	0.050* (0.030)
Short term	0.036** (0.016)	0.002 (0.019)	0.009 (0.016)	0.010 (0.015)	0.014 (0.013)	-0.010 (0.017)
Longer term	0.036* (0.019)	-0.021 (0.024)	0.029 (0.020)	0.029 (0.019)	0.026 (0.016)	0.010 (0.021)
Dep Var Mean	.110	.261	.192	.182	.107	.213
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,759	3,354	6,759	3,453	6,753	3,429
R squared	.647	.651	.683	.680	.651	.694

Source: Authors' calculations using the Understanding America Study modules 378 and 441.

Notes: For definitions of all variables see Table A.2 of the Appendix. *Group 1* was exposed to the compound interest story, *Group 2* to the risk diversification story, and *Group 3* read the inflation story. The variable *short term* measures the effect of the story right after the intervention. The variable *longer term* measures the effect 8 months after respondents were exposed to the stories. Regressions are estimated with OLS. Robust standard errors in parentheses are clustered by individuals. All models include individual and time fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5. Short- and Longer-term Effects on Chance of Choosing Wrong Answers

	(1) <i>Compound interest</i> Earning	(2) <i>Double</i>	(3) <i>Risk diversification</i> Stock	(4) <i>Bonus</i>	(5) <i>Inflation</i> Job	(6) <i>Friend</i>
Short term × Group 1	-0.021 (0.035)	-0.073* (0.041)	0.014 (0.023)		0.011 (0.030)	
Longer term × Group 1	0.009 (0.035)	-0.015 (0.046)	-0.034 (0.028)		-0.010 (0.040)	
Short term × Group 2	0.078** (0.034)		-0.023 (0.024)	-0.094*** (0.030)	0.021 (0.029)	
Longer term × Group 2	0.031 (0.035)		0.003 (0.028)	-0.030 (0.033)	0.019 (0.040)	
Short term × Group 3	-0.003 (0.034)		-0.017 (0.021)		-0.060* (0.032)	-0.067** (0.030)
Longer term × Group 3	0.019 (0.036)		-0.034 (0.028)		-0.053 (0.040)	-0.034 (0.036)
Short term	0.071*** (0.025)	-0.028 (0.026)	0.012 (0.015)	0.007 (0.020)	-0.029 (0.020)	0.002 (0.020)
Longer term	-0.003 (0.025)	-0.021 (0.031)	-0.014 (0.019)	-0.012 (0.022)	-0.033 (0.028)	-0.000 (0.025)
Dep Var Mean	.257	.359	.122	.158	.267	.212
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,759	3,354	6,759	3,453	6,753	3,429
R squared	.576	.468	.579	.515	.563	.565

Source: Authors' calculations using the Understanding America Study modules 378 and 441.

Notes: For definitions of all variables see Table A.2 of the Appendix. *Group 1* was exposed to the compound interest story, *Group 2* to the risk diversification story, and *Group 3* read the inflation story. The variable *short term* measures the effect of the story right after the intervention. The variable *longer term* measures the effect 8 months after respondents were exposed to the stories. Regressions are estimated with OLS. Robust standard errors in parentheses are clustered by individuals. All models include individual and time fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6. The Effects of Stories on Time Spent on Answering Questions

	Dep Var: Time spent in answering question (seconds)					
	(1) Earning	(2) Double	(3) Stock	(4) Bonus	(5) Job	(6) Friend
Short term × Group 1	4.442 (3.525)	-1.867 (4.519)	0.492 (2.036)		1.701 (3.500)	
Longer term × Group 1	-1.850 (3.677)	-3.374 (4.937)	-0.967 (2.022)		-3.264 (3.681)	
Short term × Group 2	1.744 (3.096)		0.074 (1.916)	3.867* (2.264)	-2.421 (3.392)	
Longer term × Group 2	6.989* (3.684)		0.538 (2.223)	-0.666 (2.501)	-2.600 (3.827)	
Short term × Group 3	1.176 (3.154)		-2.950 (1.989)		9.018*** (3.180)	9.167*** (3.351)
Longer term × Group 3	4.432 (3.756)		-2.690 (2.054)		-7.086* (3.738)	-0.864 (3.689)
Short term	-19.631*** (2.221)	-24.513*** (3.110)	-13.079*** (1.262)	-11.056*** (1.555)	-34.865*** (2.359)	-31.827*** (2.440)
Longer term	-1.067 (2.499)	2.850 (3.431)	-2.937** (1.355)	-0.061 (1.638)	-1.899 (2.710)	-11.571*** (2.681)
Dep Var Mean	46.5	53.6	26.6	34.9	55.7	48.9
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,477	2,976	6,651	3,405	6,465	3,285
R squared	.545	.58	.527	.555	.607	.58

Source: Authors' calculations using the Understanding America Study modules 378 and 441.

Notes: For definitions of all variables see Table A.2 of the Appendix. *Group 1* was exposed to the compound interest story, *Group 2* to the risk diversification story, and *Group 3* read the inflation story. The variable *short term* measures the effect of the story right after the intervention. The variable *longer term* measures the effect 8 months after respondents were exposed to the stories. Regressions are estimated with OLS. Robust standard errors in parentheses are clustered by individuals. All models include individual and time fixed effects. *p < 0.10, **p < 0.05, ***p < 0.01.

Table 7. Financial Literacy and Financial Distress Indicators

	(1) Financial fragility	(2) Over- indebtedness	(3) Financial dissatisfaction	(4) Difficult ends meet
Financial literacy	-0.114*** (0.018)	-0.099*** (0.019)	-0.047** (0.019)	-0.118*** (0.022)
Male	-0.008 (0.015)	-0.043** (0.017)	0.015 (0.016)	-0.016 (0.019)
Bachelor	-0.041*** (0.015)	0.013 (0.018)	-0.008 (0.017)	0.001 (0.020)
Age≥60	-0.047** (0.019)	-0.050** (0.022)	0.005 (0.021)	-0.026 (0.023)
Income≥75k	-0.149*** (0.015)	-0.088*** (0.019)	-0.131*** (0.018)	-0.187*** (0.021)
Black non-Hispanic	0.118*** (0.040)	0.114*** (0.041)	0.044 (0.038)	0.062 (0.040)
Hispanic (any race)	0.118*** (0.042)	0.061 (0.042)	-0.050 (0.036)	0.037 (0.044)
Other non-Hispanic	0.043 (0.028)	0.043 (0.031)	0.015 (0.030)	0.042 (0.033)
Divorced or separated	0.115*** (0.022)	0.047** (0.024)	0.094*** (0.023)	0.089*** (0.025)
Widowed	0.108*** (0.037)	0.057 (0.037)	0.095** (0.037)	0.078* (0.040)
Never Married	0.128*** (0.030)	0.080** (0.033)	0.085*** (0.032)	0.062* (0.034)
Unemployed	0.076 (0.048)	0.026 (0.049)	0.112** (0.049)	0.131** (0.052)
Retired	0.005 (0.018)	-0.058*** (0.021)	-0.064*** (0.020)	-0.052** (0.023)
Not in labor force	0.204*** (0.029)	0.057* (0.029)	0.149*** (0.030)	0.145*** (0.031)
Number of household members	0.036*** (0.008)	0.038*** (0.009)	0.030*** (0.009)	0.046*** (0.009)
Constant	0.213*** (0.029)	0.260*** (0.032)	0.187*** (0.029)	0.348*** (0.033)
Observations	2,122	2,184	2,212	2,218
R squared	.243	.106	.117	.157

Source: Authors' calculations using the Understanding America Study module 378.

Notes: For definitions of all variables see Table A.2 of the Appendix. The reference group for variable *male* is *female*. The reference group for variable *Bachelor* are those without a bachelor's degree. The reference group for *Age≥60* is the group younger than age 60. The reference group for *Income≥75k* are those who earn income less than 75k. The reference group for race/ethnicity (*Black, Hispanic, and Other non-Hispanic*) is white. The reference group for marital status (*divorced or separated, widowed, and never married*) are those who are married. The reference group for employment status (*unemployed, retired, and not in labor force*) are those that are employed. All regressions are estimated with OLS. Robust standard errors in parentheses are clustered by individuals. *p < 0.10, **p < 0.05, ***p < 0.01.

Table 8. Treatment Effects on Financial Distress Indicators

	(1) Financial fragility	(2) Over- indebtedness	(3) Financial dissatisfaction	(4) Difficult ends meet
Longer term × Group 1	-0.019 (-0.97)	-0.020 (-0.70)	0.027 (0.89)	-0.002 (-0.07)
Longer term × Group 2	-0.017 (-0.84)	0.012 (0.42)	-0.007 (-0.24)	0.009 (0.27)
Longer term × Group 3	0.008 (0.42)	0.011 (0.38)	-0.002 (-0.05)	0.036 (1.10)
Longer term	0.013 (0.95)	0.011 (0.51)	0.010 (0.47)	0.046* (2.11)
Individual FE	Yes	Yes	Yes	Yes
Observations	4,224	4,380	4,512	4,542
R squared	.912	.804	.797	.794

Source: Authors' calculations using the Understanding America Study modules 378 and 441.

Notes: For definitions of all variables see Table A.2 of the Appendix. *Group 1* was exposed to the compound interest story, *Group 2* to the risk diversification story, and *Group 3* read the inflation story. The variable *longer term* measures the effect 8 months after respondents were exposed to the stories. Regressions are estimated with OLS. Robust standard errors in parentheses. All models include individual and time fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Appendix A: Tables

Table A.1. Summary Statistics of Time Spent Reading Stories

	Count	Mean	SD	Min	P50	Max
Time spent reading story 1 (minutes)	1563	2.25	1.62	0.08	2.02	8.38
Time spent reading story 2 (minutes)	1677	1.86	1.25	0.05	1.73	8.00
Time spent reading story 3 (minutes)	1653	1.85	1.16	0.05	1.68	7.18

Source: Authors' calculations using the Understanding America Study modules 378.

Notes: Story 1 is about compound interest, story 2 is about risk diversification, and story 3 is about inflation.

Table A.2. Definition and Descriptive Statistics for Dependent and Explanatory Variables

Dependent variables		Mean	SD	Min	Max
<i>Knowledge Questions</i>					
Correct response	Equal to one if the question is answer correctly				
Earning correct		0.63	0.48	0.0	1.0
Double correct		0.37	0.48	0.0	1.0
Stock correct		0.68	0.46	0.0	1.0
Bonus correct		0.65	0.48	0.0	1.0
Job correct		0.63	0.48	0.0	1.0
Friend correct		0.56	0.50	0.0	1.0
"Do not know" response	Equal to one if the respondent chose "do not know"				
Earning DNK		0.11	0.31	0.0	1.0
Double DNK		0.27	0.44	0.0	1.0
Stock DNK		0.19	0.39	0.0	1.0
Bonus DNK		0.19	0.39	0.0	1.0
Job DNK		0.11	0.31	0.0	1.0
Friend DNK		0.22	0.42	0.0	1.0
Incorrect response	Equal to one if the respondent chose incorrect response				
Earning incorrect		0.26	0.44	0.0	1.0
Double incorrect		0.36	0.48	0.0	1.0
Stock incorrect		0.12	0.33	0.0	1.0
Bonus incorrect		0.16	0.36	0.0	1.0

Job Incorrect		0.27	0.44	0.0	1.0
Friend incorrect		0.22	0.41	0.0	1.0
Time spent	Average time spent on answering each knowledge question (seconds)				
Earning time spent		47.08	41.77	1.0	299.0
Double time spent		59.50	58.78	1.0	300.0
Stock time spent		26.70	23.74	0.0	294.0
Bonus time spent		35.97	29.65	1.0	291.0
Job time spent		56.29	44.22	1.0	293.0
Friend time spent		49.89	41.50	1.0	300.0

Financial Distress Indicators

Financial fragility	<i>Financial fragility</i> is based on the question, “How confident are you that you could come up with \$2,000 if an unexpected need arose within the next month?”; respondents are deemed financially fragile if they respond, “could probably not” or “certainly could not.”	0.18	0.38	0.0	1.0
Over-indebtedness	<i>Over-indebtedness</i> is based on the question “As of today, which of the following statements describes how manageable your household debt is?”. The dummy equals one if respondents choose “have a bit more debt than is manageable” or “have much more debt than is manageable.”	0.19	0.39	0.0	1.0
Financial dissatisfaction	<i>Financial dissatisfaction</i> is based on the question: “Overall, how satisfied are you with your current financial situation?” and we classify as financially dissatisfied those who choose “not very satisfied” or “not at all satisfied.”	0.18	0.39	0.0	1.0
Difficult ends meet	<i>Difficult ends meet</i> is based on the question: “How difficult is it for you to cover your expenses and pay all your bills right now?” where people who responded with “very difficult” or “somewhat difficult” are classified as having difficulty making ends meet.	0.25	0.44	0.0	1.0

Explanatory Variables

Male	An indicator equal to one if gender is male	0.45	0.50	0.0	1.0
Bachelor	An indicator equal to one if the respondent has a bachelor's degree or higher	0.40	0.49	0.0	1.0
Age \geq 60	An indicator equal to one if the respondent's age is equal or above 60-year-old	0.61	0.49	0.0	1.0
Income \geq 75k	An indicator equal to one if annual income is greater than or equal to 75k	0.42	0.49	0.0	1.0
Black non-Hispanic	An indicator equal to one if race is Black non-Hispanic	0.08	0.27	0.0	1.0
Hispanic (any race)	An indicator equal to one if race is Hispanic	0.06	0.24	0.0	1.0
Other non-Hispanic	An indicator equal to one if race is other non-Hispanic	0.08	0.28	0.0	1.0
Divorced or separated	An indicator equal to one if the marital status is "divorced" or "Separated"	0.22	0.42	0.0	1.0
Widowed	An indicator equal to one if the marital status is "widowed"	0.06	0.24	0.0	1.0
Never Married	An indicator equal to one if the marital status is "Never married"	0.10	0.30	0.0	1.0
Unemployed	An indicator equal to one if the employment status is "unemployed"	0.04	0.20	0.0	1.0
Retired	An indicator equal to one if the respondent is retired	0.39	0.49	0.0	1.0
Not in labor force	An indicator equal to one if the respondent is not in the labor force	0.16	0.36	0.0	1.0
Number of household members	The number of household members	1.27	1.12	0.0	8.0
Financial literacy	An indicator equal to one for respondents who answered all three basic financial literacy questions correctly (Big 3) on interest rate, risk diversification, and inflation.	0.37	0.48	0.0	1.0

Source: Authors' calculations using the Understanding America Study modules 378 and 441.

Notes: We have six knowledge questions, with two questions for each financial topic: compound interest, risk diversification, and inflation. Appendix B reports the story language and exact wording of the knowledge questions.

Table A.3. Balance Test on Participant Characteristics

Variable	Control Group	Group1- Control Group	Group2- Control Group	Group3- Control Group	Joint test P-value
Age	61.583	0.159	0.429	0.471	0.737
Female	0.542	-0.002	0.003	0.025	0.790
<i>Race/ethnicity</i>					
White non-Hispanic	0.769	0.013	0.001	0.024	0.736
Black non-Hispanic	0.078	-0.005	0.006	-0.001	0.921
Hispanic (any race)	0.074	-0.017	-0.017	-0.024*	0.387
Asian non-Hispanic	0.029	0.017	-0.003	-0.003	0.279
Other non-Hispanic	0.079	0.009	0.011	0.002	0.892
<i>Marital status</i>					
Married	0.623	-0.007	0.002	-0.037	0.519
Divorced or separated	0.186	0.066***	0.032	0.054**	0.036**
Widowed	0.071	-0.021	0.000	-0.007	0.375
Never Married	0.120	-0.038**	-0.034*	-0.010	0.096*
<i>Education</i>					
High school or less	0.219	-0.002	-0.008	-0.002	0.991
Some college	0.373	0.014	0.028	0.003	0.764
College degree	0.256	-0.049*	-0.023	-0.021	0.283
Above college	0.151	0.036	0.003	0.019	0.348
<i>Employment status</i>					
Employed	0.448	0.023	-0.020	-0.044	0.131
Unemployed	0.041	-0.003	-0.002	0.013	0.583
Retired	0.382	-0.010	0.016	0.008	0.834
Not in labor force	0.155	-0.015	0.006	0.014	0.575
<i>Income</i>					
Under 25k	0.182	-0.019	-0.006	-0.001	0.830
25-50k	0.193	0.024	0.017	0.041*	0.387
50-75k	0.208	-0.013	-0.025	-0.047**	0.192
75-100k	0.157	-0.018	-0.013	-0.005	0.825
100-150k	0.131	0.043**	0.021	0.012	0.247
above 150k	0.129	-0.018	0.006	-0.002	0.632
Number of household members	1.225	0.048	0.091	0.036	0.580

Source: Authors' calculations using the Understanding America Study module 378.

Notes: For definitions of all variables see Table A.2 of the Appendix. *Group 1* was exposed to the compound interest story, *Group 2* to the risk diversification story, and *Group 3* read the inflation story. Column 1 reports the mean of the control group (group 4). Columns 2-3 report the difference between treatment groups (groups 1, 2, and 3 respectively) and control group. Column 5 reports the p-values from the t-test of equality across all four groups. Each row shows a regression of the variable on the treatment dummies for group 1, group 2, and group 3. *p < 0.10, **p < 0.05, ***p < 0.01.

Table A.4. Balance Test on Pre-intervention Response to Knowledge and Distress Questions

Variable	Control Group	Group1- Control Group	Group2- Control Group	Group3- Control Group	Joint test P-value
<i>Knowledge question</i>					
Earning question correct	0.663	0.048*	0.013	0.016	0.349
Double question correct	0.351	-0.029	0.000	0.000	0.307
Stock question correct	0.695	-0.012	-0.062**	-0.045	0.094*
Bonus question correct	0.656	0.000	-0.053*	0.000	0.064*
Job question correct	0.609	0.009	-0.012	0.010	0.860
Friend question correct	0.549	0.000	0.000	0.033	0.260
Earning question- do not know	0.088	-0.007	0.032*	0.000	0.154
Double question- do not know	0.286	-0.024	0.000	0.000	0.363
Stock question- do not know	0.186	-0.007	0.070***	0.010	0.008***
Bonus question- do not know	0.181	0.000	0.019	0.000	0.421
Job question- do not know	0.103	0.004	0.004	-0.040**	0.011**
Friend question- do not know	0.234	0.000	0.000	-0.056**	0.019**
<i>Distress question</i>					
Financial fragility	0.160	0.011	0.028	0.009	0.671
Over-indebtedness	0.183	-0.009	-0.003	0.009	0.898
Financial dissatisfaction	0.187	-0.018	-0.028	0.008	0.377
Difficult ends meet	0.248	-0.042*	-0.002	-0.008	0.291

Source: Authors' calculations using the Understanding America Study module 378.

Notes: For definitions of all variables see Table A.2 of the Appendix. *Group 1* was exposed to the compound interest story, *Group 2* to the risk diversification story, and *Group 3* read the inflation story. Column 1 reports the mean of the control group (group 4). Columns 2-3 report the difference between treatment groups (groups 1, 2, and 3 respectively) and control group. Column 5 reports the p-values from the t-test of equality across all four groups. Each row shows a regression of the variable on the treatment dummies for group 1, group 2, and group 3. *p < 0.10, **p < 0.05, ***p < 0.01.

Table A.5. Short- and Longer-term Effects on Chance of Choosing Correct Answer: Including Additional Controls

	(1)	(2)	(3)	(4)	(5)	(6)
	<i>Compound interest</i>		<i>Risk diversification</i>		<i>Inflation</i>	
	Earning	Double	Stock	Bonus	Job	Friend
Short term × Group 1	0.028 (0.028)	0.170*** (0.033)	-0.021 (0.021)		0.009 (0.023)	
Longer term × Group 1	-0.008 (0.028)	-0.037 (0.036)	0.029 (0.027)		0.009 (0.033)	
Short term × Group 2	-0.039 (0.027)		0.192*** (0.023)	0.180*** (0.028)	-0.011 (0.022)	
Longer term × Group 2	-0.002 (0.029)		0.092*** (0.028)	0.082*** (0.029)	-0.005 (0.032)	
Short term × Group 3	0.011 (0.027)		0.039** (0.019)		0.061** (0.025)	0.077*** (0.025)
Longer term × Group 3	-0.021 (0.029)		0.074*** (0.026)		0.013 (0.033)	-0.020 (0.030)
Short term	-0.102*** (0.020)	0.023 (0.020)	-0.021 (0.014)	-0.019 (0.018)	0.019 (0.014)	0.009 (0.015)
Longer term	-0.032 (0.020)	0.041* (0.024)	-0.019 (0.018)	-0.018 (0.020)	0.012 (0.022)	-0.007 (0.021)
Male	0.095*** (0.015)	0.075*** (0.021)	0.095*** (0.016)	0.013 (0.021)	0.053*** (0.016)	0.102*** (0.024)
Bachelor or higher	0.160*** (0.016)	0.137*** (0.023)	0.190*** (0.016)	0.175*** (0.022)	0.182*** (0.017)	0.172*** (0.024)
Age≥60	0.019 (0.019)	0.038 (0.026)	0.046** (0.019)	0.057** (0.027)	-0.008 (0.019)	0.038 (0.029)
Income≥75k	0.126*** (0.018)	0.016 (0.024)	0.108*** (0.018)	0.132*** (0.025)	0.086*** (0.018)	0.091*** (0.027)
Black non-Hispanic	-0.275*** (0.029)	-0.021 (0.038)	-0.198*** (0.032)	-0.081** (0.040)	-0.189*** (0.030)	-0.205*** (0.042)
Hispanic (any race)	-0.146*** (0.036)	0.012 (0.040)	-0.130*** (0.034)	-0.028 (0.043)	-0.093*** (0.035)	-0.153*** (0.046)
Other non-Hispanic	-0.046* (0.027)	0.037 (0.037)	-0.054* (0.028)	-0.067* (0.038)	-0.033 (0.027)	0.076* (0.040)
Divorced or separated	0.008 (0.020)	-0.029 (0.027)	-0.032 (0.021)	-0.039 (0.030)	-0.022 (0.021)	-0.040 (0.030)
Widowed	-0.062* (0.033)	-0.001 (0.039)	-0.104*** (0.034)	-0.113*** (0.043)	-0.095*** (0.034)	-0.099** (0.049)
Never Married	0.031 (0.028)	0.003 (0.039)	-0.039 (0.028)	0.008 (0.037)	-0.015 (0.028)	-0.046 (0.039)
Unemployed	-0.094** (0.040)	0.057 (0.056)	-0.044 (0.040)	-0.120** (0.059)	-0.117*** (0.039)	-0.116** (0.052)
Retired	0.015 (0.020)	-0.072** (0.028)	0.001 (0.020)	0.033 (0.028)	-0.021 (0.021)	0.021 (0.031)
Not in labor force	-0.091*** (0.024)	-0.060* (0.031)	-0.061** (0.025)	-0.105*** (0.035)	-0.095*** (0.024)	-0.103*** (0.035)
Number of household members	-0.005 (0.007)	-0.005 (0.010)	-0.016** (0.007)	-0.018* (0.010)	-0.013* (0.008)	-0.014 (0.010)

Dep Var Mean	.638	.381	.688	.661	.631	.577
Group FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,600	3,270	6,603	3,384	6,594	3,345
R squared	.145	.054	.147	.127	.105	.143

Source: Authors' calculations using the Understanding America Study modules 378 and 441.

Notes: For definitions of all variables see Table A.2 of the Appendix. *Group 1* was exposed to the compound interest story, *Group 2* to the risk diversification story, and *Group 3* read the inflation story. The variable *short term* measures the effect of the story right after the intervention. The variable *longer term* measures the effect 8 months after respondents were exposed to the stories. The reference group for variable *male* is *female*. The reference group for variable *Bachelor* are those without a bachelor's degree. The reference group for *Age \geq 60* is the group younger than age 60. The reference group for *Income \geq 75k* are those who earn income less than 75k. The reference group for race/ethnicity (*Black, Hispanic, and Other non-Hispanic*) is white. The reference group for marital status (*divorced or separated, widowed, and never married*) are those who are married. The reference group for employment status (*unemployed, retired, and not in labor force*) are those who are employed. Regressions are estimated with OLS. Robust standard errors in parentheses are clustered by individuals. All models include group fixed effects and time fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.6. Intervention Effect Variation by Income

	(1) Earning	(2) Double	(3) Stock	(4) Bonus	(5) Job	(6) Friend
Short term × Group 1	0.052 (0.041)	0.156*** (0.049)	-0.012 (0.031)		0.027 (0.035)	
Longer term × Group 1	-0.016 (0.041)	-0.032 (0.050)	0.006 (0.041)		0.045 (0.048)	
Short term × Group 1 × Income \geq 75k	-0.050 (0.048)	0.029 (0.063)	-0.029 (0.037)		-0.033 (0.042)	
Longer term × Group 1 × Income \geq 75k	0.005 (0.049)	-0.014 (0.064)	0.040 (0.049)		-0.087 (0.059)	
Short term × Group 2	-0.022 (0.037)		0.220*** (0.037)	0.220*** (0.041)	-0.003 (0.036)	
Longer term × Group 2	-0.004 (0.044)		0.120*** (0.042)	0.045 (0.043)	-0.004 (0.048)	
Short term × Group 2 × Income \geq 75k	-0.018 (0.046)		-0.077* (0.044)	-0.097* (0.050)	-0.012 (0.040)	
Longer term × Group 2 × Income \geq 75k	0.008 (0.049)		-0.080 (0.050)	0.078 (0.051)	0.005 (0.055)	
Short term × Group 3	0.005 (0.039)		0.049* (0.028)		0.047 (0.039)	0.078** (0.039)
Longer term × Group 3	-0.054 (0.043)		0.068* (0.040)		-0.026 (0.049)	-0.039 (0.045)
Short term × Group 3 × Income \geq 75k	0.022 (0.044)		-0.032 (0.033)		0.035 (0.050)	0.002 (0.047)
Longer term × Group 3 × Income \geq 75k	0.078 (0.049)		-0.010 (0.044)		0.111** (0.056)	0.058 (0.052)
Short term	-0.107*** (0.024)	0.026 (0.024)	-0.021 (0.016)	-0.017 (0.022)	0.016 (0.017)	0.009 (0.019)
Longer term	-0.033 (0.024)	0.041 (0.030)	-0.016 (0.022)	-0.017 (0.024)	0.007 (0.027)	-0.010 (0.025)
Dep Var Mean	.634	.380	.686	.660	.626	.575
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,747	3,348	6,747	3,453	6,741	3,423
R squared	.664	.526	.715	.656	.646	.688

Source: Authors' calculations using the Understanding America Study modules 378 and 441.

Notes: For definitions of all variables see Table A.2 of the Appendix. *Group 1* was exposed to the compound interest story, *Group 2* to the risk diversification story, and *Group 3* read the inflation story. The variable *short term* measures the effect of the story right after the intervention. The variable *longer term* measures the effect 8 months after respondents were exposed to the stories. Regressions are estimated with OLS. Robust standard errors in parentheses are clustered by individuals. All models include individual and time fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.7. Intervention Effect Variation by Education

	(1) Earning	(2) Double	(3) Stock	(4) Bonus	(5) Job	(6) Friend
Short term × Group 1	0.033 (0.039)	0.146*** (0.049)	-0.041 (0.031)		0.034 (0.035)	
Longer term × Group 1	-0.016 (0.041)	-0.041 (0.049)	-0.009 (0.040)		0.018 (0.047)	
Short term × Group 1 × Bachelor	-0.011 (0.049)	0.048 (0.063)	0.043 (0.036)		-0.054 (0.041)	
Longer term × Group 1 × Bachelor	0.002 (0.048)	0.009 (0.065)	0.081* (0.048)		-0.025 (0.059)	
Short term × Group 2	-0.016 (0.038)		0.226*** (0.036)	0.220*** (0.040)	-0.021 (0.034)	
Longer term × Group 2	-0.004 (0.043)		0.115*** (0.041)	0.069 (0.042)	-0.010 (0.047)	
Short term × Group 2 × Bachelor	-0.036 (0.046)		-0.102** (0.043)	-0.107** (0.050)	0.033 (0.041)	
Longer term × Group 2 × Bachelor	0.010 (0.047)		-0.077 (0.049)	0.026 (0.052)	0.021 (0.054)	
Short term × Group 3	0.012 (0.039)		0.051* (0.029)		0.062 (0.038)	0.086** (0.040)
Longer term × Group 3	-0.045 (0.043)		0.084** (0.040)		-0.028 (0.048)	-0.043 (0.044)
Short term × Group 3 × Bachelor	0.007 (0.043)		-0.039 (0.032)		-0.003 (0.050)	-0.020 (0.046)
Longer term × Group 3 × Bachelor	0.060 (0.048)		-0.042 (0.043)		0.122** (0.056)	0.067 (0.052)
Short term	-0.107*** (0.024)	0.026 (0.024)	-0.021 (0.016)	-0.017 (0.022)	0.016 (0.017)	0.009 (0.019)
Longer term	-0.033 (0.024)	0.041 (0.030)	-0.016 (0.022)	-0.017 (0.024)	0.007 (0.027)	-0.010 (0.025)
Dep Var Mean	.634	.380	.686	.660	.627	.575
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,759	3,354	6,759	3,453	6,753	3,429
R squared	.665	.525	.715	.655	.646	.688

Source: Authors' calculations using the Understanding America Study modules 378 and 441.

Notes: For definitions of all variables see Table A.2 of the Appendix. *Group 1* was exposed to the compound interest story, *Group 2* to the risk diversification story, and *Group 3* read the inflation story. The variable *short term* measures the effect of the story right after the intervention. The variable *longer term* measures the effect 8 months after respondents were exposed to the stories. Regressions are estimated with OLS. Robust standard errors in parentheses are clustered by individuals. All models include individual and time fixed effects. *p < 0.10, **p < 0.05, ***p < 0.01.

Table A.8. Intervention Effect Variation by Age

	(1) Earning	(2) Double	(3) Stock	(4) Bonus	(5) Job	(6) Friend
Short term × Group 1	0.044 (0.045)	0.186*** (0.057)	-0.033 (0.037)		0.007 (0.038)	
Longer term × Group 1	-0.035 (0.046)	-0.041 (0.058)	0.011 (0.048)		-0.007 (0.055)	
Short term × Group 1 × Age≥60	-0.026 (0.049)	-0.034 (0.065)	0.016 (0.039)		0.009 (0.044)	
Longer term × Group 1 × Age≥60	0.032 (0.050)	0.006 (0.064)	0.020 (0.051)		0.025 (0.060)	
Short term × Group 2	-0.028 (0.044)		0.138*** (0.037)	0.134*** (0.047)	-0.052 (0.037)	
Longer term × Group 2	0.033 (0.047)		0.074 (0.047)	0.080* (0.045)	-0.002 (0.049)	
Short term × Group 2 × Age≥60	-0.002 (0.047)		0.079* (0.045)	0.071 (0.052)	0.070* (0.043)	
Longer term × Group 2 × Age≥60	-0.054 (0.052)		0.018 (0.052)	-0.003 (0.051)	0.001 (0.055)	
Short term × Group 3	0.045 (0.044)		0.030 (0.033)		0.037 (0.044)	0.039 (0.044)
Longer term × Group 3	-0.039 (0.049)		0.102** (0.045)		-0.045 (0.052)	-0.094* (0.050)
Short term × Group 3 × Age≥60	-0.048 (0.046)		0.007 (0.035)		0.038 (0.052)	0.063 (0.050)
Longer term × Group 3 × Age≥60	0.029 (0.052)		-0.055 (0.048)		0.106* (0.058)	0.125** (0.055)
Short term	-0.107*** (0.024)	0.026 (0.024)	-0.021 (0.016)	-0.017 (0.022)	0.016 (0.017)	0.009 (0.019)
Longer term	-0.033 (0.024)	0.041 (0.030)	-0.016 (0.022)	-0.017 (0.024)	0.007 (0.027)	-0.010 (0.025)
Dep Var Mean	.634	.380	.686	.660	.627	.575
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,759	3,354	6,759	3,453	6,753	3,429
R squared	.665	.525	.714	.654	.646	.689

Source: Authors' calculations using the Understanding America Study modules 378 and 441.

Notes: For definitions of all variables see Table A.2 of the Appendix. *Group 1* was exposed to the compound interest story, *Group 2* to the risk diversification story, and *Group 3* read the inflation story. The variable *short term* measures the effect of the story right after the intervention. The variable *longer term* measures the effect 8 months after respondents were exposed to the stories. Regressions are estimated with OLS. Robust standard errors in parentheses are clustered by individuals. All models include individual and time fixed effects. *p < 0.10, **p < 0.05, ***p < 0.01.

Table A.9. Intervention Effect Variation by Gender

	(1) Earning	(2) Double	(3) Stock	(4) Bonus	(5) Job	(6) Friend
Short term × Group 1	0.031 (0.041)	0.175*** (0.049)	-0.028 (0.032)		-0.009 (0.034)	
Longer term × Group 1	-0.050 (0.043)	-0.003 (0.052)	0.029 (0.042)		-0.010 (0.050)	
Short term × Group 1 × Male	-0.004 (0.048)	-0.020 (0.064)	0.008 (0.037)		0.046 (0.043)	
Longer term × Group 1 × Male	0.075 (0.048)	-0.074 (0.062)	-0.014 (0.048)		0.040 (0.058)	
Short term × Group 2	-0.057 (0.039)		0.220*** (0.036)	0.181*** (0.040)	-0.016 (0.036)	
Longer term × Group 2	-0.035 (0.043)		0.080* (0.043)	0.056 (0.043)	-0.000 (0.048)	
Short term × Group 2 × Male	0.060 (0.045)		-0.073 (0.045)	-0.007 (0.051)	0.015 (0.041)	
Longer term × Group 2 × Male	0.075 (0.050)		0.012 (0.050)	0.050 (0.052)	-0.003 (0.056)	
Short term × Group 3	0.007 (0.037)		0.024 (0.029)		0.038 (0.037)	0.098** (0.039)
Longer term × Group 3	-0.042 (0.043)		0.069* (0.039)		-0.013 (0.047)	-0.043 (0.044)
Short term × Group 3 × Male	0.018 (0.045)		0.026 (0.032)		0.054 (0.051)	-0.045 (0.047)
Longer term × Group 3 × Male	0.050 (0.049)		-0.004 (0.045)		0.080 (0.058)	0.061 (0.052)
Short term	-0.107*** (0.024)	0.026 (0.024)	-0.021 (0.016)	-0.017 (0.022)	0.016 (0.017)	0.009 (0.019)
Longer term	-0.033 (0.024)	0.041 (0.030)	-0.016 (0.022)	-0.017 (0.024)	0.007 (0.027)	-0.010 (0.025)
Dep Var Mean	.634	.380	.686	.660	.627	.575
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,759	3,354	6,759	3,453	6,753	3,429
R squared	.665	.526	.714	.654	.645	.688

Source: Authors' calculations using the Understanding America Study modules 378 and 441.

Notes: For definitions of all variables see Table A.2 of the Appendix. *Group 1* was exposed to the compound interest story, *Group 2* to the risk diversification story, and *Group 3* read the inflation story. The variable *short term* measures the effect of the story right after the intervention. The variable *longer term* measures the effect 8 months after respondents were exposed to the stories. Regressions are estimated with OLS. Robust standard errors in parentheses are clustered by individuals. All models include individual and time fixed effects. *p < 0.10, **p < 0.05, ***p < 0.01.

Table A.10. The Effects of Stories on Percentage of Time Spent Answering Questions

	Dep Var: Time spent in answering questions (seconds)					
	(1) Earning	(2) Double	(3) Stock	(4) Bonus	(5) Job	(6) Friend
Short term × Group 1	0.279 (0.277)	-0.090 (0.332)	0.089 (0.131)		0.147 (0.248)	
Longer term × Group 1	-0.046 (0.314)	-0.196 (0.415)	0.083 (0.158)		-0.143 (0.292)	
Short term × Group 2	0.230 (0.236)		0.014 (0.132)	0.302** (0.154)	-0.356 (0.245)	
Longer term × Group 2	0.411 (0.294)		-0.069 (0.172)	-0.113 (0.214)	-0.506* (0.305)	
Short term × Group 3	0.224 (0.232)		-0.193 (0.134)		0.649*** (0.235)	0.610** (0.246)
Longer term × Group 3	0.433 (0.297)		-0.144 (0.159)		-0.721** (0.305)	-0.190 (0.297)
Short term	-1.673*** (0.171)	-2.023*** (0.230)	-1.053*** (0.092)	-0.938*** (0.097)	-2.779*** (0.166)	-2.445*** (0.181)
Longer term	1.260*** (0.210)	1.943*** (0.300)	0.576*** (0.111)	0.997*** (0.130)	1.663*** (0.206)	0.406* (0.220)
Dep Var Mean	4.1	4.74	2.35	3.08	4.94	4.2
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,477	2,976	6,651	3,405	6,465	3,285
R squared	.49	.551	.489	.465	.565	.484

Source: Authors' calculations using the Understanding America Study modules 378 and 441.

Notes: For definitions of all variables see Table A.2 of the Appendix. *Group 1* was exposed to the compound interest story, *Group 2* to the risk diversification story, and *Group 3* read the inflation story. The variable *short term* measures the effect of the story right after the intervention. The variable *longer term* measures the effect 8 months after respondents were exposed to the stories. Regressions are estimated with OLS. Robust standard errors in parentheses are clustered by individuals. All models include individual and time fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.11. Subsample Analysis: Restricted Sample to Those who Answered Correctly Pre-Intervention

	Dep Var: Time spent in answering questions (seconds)					
	(1) Earning	(2) Double	(3) Stock	(4) Bonus	(5) Job	(6) Friend
Short term × Group 1	7.475* (4.317)	1.941 (8.965)	0.760 (2.617)		-0.234 (4.464)	
Longer term × Group 1	-2.873 (4.388)	-2.057 (8.140)	-0.713 (2.520)		-7.027 (4.569)	
Short term × Group 2	0.667 (3.594)	0.000	0.746 (2.327)	3.158 (2.980)	-2.819 (4.058)	
Longer term × Group 2	5.625 (4.349)		2.149 (2.662)	0.074 (3.075)	-3.536 (4.610)	
Short term × Group 3	-0.951 (3.904)		-3.084 (2.410)		10.180*** (3.833)	14.657*** (4.186)
Longer term × Group 3	3.943 (4.788)		-2.425 (2.499)		-7.224* (4.299)	2.815 (4.962)
Short term	-17.728*** (2.654)	-30.377*** (6.799)	-14.349*** (1.544)	-11.140*** (1.990)	-35.438*** (2.806)	-37.670*** (3.265)
Longer term	-0.171 (3.120)	-0.829 (6.269)	-3.747** (1.627)	0.148 (1.878)	0.065 (3.058)	-11.162*** (3.755)
Dep Var Mean	47.8	59.8	26.8	36.7	58.7	52.6
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,395	972	4,428	2,145	3,948	1,860
R squared	.516	.577	.514	.53	.607	.569

Source: Authors' calculations using the Understanding America Study modules 378 and 441.

Notes: For definitions of all variables see Table A.2 of the Appendix. *Group 1* was exposed to the compound interest story, *Group 2* to the risk diversification story, and *Group 3* read the inflation story. The variable *short term* measures the effect of the story right after the intervention. The variable *longer term* measures the effect 8 months after respondents were exposed to the stories. Regressions are estimated with OLS. Robust standard errors in parentheses are clustered by individuals. All models include individual and time fixed effects. *p < 0.10, **p < 0.05, ***p < 0.01.

Table A.12. Subsample Analysis: Restricted Sample to Those who Answered “Don’t know” Pre-Intervention

	Dep Var: Time spent in answering questions (seconds)					
	(1) Earning	(2) Double	(3) Stock	(4) Bonus	(5) Job	(6) Friend
Short term × Group 1	-0.975 (9.990)	4.940 (5.627)	1.158 (4.035)		1.952 (7.809)	
Longer term × Group 1	-4.247 (10.921)	-3.402 (8.083)	1.936 (4.757)		-1.641 (10.316)	
Short term × Group 2	8.376 (9.676)	0.000	-2.642 (4.014)	6.835* (3.618)	-3.972 (9.691)	
Longer term × Group 2	14.778 (11.783)		-4.369 (4.943)	2.021 (6.500)	2.509 (13.203)	
Short term × Group 3	12.212 (10.491)		-1.318 (4.470)	0.000	-18.411* (9.532)	0.556 (7.483)
Longer term × Group 3	12.785 (11.893)		-4.486 (4.183)		-13.186 (13.830)	-7.627 (8.143)
Short term	-13.420 (8.324)	-15.140*** (4.243)	-7.393*** (2.762)	-8.238*** (2.450)	-13.228** (5.349)	-18.907*** (5.267)
Longer term	-1.660 (9.255)	7.306 (6.007)	1.383 (3.309)	1.400 (4.565)	6.158 (8.433)	-12.884** (5.427)
Dep Var Mean	32.2	35.4	23.8	26.5	33.9	34.3
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	627	876	1,356	657	633	669
R squared	.602	.533	.545	.58	.568	.572

Source: Authors’ calculations using the Understanding America Study modules 378 and 441.

Notes: For definitions of all variables see Table A.2 of the Appendix. *Group 1* was exposed to the compound interest story, *Group 2* to the risk diversification story, and *Group 3* read the inflation story. The variable *short term* measures the effect of the story right after the intervention. The variable *longer term* measures the effect 8 months after respondents were exposed to the stories. Regressions are estimated with OLS. Robust standard errors in parentheses are clustered by individuals. All models include individual and time fixed effects. *p < 0.10, **p < 0.05, ***p < 0.01.

Appendix B: Intervention Stories and Knowledge Questions

Story Group 1: Compound Interest - A wedding gift and compound interest

Dave and Michelle, two 25-year olds, recently got married. They received \$5,000 in cash as wedding presents and needed to decide what to do with the money. The answer didn't seem obvious.

Looking over their finances didn't take long because they didn't have much money, especially since Michelle's job at the time was only an internship. The two of them didn't generally think of themselves as big planners and, at first, it seemed pointless to even consider investing for the long term. Dave suggested not investing right away and instead waiting until they had better jobs and made more money.

But Michelle told Dave about the Rule of 72. This rule approximates how many years it takes for an investment to double at a given annual rate of return. The formula is simple, as she explained: "Just divide 72 by the annual return and you'll get the number of years it will take for your money to double."

Rule of 72

$$72 / \text{annual rate of return} = \text{years for your money to double}$$

It will take...

72 years for your money to double if you earn a return of **1%** ($72 / 1 = 72$)

24 years for your money to double if you earn a return of **3%** ($72 / 3 = 24$)

12 years for your money to double if you earn a return of **6%** ($72 / 6 = 12$)

7.2 years for your money to double if you earn a return of **10%** ($72 / 10 = 7.2$)

She noted that, with a 7% return, it would take about 10 years for their investment to double. At first, Dave wondered whether they could earn such a high return: 7% is a lot! But Michelle pointed out that they would be investing for the long term, and a diversified portfolio of stocks could yield returns in that range (even if it could go up or down).

This simple rule helped Michelle figure out that at a 7% annual return, the original \$5,000 would grow to a whopping \$160,000 by the time she and Dave turned age 75k. When Michelle first pointed this out to Dave, he thought something had to be wrong with Michelle's calculation. But, as she explained, the money grows because returns are compounded over time. In other words, all of the money including the earned return, gets reinvested every year, so that over the long term, there's some serious build-up!

Let's do the math!

If Dave and Michelle earned a 7% annual return, their investment would approximately double every 10 years.

If they invested **\$5000** when they were **25 years old**, then:

by age 35, it would double to about	\$10,000
which would double again by age 45 to about	\$20,000
which would double again by age 55 to about	\$40,000
which would double again by age 65 to about	\$80,000
which would double again by age 75 to about	\$160,000.

If Michelle and Dave waited until they were 55 years old to invest the \$5,000 and earned the same 7% return, they would end up with about \$20,000 by the time they were 75k. And while \$20,000 would be nice, the \$160,000 they'd have if they invested right away would be even nicer!

Dave and Michelle decided to invest their \$5,000 right away, giving it more time to grow. When their friends and family gave them \$5,000, they never imagined it could turn into six figures. The young couple now understands that knowing more about compound interest and the Rule of 72 will be important for their future. Investing the money right away was the best wedding gift they could have given themselves!

Story Group 2: Risk Diversification - Don't put all your eggs in one basket

Kate and her husband Sam are discussing what they could do with some money they recently got from selling their car. Kate suggests that they could invest it in the stock market to get a higher return, compared to what they would get from just putting it in a bank account.

At first, Sam didn't understand why just putting money somewhere safe isn't good enough. But Kate reminded him that, when they invested for the long term, they needed to take some risk. Otherwise, there's no way to make their money grow, because the average amount of money an investment earns over the long run is related to the riskiness of the investment. Riskier investments tend to earn higher returns, while less risky investments earn lower returns. But that doesn't necessarily mean that riskier investments are better, since riskier investments also stand a chance of losing money. In other words, there's a trade-off between risk and return.

Kate explained to Sam that every type of investment has some degree of risk. At the same time, he wants to avoid a total wipeout and losing everything he owns all at once. For example, if he owned stock in just one company, then he's relying on the performance of just that one company. If it went bankrupt or even just lost money, his investment would be affected, too. As Kate explained, "that's why it's important to invest in a mix of assets and not put all your money in one place."

Next, Sam told Kate that he was thinking about investing in the company where he works, since the company's growing and Sam is confident it's doing well. Kate wonders if he's been listening to her at all! She tells him that the whole point of putting his money in several different companies is that, if something unexpectedly bad happened to one of them, he'll be cushioned to a certain degree. But if Sam invested only in the company where he worked and that company tanked, both his job *and* his investments would be in trouble. That's where not putting all your eggs in one basket comes in: you shouldn't have your investments and your job tied to the same company, and you shouldn't have all of your money invested in one company. Instead, spread it around.

Kate asked Sam to think about the following scenario: What if he invested in several different companies that all manufactured umbrellas, and all of a sudden, the value of umbrellas crashed? That might sound unlikely, but think about when the tech bubble burst or when the real estate market collapsed. Therefore, it's smart to invest in many different kinds of companies. Basically, you want the ups and downs of each investment to be as unrelated to other investments as possible, so that if some do badly, others will offset those losses.

Sam realized that he now understood the saying 'don't put all your eggs in one basket' when it comes to investments. Learning this rule, he now sees, will be important for his financial future.

Story Group3: Inflation - Inflation and the plaid shirt

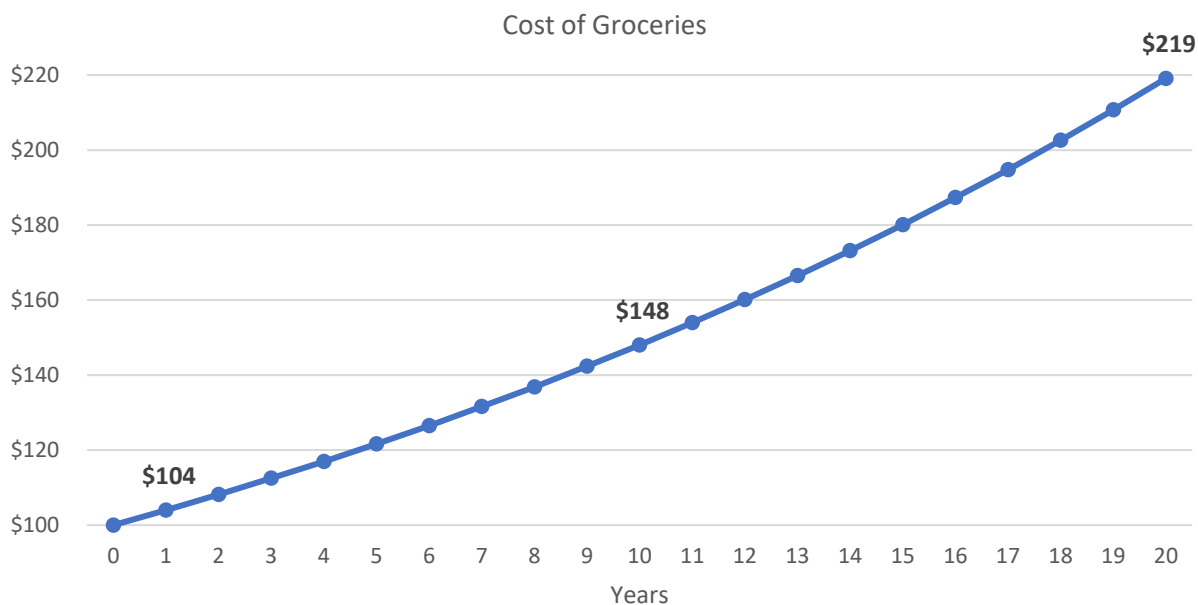
This is the story of how a very cute plaid shirt inspired Lisa to save more for the future. Lisa and Beth were shopping together when Beth spotted the shirt and knew it would look great on Lisa. But when Lisa saw it, she had a flashback to the 1990s, the last time plaid shirts were trendy. The new shirt cost \$50 and Lisa remembered paying \$30 for similar shirts back then. So the word 'inflation' popped into Lisa's head.

Inflation describes price increases over time. Lisa realized that not only do shirts that used to cost \$30 now cost \$50, but many things that used to be \$30 now cost more. With inflation, the same number of dollars buys less. So the price of a shirt, as well as other things like haircuts and groceries, can rise.

Imagine that inflation is 4% per year: this means that prices rise 4% every year. An item that costs \$100 at the beginning of a year will then cost \$104 at the end of that year. This might not seem like a big deal, until you consider that everything costs a bit more, on average. Therefore, if your paycheck doesn't grow at the same rate, you won't be able to buy as much as you used to at the higher prices.

When Lisa had her plaid shirt 'aha' moment, she realized that prices had risen, and that they're probably going to be even higher in the future. Her friend Beth understood that part, too. But Beth couldn't figure out how the same shirt could go all the way from \$30 in the 1990's to \$50 now, when it feels like prices rise only a little each year.

Lisa explained that this happens because price increases build upon one another. Let's say prices increased 4% every year for 20 years. A \$100 bag of groceries will cost \$104 after one year. After 10 years, it will cost \$148, and the 4% just keeps adding up to more and more money, so that after 20 years your \$100 bag of groceries costs \$219. In other words, your \$100 groceries cost more than twice as much 20 years later.



Lisa knows that, when she thinks about how much money she'll need for the future, she must also take into account how much more things will cost. Reminded by her new shirt, she's happy to have understood inflation, and she recognizes that knowing more about how to manage money will be important for her financial future.

Knowledge Questions*Earning, Pre intervention*

Consider the following scenario: Jack and Jill are twins. At age 20, Jack started contributing \$20 a month to a savings account. After 20 years, when he was age 40, he stopped adding to his savings but left the money in the account. Jill didn't start to save until she was 40. Then, she saved \$20 a month until she retired 20 years later at age 60. Suppose both Jack and Jill earned a 6% return each year on their savings. When they both retired at age 60, who had more money? Select one choice.

- 1 Jack
- 2 Jill
- 3 They had the same amount
- 98 Don't know

Earning, Post intervention

Anna and Jessica are twins. At age 20, Jessica started contributing \$20 a month to a savings account. After 20 years, when she was age 40, she stopped adding to her savings but she left the money in the account. Anna didn't start to save until she was 40. Then, she saved \$20 a month until she retired 20 years later at age 60. Suppose both Anna and Jessica earned a 6% return each year on their savings. When they both retired at age 60, who had more money? Select one choice.

- 1 Anna
- 2 Jessica
- 3 They had the same amount
- 98 Don't know

Double, Pre Intervention

Mary put away \$1,000 at age 25 after finishing her Master's degree and she promised not to touch it for many years. She was able to invest in a stock mutual fund with an annual return of 7%. She is now 55 years old. How many times did her initial amount double since she invested at age 25? Select one choice.

- 1 2 times
- 2 3 times
- 3 10 times
- 98 Don't know Times

Double, Post Intervention

Jason inherited a \$1,000 at age 35 from his grandparents and promised to save it for his retirement. He invested it in a stock mutual fund with an annual return of 7%. He is now 65 years old. How many times did his initial amount double since he invested at age 35? Select one choice.

- 1 2 times
- 2 3 times
- 3 10 times
- 98 Don't know

Stock, Pre intervention

Suppose you are a member of a stock investment club. This year, the club has about \$200,000 to invest in stocks and the members prefer not to take a lot of risk. Which of the following strategies would you recommend to your fellow members? Select one choice.

- 1 Put all of the money in one stock
- 2 Put all of the money in two stocks
- 3 Put all of the money equally divided in 100 large firms in the United States
- 98 Don't know

Stock, Post intervention

Suppose you are advising an old friend who wants to invest \$50,000 in stocks, but he prefers not to take a lot of risk. Which of the following strategies would you recommend to your friend? Select one choice.

- 1 Put all of the money in one stock
- 2 Put all of the money in two stocks
- 3 Put all of the money equally divided in 100 large firms in the United States
- 98 Don't know

Bonus, Pre intervention

Imagine that you've been with NewTech Inc. for the past ten years and just got a \$5,000 bonus since the company is doing so well. Thrilled about the bonus, you're thinking about investing it in the stock market. You never invested before but want to use this bonus to start saving for retirement. What option should you choose? Select one choice.

- 1 Investing in NewTech Inc. as you love working with the firm and see first-hand that the business is doing very well
- 2 Investing in a technology index fund that tracks the performance of 340 technology stocks
- 3 Investing in a diverse fund that holds shares of companies across the energy, financial services, health care, leisure, and technology sector
- 98 Don't know

Bonus, Post intervention

Imagine your spouse just got a \$5,000 bonus from AllWell Inc., the company she works for, because she helped develop a new drug that she believes will be very useful. She is thinking about investing the bonus in the stock market to help build her retirement account, but she has never invested before. Which option would you recommend to her? Select one choice.

- 1 Investing the bonus in AllWell Inc
- 2 Investing the bonus in a health care index fund that tracks the performance of 340 health care stocks
- 3 Investing the bonus in a diverse fund that holds shares of companies across the energy, financial services, health care, leisure, and technology sector
- 98 Don't know

Job, Pre-intervention

Rita must choose between two job offers. She wants to select the job with a salary that will afford her the higher standard of living for the next few years. Job A offers a 3% raise every year, while Job B won't give her a raise for the next few years. If Rita chooses Job A, she will live in City A. If Rita chooses Job B, she will live in City B. Rita finds that the price of goods and services today are about the same in both areas. Prices are expected to rise, however, by 4% in City A every year, and stay the same in City B. Based on her concerns about standard of living, what should Rita do? Select one choice.

- 1 Take Job A
- 2 Take Job B
- 3 Take either one: she will be able to afford the same future standard of living in both places
- 98 Don't know

Job, Post-intervention

Jacob has two job offers to choose from and he wants to select the job with a salary that will afford him the higher standard of living for the next few years. Job A offers a 3% raise every year, while Job B will not provide a raise for the next few years. If Jacob chooses Job A, he will live in City A. If Jacob chooses Job B, he will live in City B. Jacob finds that the price of goods and services today are about the same in both areas. Prices are expected to rise, however, by 4% in City A every year, and stay the same in City B. Based on his concerns about standard of living, what should Jacob do? Select one response.

- 1 Take Job A
- 2 Take Job B

3 Take either one: he will be able to afford the same future standard of living in both places
98 Don't know

Friend, Pre-intervention

Adele is 50 years old and is discussing three investment opportunities with a friend. She has already put aside a good sum of money and wants to invest it for the next 10 years, after that she will take an early retirement and move to Florida. She wants to play it safe, so she could invest in a) a saving account that pays 1% per year, b) a T-bill that pays 1.5% per year, or c) a certificate of deposit that pays 2%. The current inflation rate is 2.5% and expected to stay at that level. Her friend tells her that if she invests in this way, she will not be able to buy the same things she can afford today with the sum of money she has in 10 years. Which of the following is correct?

- 1 Her friend is right
- 2 Her friend is wrong
- 3 We cannot tell with this information
- 98 Don't know

Friend, Post-intervention

Suppose you are 50 years old and are discussing three investment opportunities with your adult child. You have put aside a good sum of money and want to invest it for the next 10 years, but you want to play it safe. Your three investment choices are, a) a saving account that pays 1% per year, b) a T-bill that pays 1.5% per year, or c) a certificate of deposit that pays 2%. The current inflation rate is 2.5% and expected to stay at that level. Your son tells you that if you invest in this way, you won't be able to afford the same things in 10 years. Which of the following is correct?

- 1 Your son is right
- 2 Your son is wrong
- 3 We cannot tell with this information
- 98 Don't know