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**Working Paper**

## Stereotypes, financial literacy, and confidence: An information provision experiment

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*Stereotypes, financial literacy,  
and confidence:  
An information provision experiment*

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# Stereotypes, financial literacy, and confidence: An information provision experiment\*

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May 2, 2025

## Abstract

Financial literacy is an important prerequisite for making informed financial decisions, but it remains low, especially among women and older people. Internalized stereotypes can undermine confidence and subsequently affect behavior in financial matters, leading to suboptimal decisions. This paper investigates how stereotype salience affects confidence in financial literacy. In an information provision experiment, we inform respondents about age or gender differences in numeracy to examine the impact on financial literacy, confidence, hypothetical investment and saving decisions, and demand for information and education. We find that being informed about age differences has no significant effect. In contrast, being informed about gender differences increases the confidence of male respondents through a stereotype boost, while leaving female respondents largely unaffected.

*JEL Codes:* C90, D91, G53, I24, J16

*Keywords:* survey experiment, numeracy, gender stereotypes, age stereotypes

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## 1 Introduction

To make informed financial decisions, individuals need to have a solid understanding of financial concepts. In recent years, the shift from defined benefit to defined contribution pension schemes has placed greater responsibility on the individual to actively manage their own savings (Poterba 2014). As a result, individuals need to keep up with increasingly complex financial markets and recent inflation developments in order to remain financially resilient. In response, policymakers at the national and international level have launched initiatives to enhance financial literacy (see, e.g., OECD 2020). Despite these efforts and the growing importance of financial literacy, it remains relatively low – especially among women and older people (Lusardi and Mitchell 2011). However, financial literacy is particularly important for these groups because women are at higher risk of facing poverty in old age, while older people need to be able to make informed decisions about their pensions, such as when to retire, and to manage their financial needs after retirement (Lusardi and Messy 2023; Preston and Wright 2023).

These group differences in financial literacy cannot be fully explained by differences in cognitive ability. Confidence can be a driving force in explaining differences in financial literacy and financial decision making. For example, women are less confident in their own financial literacy and in their ability to handle financial matters (Lusardi and Mitchell 2014). In contrast, older people continue to show high levels of confidence in financial decision making, although financial literacy (Okamoto and Komamura 2021; Finke et al. 2017; Almenberg and S  ve-S  derbergh 2011) and numeracy (Hanushek et al. 2025) decline with age.

While previous studies have provided evidence of group differences in both financial literacy and confidence in one’s own financial literacy (see, e.g., Bucher-Koenen et al. 2023; Bottazzi and Lusardi 2021; Finke et al. 2017), the mechanisms driving these findings are not yet fully understood. One potential mechanism could be internalized stereotypes: If certain groups have been conditioned to believe that they know less about financial matters, this may be reflected in their knowledge, confidence and ultimately their savings decisions. The psychological literature refers to this as stereotype threat. Stereotype threat occurs when an individual from a stereotyped group fears of being judged or treated unfairly based on that stereotype. The opposite is called stereotype boost. In other words, individuals attribute certain stereotypes about demographic groups to themselves, which then influences their performance according to the stereotype (Spencer et al. 1999; Steele et al. 2002; Spencer et al. 2016).

To investigate the role of stereotypes for financial literacy and confidence we conduct an information provision experiment with a quota-representative sample of about 2,500 German respondents. Treated respondents are exposed to information about either age or gender differences in numeracy skills, thereby making existing stereotypes salient. More specifically, they are informed that according to the results of an international study comparing the skills of adults, young people (men) have higher numeracy skills than older people (women). We base our treatment on negative stereotypes about numeracy related to gender and age. In addition, the experiment includes an active control group which is informed that in an international comparison, adults in Germany have average everyday skills. This experimental design allows us to analyze whether the exposure to stereotypes affects confidence

and, therefore, correct answers to financial literacy questions. We also investigate whether exposure to these group differences translates into behavioral changes by analyzing hypothetical investment and savings decisions and the demand for information and education. If financial literacy – or even confidence in one’s own ability – is affected by exposure to stereotypes, this may have implications for behavior. For example, groups that are stereotypically associated with lower skills might abstain from making important financial decisions because they do not consider themselves able to make the right decisions. They may also have a greater demand for additional information and for educational opportunities.

Our results show that information about gender differences in numeracy skills leads to increased confidence in answering financial literacy questions. This effect is driven by an increase in confidence among treated male respondents, while treated female respondents are largely unaffected. However, this increase in confidence does not translate into differences in savings decisions or demand for information and education. Focusing instead on the age treatment, we observe neither average treatment effects nor heterogeneity in the response to treatment for any of our outcomes.

This paper is closely linked to three strands of literature: First, there is an emerging literature that uses randomized control trials to better understand answering behaviour in financial literacy questions. For example, Bucher-Koenen et al. (2024) and Cziriak et al. (2024) show that the gender gap in financial literacy decreases if respondents are not able to choose the “I don’t know” option. Moreover, they demonstrate that a substantial part of the gender gap in financial literacy can be explained by a lack of confidence among women. Hospido et al. (2023) propose additional measures to reduce this bias in confidence. They find that women are less likely to choose the “I don’t know” option and answer more questions correctly if they are presented with the information that the gender gap in financial literacy is driven by women answering more often with “I don’t know”. While this information reduces the gender gap in financial literacy, it does not eliminate it completely.

The second research strand focuses on the effect of individual (over)confidence on different economic outcomes. In the context of financial literacy, there are gender and age gaps in confidence (Lusardi and Mitchell 2014). While financial literacy appears to decline at older ages, confidence tends to increase, especially for older men (Okamoto and Komamura 2021; Finke et al. 2017). As perceived financial literacy can be a driver for financial outcomes (Vörös et al. 2021; Anderson et al. 2017), overconfidence in one’s own financial literacy can foster adverse financial behavior, for instance mortgage payment delinquency (Kim et al. 2020). Moreover, men tend to be more overconfident than women in competitive situations, which contributes to the gender gap in, for example, (expected) wages (Adamecz-Völgyi and Shure 2022; Briel et al. 2022) or financial decisions (Beckmann and Menkhoff 2008; Barber and Odean 2001).

Finally, we contribute to the literature on stereotypes and task performance - particularly in relation to numeracy. Gender stereotypes are present across different tasks (Bordalo et al. 2019) and stereotypes about gender and numeracy are formed at an early age, where stereotypes seem to have a negative impact on the financial knowledge of girls but a positive impact on boys (Driva et al. 2016). As Skagerlund et al. (2018) point out, numeracy can be a predictor for financial literacy. The presence

of gender differences in financial literacy at younger ages can be explained by the socio-cultural environment of children (Bottazzi and Lusardi 2021). Furthermore, Tinghög et al. (2021) provide evidence that stereotype threat may contribute to gender differences in financial literacy. In addition, Jouini et al. (2018) argue that negative stereotypes about gender and math lead to lower confidence, less risky decisions, and lower performance of women in math-related tasks.

We contribute to this literature by analyzing how stereotypes affect confidence in financial literacy. We propose an experimental design, where respondents are exposed to stereotypes by making group differences salient. This allows us to analyze answering behavior and confidence in the context of financial literacy. We point out that the direction of the stereotype matters. The exposure to a numeracy stereotype in favor of men does not seem to affect women but boosts the confidence of men. In addition, while most studies focus on gender differences, our paper provides a more nuanced picture by examining the role of information about both gender and age differences in numeracy skills.

Our paper is structured as follows. In Section 2 we present our experimental design and in Section 3 our empirical strategy and hypotheses. The results are presented in Section 4. Finally, Section 5 concludes.

## 2 Survey and experimental design

### 2.1 Survey

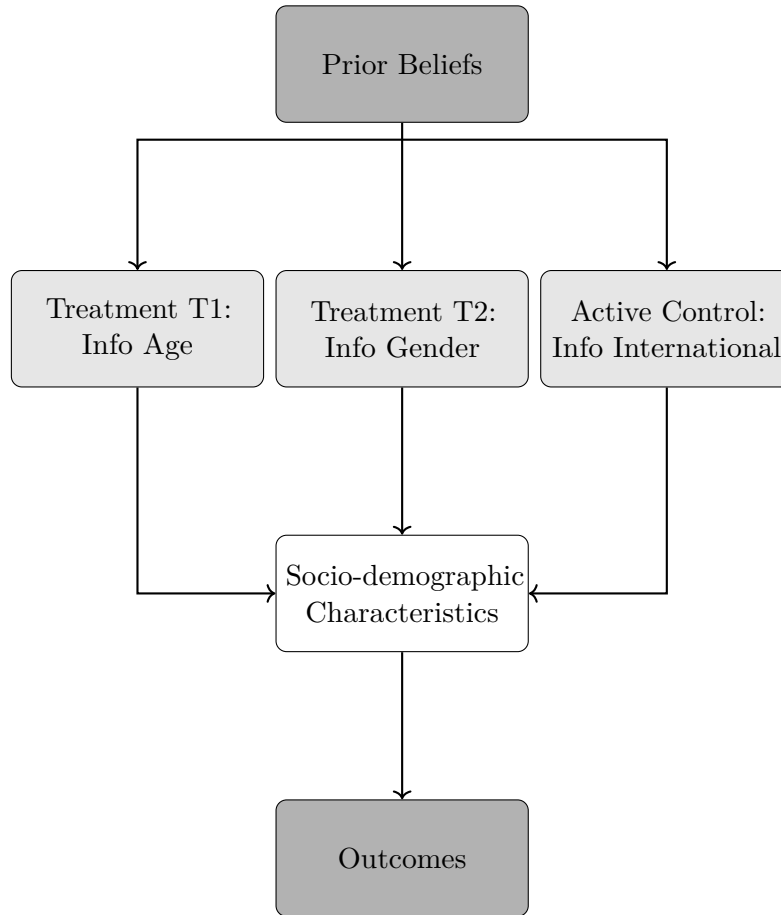
Our analysis is based on data from an online survey conducted in Germany in November 2023. The target population of the survey was the German population over the age of 17, and the sample is quota representative in terms of age, gender, education, and residence in East or West Germany. Our sample has 2,517 observations, from which we exclude 19 respondents due to missing values in outcome and control variables. On average, respondents took 9 minutes and 42 seconds to complete the survey. The average age of the respondents is 50, half of them are female and about 16% live in East Germany. About a third of the respondents have completed at least 12 years of schooling, 55% are employed and 32% of respondents have a migration background.<sup>1</sup> When comparing our sample to the average population (see Table B.2), we observe only small differences with the exception of political leaning. Respondents in our sample seem to be more conservative than the average population.<sup>2</sup>

The survey includes an information provision experiment designed to make stereotypes salient. Specifically, respondents are randomly informed about differences in numeracy skills between groups. The experimental design is described below.

<sup>1</sup>We show an overview of all variables used for the analysis in Appendix A. Summary statistics are presented in Table C.1.

<sup>2</sup>We categorize a respondent as conservative, if a respondent says that they would vote for CDU, AfD, Freie Wähler, ÖDP, Die Basis, Die Rechte or Die Heimat, if there was a federal election on the upcoming Sunday. Our measure for the German population is based on the result of the last federal election (Bundeswahlleiterin 2021). However, voters' preferences may have changed in the two years between the election and the survey, which could explain why our sample differs from the general population in this dimension.

Figure 1: Experimental Setup



## 2.2 Experimental design

Our experimental design consists of three steps: The elicitation of prior beliefs, the information treatment, and the measurement of our outcomes. Figure 1 provides an overview of the experimental setup.

### 2.2.1 Step 1: Elicitation of prior beliefs

To understand whether stereotypes regarding numeracy skills are salient among respondents, we elicit their prior beliefs about group differences in these skills. We focus on numeracy skills which can be a predictor for financial literacy (Skagerlund et al. 2018), because numeracy includes the ability to understand, use, interpret, and communicate mathematical information and concepts in everyday situations (Rammstedt 2013). Eliciting prior beliefs about numeracy and everyday skills before the treatment allows us to assess whether the treatment confirms respondents stereotypes or whether it opposes them. By asking all groups about their beliefs, we ensure that the mechanism through which the treatment operates goes beyond priming.

Specifically, we ask the survey respondents whether they think that younger or older people have higher numeracy skills. We ask a similar question when comparing men and women. In addition, we ask them what they think about how adults in Germany compare internationally in terms of their

everyday skills.<sup>3</sup> The questions for the prior beliefs can be found in the appendix E.2. We discuss respondents’ prior beliefs in Section 4.2.

### 2.2.2 Step 2: Information treatment

In the second step, respondents are randomly assigned to one of three experimental groups: i) the age treatment group, ii) the gender treatment group, or iii) the active control group.<sup>4</sup> We provide each experimental group with a different information treatment. The information presented is based on the latest available results of the Programme for the International Assessment of Adult Competencies (PIAAC) at the time of the survey.

We provide information in the form of a statement, which is accompanied by a figure that is meant to illustrate the comparison, as shown in Figure E.1. Each treatment, including the active control information, is introduced by the following sentence: *“Germany regularly participates in an international survey on the skills and abilities of adults (PIAAC). The latest survey yielded the following results, among others”*. The provided information for each group is as follows:

- *Age Treatment (T1)*: In Germany, young adults have higher numeracy skills than older adults.
- *Gender Treatment (T2)*: In Germany, men have higher numeracy skills than women.
- *Active Control (C)*: In an international comparison, adults in Germany have average everyday skills.

We chose a design in which not only the treatment groups but also the control group received information. This ensures that treatment effects are not just due to receiving some information, but that the specific information matters. The information provided to the control group does inform about our issue of interest (i.e. skill differences) but in a more neutral way, i.e. without highlighting group differences in numeracy skills. We can then isolate the effect of the particular type of information provided from the effect of receiving any information at all. Additionally, receiving information may also increase the attention of respondents (Haaland et al. 2023). At the very end of our survey, we debrief all respondents by informing them about the study on which the information treatments are based. We also explain that the group differences may depend on the way skills are measured.

### 2.2.3 Step 3: Outcomes

In the third step, we elicit the outcomes of interest. To reduce concerns about experimenter demand effects, we do not elicit them immediately after the information treatment. Instead, we first ask respondents about their socio-demographic characteristics. Only then do we ask about our outcomes.

Our analysis focuses on three sets of outcome variables:

- 1 Financial literacy and confidence
- 2 Hypothetical investment and savings decisions

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<sup>3</sup>Everyday skills refer to skills needed in everyday life in a modern society. In the Programme for the International Assessment of Adult Competencies (PIAAC), the study on which we base our information treatments, these include numeracy, reading, and technology-based problem solving.

<sup>4</sup>We provide evidence of the integrity of the randomization in Table B.1.



### 3 Demand for information and education

**Financial literacy and confidence** Our first set of outcomes captures respondents’ financial literacy and confidence in their own financial literacy skills. This allows us to analyze whether the information treatment has a direct effect on respondents’ task performance when answering a standard set of financial literacy questions and their confidence in answering them. We measure financial literacy using the “Big Three” financial literacy questions established by Lusardi and Mitchell (2008) and calculate the score as the sum of correct answers. The wording to the questions can be found in Appendix E.4. To gain a deep understanding of respondents confidence, we measure confidence in several different ways, as described below.<sup>5</sup>

- *“Don’t know” answers:* Each of the three financial literacy questions comes with an “I don’t know” option. For this outcome we calculate how often a respondent chose this option. Therefore, a higher number indicates a lower level of confidence.
- *Subjective financial literacy:* Respondents are asked how many questions they think they answered correctly. A higher subjective financial literacy indicates higher levels of confidence.
- *Relative position:* Respondents are asked how many respondents in their opinion had more correct answers than they did. We have re-coded this variable in such a way that a higher relative positions indicates a higher level of confidence.
- *Confidence in answers:* After each financial literacy question, respondents are asked how confident they feel in their answer. We construct an index by taking the average of the three confidence responses. Accordingly, a higher index indicates a higher level of confidence.
- *Overconfidence:* We measure overconfidence by taking the difference between the subjective financial literacy and the actual financial literacy score. Positive values, implying that an individual thinks they have answered more questions correctly than they actually did, indicate overconfidence. Negative values, implying that an individual thinks they have answered fewer questions correctly than they actually did, suggest underconfidence.

**Hypothetical investment and saving decisions** If information on such group differences affects confidence and financial literacy, it may also have an effect on investment and savings decisions (Preston and Wright 2023). Investing on the stock market requires financial literacy and numeracy skills to understand financial products. A potential stereotype threat, induced by our information treatment, might lead affected respondents to be less willing to invest money in the stock market. Therefore, our second set of outcomes focuses on such (hypothetical) decisions. More precisely, we ask respondents how they would allocate a hypothetical lottery win of 100,000 euros. They can allocate the amount between a savings account, cash savings, private pension, stocks/funds/ETFs, immediate consumption such as a vacation, giving it to relatives or other people, and donating. We then construct two variables that capture the share of money that a respondent wants to allocate to investment or saving options rather than using it for (immediate) consumption. The *Saving* variable captures putting money into a

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<sup>5</sup>A correlation matrix for our confidence outcomes can be found in Table C.3.

savings account or cash savings, whereas the *Investment* variable captures investing in private pensions or stock options, i.e. shares/funds/ETFs.

**Demand for information and education** Finally, respondents are asked to indicate their level of agreement with a series of statements about information and education policies. We do this to understand whether being informed about group differences, and thereby highlighting possible existing stereotypes, affects their demand for education and for government intervention. More specifically, we present them with the following statements:

- Even after leaving school, the state should ensure that all citizens are provided with regular information on savings and old-age provision.
- A federal government online platform on financial literacy is a good way to keep up with the financial system.
- Financial literacy courses are a good way to keep up with the financial system.
- I see a great need for me to attend a financial literacy course.
- There should be a greater focus on financial literacy in schools.
- Private old-age provision should be left to each individual and the state should not interfere in this.<sup>6</sup>

We elicit all answers on a 5-point Likert scale with the following answering options: strongly disagree, somewhat disagree, undecided, somewhat agree, and strongly agree. For our main analysis we construct an index on the demand for information and education. To build the index, we calculate the average across these outcomes and standardize it.

### 3 Empirical Framework

#### 3.1 Estimation equation

To analyze the causal effect of providing information on group differences in financial literacy, we use an OLS estimator and estimate the following equations:

$$Y_i = \alpha_1 + \alpha_2 Treat_{ij} + \alpha^T X'_i + \varepsilon_i \quad (1)$$

$$Y_i = \beta_1 + \beta_2 Treat_{ij} \times H_i + \beta_3 Treat_{ij} + \beta_4 H_i + \beta^T X'_i + \varepsilon_i \quad (2)$$

Equation (1) estimates the average treatment effects.  $Y_i$  denotes the respective outcome variable.  $Treat_{ij}$  is an indicator of whether an individual  $i$  is either in the active control group or in the age or gender treatment group ( $j$ ). With equation (2) we estimate heterogeneous responses to the treatment.  $H_i$  denotes the heterogeneity dimension of interest, namely age or gender. Finally,  $X'_i$  is a vector

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<sup>6</sup>We have recoded this statement so that a higher number indicates more state involvement, to bring it in line with the other statements.

of individual controls and  $\varepsilon$  denotes the error term. In all specifications, we control for age, gender, residence in East or West Germany, education, risk attitude, trust in public institutions and statistics, patience, marital status, employment status, household income, household size, migration background, political affiliation, prior beliefs, self-assessed numeracy skills, self-assessed financial skills, self-assessed reading skills and savings behavior. More information about the control variables can be found in Appendix A.

### 3.2 Hypotheses

In this section, we introduce our hypotheses as registered in our pre-analysis plan.<sup>7</sup> We expect that the average treatment effect will be close to zero, because we expect the respective groups to show opposite responses to the treatments. Therefore, our main focus is on analyzing heterogeneity in treatment responses. We base our hypotheses on the idea of stereotype threat or stereotype boost.<sup>8</sup> The groups to which we refer to in our hypotheses are always compared to the same group in the control group. For example, we compare women in the gender treatment group to women in the control group.

#### Confidence

*Hypothesis Ia – Confidence: Age:* Older<sup>9</sup> respondents will be less confident when learning that their group has lower numeracy skills.

*Hypothesis Ib – Confidence: Gender:* Women will be less confident when learning that their group has lower numeracy skills.

#### Hypothetical investment and savings decisions

*Hypothesis IIa – Hypothetical investment and saving decisions: Age:* Older respondents will allocate money from a hypothetical lottery win more towards less risky and less financially profitable options, when learning that their group has lower numeracy skills.

*Hypothesis IIb – Hypothetical investment and saving decisions: Gender:* Women will allocate money from a hypothetical lottery win more towards less risky and less financially profitable<sup>10</sup> options, when learning that their group has lower numeracy skills.

#### Demand for information and education

*Hypothesis IIIa – Demand for information and education: Age:* Older respondents will have a higher demand for information and education when learning that their group has lower numeracy skills.

*Hypothesis IIIb – Demand for information and education: Gender:* Women will have a higher demand for information and education when learning that their group has lower numeracy skills.

<sup>7</sup>For the pre-registration see AEARCTR-0012432. Note that in order to be consistent throughout the paper, we have changed the wording from “everyday mathematical competencies” to “numeracy skills” in all hypotheses.

<sup>8</sup>Stereotype threat (boost) refers to the concept that individuals change their behavior in a negative (positive) way according to a particular stereotype (Spencer et al. 1999; Steele et al. 2002; Spencer et al. 2016).

<sup>9</sup>Older respondents are aged 45 years and above.

<sup>10</sup>The original hypotheses in the pre-analysis plan referred to these as “less relatable” options. This wording was an error and the hypothesis was intended to be formulated in parallel with the age hypothesis.

## 4 Results

### 4.1 Age and gender differences in self-reported skills

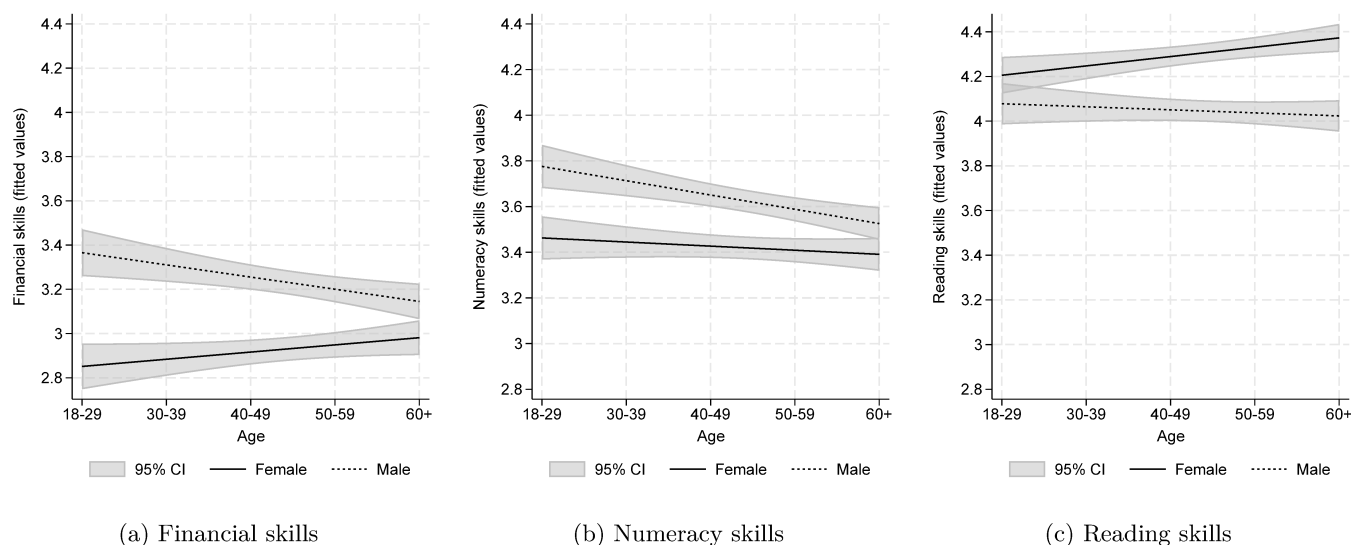
In this section, we want to shed light on respondents' self-reported skills. Before the information treatment, respondents were asked to assess their own skills regarding financial, numeracy, and reading skills.<sup>11</sup> Figure 2 shows fitted values of age-specific self-reported skills. For self-reported financial skills in Figure 2a, we see that men report higher financial knowledge than women across all age groups. This gap is largest for younger respondents and decreases – but does not fully vanish – with higher age. With increasing age, women report slightly higher values for their financial skills, while men report lower values. A possible explanation could be that with higher age and more life experience respondents have reflected more on their financial knowledge and therefore report values that are different from those of younger respondents. Additionally, different cohorts may evaluate their skills differently. Moreover, we also observe a gender gap in self-reported numeracy skills across age cohorts in Figure 2b. Again, the gap seems to be largest for younger individuals. Self-reported numeracy skills appear to decline slightly more for men than for women with increasing age, but again the differences do not disappear completely. The opposite can be observed in Figure 2c for self-reported reading skills. In our sample, women report higher reading skills than men. Across age groups, this gap seems to widen in favour of women, with older women reporting slightly higher reading skills than younger women.

Educational patterns may play a role in the persistence of skills gaps. Women may be more likely to pursue fields of study and occupations that require strong reading and verbal skills, while men may be more encouraged to pursue fields that emphasize numeracy skills (Lordan and Pischke 2022). This could lead to a widening of the self-reported skills gap as each gender builds confidence and expertise in different areas over the course of their lives.

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<sup>11</sup>We ask respondents how they would rate their respective skills on a scale from very good (1) to poor (5) using the wording typically used for school grades. We then recode these responses such that a higher number implies higher self-assessed skills. Financial skills refer to self-assessed financial knowledge. Numeracy skills refer to self-assessed general mathematical skills for everyday life. The exact wording to these questions can be found in Appendix E.1.

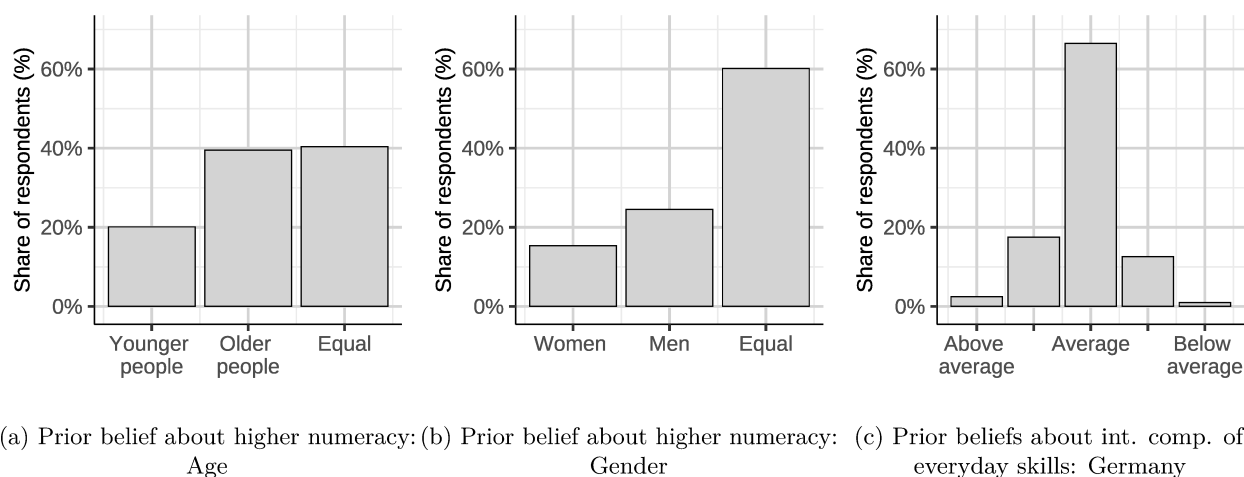
Figure 2: Age-specific self-reported skills



## 4.2 Prior beliefs about skill differences

In the first step of our experiment, we analyze respondents' prior beliefs about group differences in numeracy skills. We ask this question for differences between younger and older people, and for differences between men and women. In addition, we ask people how they think Germany compares internationally in tests of everyday skills. Figure 3 shows the responses. In the age comparison in Figure 3a, significantly more respondents believe that older people have higher numeracy skills than younger people. In the gender comparison in Figure 3b, slightly but significantly more respondents believe that men have higher numeracy skills than women. However, many respondents think that there are no age (40 %) or gender (60 %) differences in numeracy skills. In addition, as shown in Figure 3c, most respondents correctly answered that Germany performs about average in international tests of everyday skills (66 %).

Figure 3: Prior beliefs about skill differences



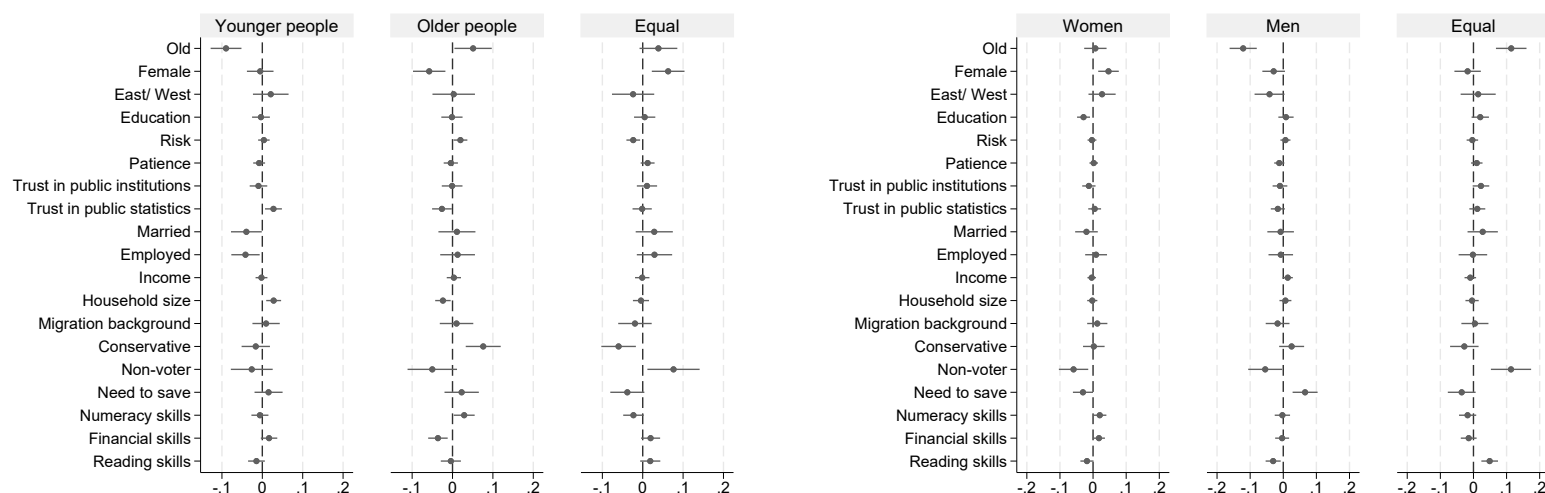
We are also interested in understanding which socio-demographic characteristics correlate with respondents' prior beliefs. Figure 4a shows the determinants of prior beliefs for the question of whether there are age differences in numeracy skills. Our findings indicate that age and gender play a role in shaping perceptions of numeracy skills. Specifically, older respondents tend to perceive their own age group as having higher numeracy skills and are less likely to believe that younger people possess such skills. In contrast, women are more likely to perceive numeracy skills as equal between younger and older people, and less likely to attribute higher skills to older individuals. Furthermore, our results show that conservative voters and respondents with higher risk preference are more likely to attribute higher numeracy skills to older people, and less likely to consider them equal between the two age groups.

Next, we focus on the determinants of prior beliefs about gender differences in numeracy skills. In Figure 4b we observe different patterns in perceptions of numeracy skills by gender and age. Women are slightly more likely to think that their own group has higher numeracy skills. In contrast, older respondents are less likely to think that men have an advantage in numeracy skills, instead tending to see skills as equal between the genders. Similarly, non-voters tend to avoid attributing higher numeracy skills to either gender, instead considering both as equally skilled.

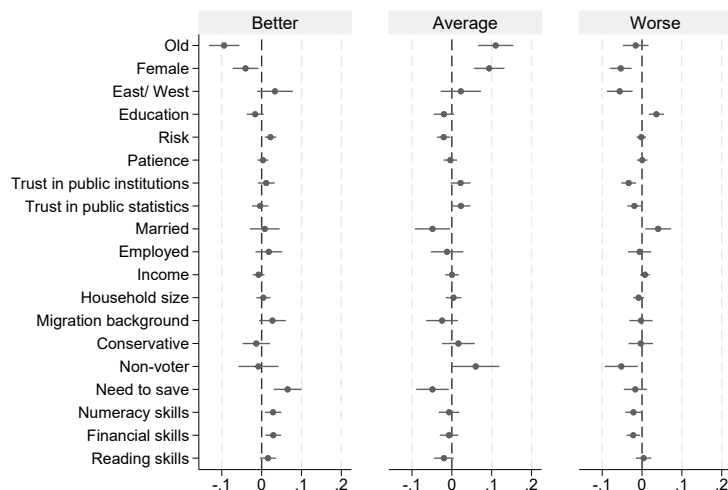
Finally, we analyze respondents' determinants of prior beliefs about how adults in Germany compare internationally in terms of everyday skills. In Figure 4c we see that older respondents and women are less likely to think that Germany is doing better than average and more likely to think that Germany is doing about average internationally. In addition, women, respondents from East Germany and respondents with a higher level of trust in public institutions are less likely to think that Germany is doing worse than average. On the contrary, those with a higher level of education are more likely to say that Germany is doing worse than average.

Figure 4: Prior beliefs about numeracy skills of groups

(a) Determinants of prior beliefs about age differences in numeracy skills (b) Determinants of prior beliefs about gender differences in numeracy skills



(c) Determinants of prior beliefs about everyday skills of German adults in an international comparison



Notes: This figure shows determinants of prior beliefs about differences in numeracy skills by age Panel (a) and gender Panel (b). Panel (c) shows determinants of prior beliefs about how adults in Germany compare internationally in terms of everyday skills. This question was measured on a 5-point scale, with 1 indicating clearly below average and 5 indicating clearly above average. The outcome variables were then coded so that respondents who answered 4 or 5 indicate above average, those who answered 1 or 2 indicate below average and those who answered 3 indicates average. The outcomes in all panels are binary variables where 1 indicates that a respondent chose this option and 0 otherwise. The number of observations is 2498. 95 % confidence intervals are displayed.





savings decisions as well as their demand for information and education (Section 4.4.2).

#### 4.4.1 Confidence and financial literacy

First, we analyze whether providing information about group differences in numeracy skills affects respondents' financial literacy and their confidence in their own financial literacy (see Table 1). Specifically, we first focus on their financial literacy score (Column 1), which is measured as the sum of correct answers to the “Big Three” financial literacy questions established by Lusardi and Mitchell (2008). The results to our confidence measures are presented in Columns 2 to 6. We measure confidence as the number of “don't know” responses (Column 2), how many questions respondents think they answered correctly (Column 3), how well they think they do compared to others (Column 4), how confident they are in their response to the financial literacy questions (Column 5) and whether they are overconfident (Column 6). Focusing on the control group, we find that these respondents have an average financial literacy score of approximately 2.1 (Column 1), implying that they on average answered two out of three questions correctly. Respondents say that they do not know the answer to 0.5 questions (Column 2) and believe they answered two out of three questions correctly (Column 3). Respondents in the control group estimate that they perform average compared to other survey respondent, i.e. they think that 40 % - 60 % of survey participants perform better than them or position themselves on average in the third quintile (Column 4). Furthermore, they are relatively confident in their answers (Column 5). More specifically, most respondents are somewhat certain or very certain (on average 64 %) that they answered each of the financial literacy questions correctly.<sup>12</sup> Given that the difference between the financial literacy score and the subjective financial literacy is close to zero (Column 6), the respondents in the control groups are neither over- nor underconfident and seem to estimate their own financial literacy quite precisely.

We show the average treatment effects in Panel A of Table 1. We do not find evidence, that the age treatment affects either financial literacy or the confidence respondents have in their financial literacy. For the gender treatment, however, we find that respondents in this treatment group are more confident in their answers.

For the analysis of heterogeneity in treatment effects, we focus first on age differences (Panel B). When looking at the control group it becomes visible that older respondents, i.e. respondents over the age of 45<sup>13</sup>, on average answer more questions correctly (Column 1).<sup>14</sup> Furthermore, they rightfully think that they answered more questions correctly (Column 3) and are more confident in their answers (Column 5). They also assess their relative position compared to others better (Column 4). When focusing on treatment effects we do not observe significant differences in effects between older and younger respondents.<sup>15</sup>

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<sup>12</sup>Confidence levels on the three different financial literacy questions are relatively similar. Respondents in the control group are slightly more confident about the question on interest rates, where 68.2 % of respondents are somewhat certain or very certain. When asked about inflation and risk, 62.62 % and 62.02 % of respondents are somewhat or very certain respectively.

<sup>13</sup>This corresponds to the median age of the German population in 2023.

<sup>14</sup>Our treatment is based on numeracy results from the PIAAC but in our analysis we measure financial literacy. Hence, older individuals may have lower numeracy skills but still perform better in financial literacy compared to younger individuals.

<sup>15</sup>As a robustness check we conduct our analysis also with different age cut-offs (see Table D.1) and with age as a

We also analyze heterogeneity by gender (Panel C). Focusing first on the control group, we find that female respondents answer fewer questions correctly than male respondents (Column 1). They are also more likely to say they do not know the answer (Column 2) and are less confident in their answers (Columns 3 and 5). In response to the treatment, we observe, that male respondents are more confident in their answers once they learn about their on average higher financial literacy. In particular, treated male respondents have a higher subjective financial literacy, i.e. they think they answered more questions correctly, and report being more confident when answering the financial literacy questions. However, this increase in confidence does not translate into a higher financial literacy score. In contrast, we do not observe any change in confidence among treated women. However, we show that female respondents respond significantly less to the treatment than male respondents in terms of subjective financial literacy and confidence in answering the financial literacy questions correctly.

Our findings suggest that there are age and gender differences not only in financial literacy but also in confidence in one's own financial literacy. Furthermore, we show that informing male respondents about gender differences in financial literacy increases their confidence, while it has no effect on female respondents. For male respondents, we may observe a stereotype boost. The treatment may confirm their perceived relative advantage in numeracy skills, which may lead to higher confidence in financial literacy. On the other hand, we do not observe changes in the confidence of female respondents, as the information may already be salient. We do not find heterogeneous treatment effects with respect to age. The information about age differences - and the stereotypes associated with it - might be less straightforward or personally relevant than gender stereotypes when it comes to numeracy skills. There might be some stereotypes regarding cognitive decline with age or the distance to schooling. However, they might not be as strongly internalized than gender stereotypes.

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continuous variable (see Table D.2). The results remain unchanged.

Table 1: Treatment effects on financial literacy and confidence

	FinLit	Confidence				
	(1) FinLit score	(2) FinLit don't know	(3) FinLit subject.	(4) Rel. position	(5) Conf. answers	(6) Overconf.
<i>Panel A: Treatment effects of information provision</i>						
Treat Age	-0.001 (0.042)	0.020 (0.035)	0.017 (0.042)	-0.054 (0.062)	-0.022 (0.049)	0.018 (0.043)
Treat Gender	0.013 (0.042)	-0.029 (0.033)	0.051 (0.041)	-0.096 (0.061)	0.102** (0.047)	0.038 (0.043)
Mean Control Group	2.097	0.521	2.012	2.952	3.875	-0.085
Observations	2498	2498	2498	2395	2498	2498
<i>Panel B: Treatment effects by age</i>						
T1:Age	-0.048 (0.070)	0.064 (0.059)	-0.042 (0.068)	-0.003 (0.090)	-0.093 (0.080)	0.005 (0.074)
Old	0.211*** (0.068)	-0.079 (0.056)	0.282*** (0.066)	0.213** (0.095)	0.281*** (0.078)	0.072 (0.069)
T1:Age × Old	0.068 (0.088)	-0.059 (0.073)	0.081 (0.085)	-0.103 (0.123)	0.105 (0.099)	0.013 (0.090)
T1:Age + T1:Age x Old	0.021 (0.052)	0.005 (0.043)	0.039 (0.052)	-0.106 (0.084)	0.012 (0.060)	0.018 (0.052)
Mean Young	1.982	0.524	1.869	2.823	3.714	-0.113
Observations	1653	1653	1653	1582	1653	1653
<i>Panel C: Treatment effects by gender</i>						
T2:Gender	0.023 (0.058)	-0.017 (0.043)	0.106* (0.055)	-0.081 (0.091)	0.197*** (0.064)	0.083 (0.059)
Female	-0.257*** (0.063)	0.211*** (0.051)	-0.342*** (0.061)	-0.014 (0.090)	-0.275*** (0.069)	-0.086 (0.062)
T2:Gender × Female	-0.028 (0.084)	-0.014 (0.066)	-0.135* (0.081)	-0.050 (0.123)	-0.204** (0.091)	-0.108 (0.085)
T2:Gender + T2:Gender x Female	-0.005 (0.060)	-0.031 (0.050)	-0.030 (0.059)	-0.131 (0.082)	-0.008 (0.066)	-0.025 (0.060)
Mean Male	2.244	0.378	2.219	2.957	4.029	-0.026
Observations	1666	1666	1666	1606	1666	1666

Notes: Robust standard errors in parenthesis. Due to missing variables the outcome variable “Relative position” has 2408 instead of 2512 observations. All specifications include the following control variables: old, female, East/West Germany, education, risk, patience, trust in public institutions, trust in public, married, employed, income, household size, migration background, conservative, non-voter, need to save for retirement, self-assessed numeracy, self-assessed financial knowledge, self-assessed reading skills and prior beliefs about numeracy skills of gender, age, and international comparison; \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

#### 4.4.2 Investment and saving decisions and demand for information and education

Second, we analyze whether the treatments affect hypothetical investment or saving decisions and demand for information and education, as shown in Table 2. To elicit hypothetical investment and saving decisions, we use a hypothetical lottery question that asks people how they would allocate 100,000 euros if they won the lottery. They can distribute the 100,000 euros between a savings account

or cash savings, a private pension, shares/funds/ETFs, immediate consumption, gifting money to relatives or other people, or donating money. With this question, we aim to determine if there is a difference in allocating money to more profitable versus less profitable options between treated and untreated respondents. To this end, we create a variable that describes how much of the hypothetical lottery win is allocated towards saving options (*Saving*), i.e. putting money into a savings account or cash savings. A second variable describes how much money is allocated towards investment options (*Investment*), i.e. a private pension or shares/funds/ETFs.<sup>16</sup> Focusing on the control group, we see that respondents allocate about 40% of their hypothetical lottery win towards saving options and around 28% are allocated towards investment options. Correspondingly, respondents would spend or donate about one-third of their lottery win. With respect to the average treatment effect (Panel A), we do not observe significant changes due to the information treatments. Furthermore, we do not find significant differences in treatment effects between older and younger respondents (Panel B). In Panel C we report that women in the control group put slightly more money towards saving options compared to men. Table D.3 in the appendix reveals that this is offset by lower stock investments by women. This finding is in line with the results of previous studies showing that women seem to be less likely to invest money in riskier financial options (Barber and Odean 2001; Beckmann and Menkhoff 2008). In response to the gender treatment, treated women allocate less money to savings options than treated men.

Finally, we analyze whether receiving information about group differences in financial literacy affects the demand for information and education policies aimed to reduce these differences. Using our information demand outcomes from Section 2.2.3, we construct an information index that increases if respondents are more in favor of the measures. Focusing on the effect of our information treatments, we do not observe any changes in the demand for information and education due to either treatment (Panel A). Furthermore, we do not observe heterogeneity in response to the treatments between older and younger respondents (Panel B) or between male and female respondents (Panel C).<sup>17</sup>

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<sup>16</sup>The treatment effects for each individual option can be found in Table D.3 in the appendix.

<sup>17</sup>We show the results for the individual demand for information and education outcomes in Table D.4.

Table 2: Treatment effects on investment and saving decisions and demand for information and education

	(1) Saving	(2) Investment	(3) Info index
<i>Panel A: Treatment effects of information provision</i>			
Treat Age	-1.488 (1.494)	1.286 (1.293)	0.026 (0.046)
Treat Gender	-0.388 (1.500)	0.274 (1.310)	0.023 (0.045)
Mean Control Group	39.470	28.038	-0.018
Observations	2498	2498	2498
<i>Panel B: Treatment effects by age</i>			
T1:Age	-1.746 (2.166)	1.219 (1.989)	0.008 (0.069)
Old	-0.179 (2.304)	-0.716 (2.062)	-0.065 (0.073)
T1:Age × Old	0.521 (2.961)	0.022 (2.623)	0.024 (0.092)
T1:Age + T1:Age x Old	-1.225 (2.025)	1.241 (1.701)	0.031 (0.061)
Control Mean Young	37.780	31.500	0.086
Observations	1653	1653	1653
<i>Panel C: Treatment effects by gender</i>			
T2:Gender	2.267 (2.195)	-0.096 (1.916)	0.089 (0.063)
Female	3.660* (2.218)	-2.905 (1.912)	0.060 (0.067)
T2:Gender × Female	-5.404* (3.000)	0.783 (2.642)	-0.126 (0.090)
T2:Gender + T2:Gender x Female	-3.137 (2.053)	0.687 (1.805)	-0.037 (0.064)
Mean Male	37.201	30.260	-0.055
Observations	1666	1666	1666

Notes: Robust standard errors in parenthesis. All specifications include the following control variables: age, female, East/West Germany, education, risk, patience, trust in public institutions, trust in public, married, employed, income, household size, migration background, political affiliation, need to save for retirement, self-assessed numeracy, self-assessed financial knowledge, self-assessed literacy and prior beliefs about numeracy skills of gender, age, and international comparison; \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## 4.5 Mechanisms

In the following chapter, we discuss mechanisms that may drive the response to our treatment. To do this, we focus on the analysis of subsamples, but have to acknowledge that the resulting reduced sample size requires some caution in interpreting the results. We focus on the following mechanisms: prior beliefs about differences in numeracy skills, education, and risk preference.

**Prior beliefs about skill differences** Despite the null average treatment effects, there may be heterogeneity in treatment effects by prior beliefs about the group differences in numeracy skills. We split our sample into respondents who gave the correct answer (i.e. men or younger individuals have higher numeracy skills) and respondents who gave the wrong answer.<sup>18</sup> Respondents may intrinsically already have a perception or a stereotype on the numeracy skills of groups. Therefore, the treatment may reinforce stereotypes for those who are aware of them, or contradict respondents' existing beliefs.

The treatment effects regarding age are shown in Table D.5. We do not observe any average treatment effects, apart from a marginally significant decrease in the demand for information and education among respondents who hold the correct prior beliefs (Panel A, Column 9). There are no significant differences in treatment effects for either subgroup, with one exception: the allocation of a hypothetical lottery win toward the savings option (Column 7). In the subgroup of respondents with correct prior beliefs, older respondents react less to the treatment than younger respondents (Panel A2), but the treatment effects are insignificant for both subgroups. For the subgroup of respondents with incorrect prior beliefs, we see that young individuals in the treatment group allocate less money to the saving option (Panel B2). Table D.6 shows the results for prior beliefs about gender differences in numeracy skills. Panel A shows respondents who have indicated that men have higher numeracy skills. Hence, their prior beliefs are in line with the information given in the gender treatment. For this group we do not observe average treatment effects for our outcome measures. When we look at treatment effects by gender, we see that neither men nor women in the treatment group react to the treatment. Although the interaction term reveals that women in this group react less to the treatment than treated men in terms of subjective financial literacy and overconfidence, this does not translate into a significant treatment effect. Panel B presents respondents who did not say that men have higher numeracy skills, i.e. who answered that either women have higher numeracy skills or both groups are equal in their skills. For this group the gender treatment presents information that differs from respondents' prior beliefs. For these respondents we observe an overall increase in confidence in answers, which is driven by male respondents. Moreover, men in the treatment group increase their subjective financial literacy and show an increase in the information index. Hence, we observe a stereotype boost for men when the treatment contradicts their prior beliefs.

**Education** Education is a key driver of financial literacy. People with higher levels of education typically have a better understanding of financial concepts, feel more confident when answering financial literacy questions, and are more confident in making investment decisions (Bucher-Koenen et al. 2023; Bucher-Koenen et al. 2024; Lusardi and Mitchell 2014). In our sample, the level of education is correlated with respondents' prior beliefs: respondents with a higher level of education attribute higher numeracy skills to older people, lower numeracy skills to women and estimate that adults in Germany perform rather worse in international comparisons of everyday skills. In addition, education and school

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<sup>18</sup>We show that prior beliefs correlate to some extent with our outcomes in Table C.2. However, it is important to keep in mind, that our treatment is designed to make stereotypes salient rather than to shift beliefs.

are mentioned by respondents as reasons for these prior beliefs (see Figure 5). Hence, we take a closer look at how education shapes the responses to our treatment.

To analyse treatment responses by education, we split our sample into two groups: Higher educated individuals, who have completed ten or more years of schooling, and low educated individuals, who have completed less than ten years of schooling, left school without a degree or are still in school. We show treatment effects regarding age in Table D.7. We observe neither a significant average treatment effect nor differences in treatment response between old and young respondents.

Table D.8 shows how different levels of education are related to the response to the gender treatment. Panel A shows respondents with high education. We find an average treatment effect for our confidence measures: Respondents who are informed about gender differences in numeracy skills rank their own financial literacy higher and they are more confident in their answers. However, when they assess their own position, they rank themselves lower. These effects seem to be driven by male respondents who might experience stereotype boost and thereby become more confident. However, this does not explain the lower ranking for the relative position. It might be that when it comes to the direct comparison with others they think about their immediate peers who are likely also highly educated and that this may affect their assessment. Panel B shows the results for respondents with low education. Being informed that women have lower numeracy skills than men reduces the confidence of low educated female respondents in their own financial literacy significantly. We conclude from these results, that especially low educated women are facing stereotype threat from the treatment. However, this does not translate into changes in investment and savings decisions or in the demand for information and education.

**Risk preference** Another mechanism could be risk preference, because financial literacy is associated with higher risk taking. This is especially important when it comes to stock market participation (Hermansson and Jonsson 2021; Rooij et al. 2011). Moreover, women are often reported to be more risk averse and with age the willingness to take risks decreases (Dohmen et al. 2011). Therefore, we split our sample in respondents with high and low risk preference. We do this based on their self-reported response to the question whether they consider themselves to be a generally risk-taking person, which respondents answer on a scale of 1 to 5, with higher values indicating a greater willingness to take risks. Thus, respondents who answered 3 or higher are coded as having a high risk preference.

The results for the age treatment are reported in Table D.9. For the control group we find, that older individuals with a high risk preference are not only more confident in their financial literacy, they also have a financial literacy score. When it comes to treatment effects, older respondents with a high risk preference seem to rank themselves somewhat lower relative to other individuals, while we observe no significant treatment effects on other outcomes.

Table D.10 shows how different levels of risk preference are related to the response to the gender treatment. Panel A shows the sub-sample for individuals with a higher risk preference and Panel B

shows the sub-sample for individuals with a lower risk preference. Women in the treatment group with a higher risk preference show a higher confidence in their answers but also a lower relative position. Women with a lower risk preference report a lower confidence in their answers after they have received the gender treatment. Men on the other hand still exhibit higher confidence in their answers, irrespective of having high or low risk preference. Focusing on investment and savings decisions, we find that treated men with a high risk preference allocate more money to savings options, while treated women with a low risk preference allocate less money to these options. The allocation to investment options remains unaffected, as does the demand for information and education. Overall, our results regarding risk preference seem to suggest that risk preference plays only a minor role in how respondents react to the information treatments.

This exercise reveals that men appear to experience a stereotype boost in response to the gender treatment, particularly in their confidence in their answers but also other dimensions of confidence, regardless of the characteristic being examined. Conversely, women, especially those from vulnerable groups — such as those with lower education — show a decrease in confidence across multiple dimensions. Those women may be more susceptible to stereotype threat. When they are reminded of the negative stereotype about their group’s numeracy skills, it may lead to anxiety and self-doubt, ultimately reducing their confidence. Moreover, individuals in these vulnerable groups may already have lower self-perceptions of their abilities. When confronted with information that their group performs poorly in numeracy, it reinforces their negative self-assessment and leads to a further decline in confidence. This effect is less pronounced or absent when we look at younger and older respondents who might not have internalized age stereotypes as strongly.

## 5 Discussion and concluding remarks

In this paper, we investigated whether stereotype salience in the form of information about age and gender differences in numeracy skills affects financial literacy, confidence, hypothetical investment and saving decisions, and demand for information and education.

We hypothesized that, depending on which stereotyped group respondents belong to, our treatment will affect them differently. We show that neither information about gender differences nor information about age differences has an overall effect on respondents. Focusing on heterogeneity in treatment effects, we do not observe significant differences by age. This finding is not in line with our hypotheses that treated older respondents will be less confident, will allocate more money from a hypothetical lottery win to less risky and less profitable options, and will have a higher demand for information and education.

When focusing on gender, however, our findings suggest that male respondents become significantly more confident in their own financial literacy when they learn that men have higher numeracy skills than women. Women on the other hand do not react to the treatment. We attribute this finding to a stereotype boost experienced by male respondents. But this increase in male respondents’ self-confidence does not translate into differences in hypothetical investment and savings decisions. However, it is important to consider the hypothetical nature of the investment and savings decisions. Respondents may treat a lottery win differently than actual money. Finally, the differential response to information



on gender differences in numeracy skills on confidence does not lead to heterogeneous treatment effects in the demand for information and education. Although these results are not fully in line with our hypotheses, they do confirm that men respond differently to treatment than women in terms of confidence.

Upon further investigation into what moderates group-specific responses to the treatment, we show that the increase in confidence among treated male respondents is driven by respondents who were not aware of the higher numeracy skills of men prior to the treatment. In addition, we find that women with lower education become less confident when made aware that their group has lower numeracy skills. This pattern is not observed among different age groups. The absence of heterogeneity in response to the age treatment may be explained by respondents not being able to place themselves confidently in one group or the other. After all, it might not be clear to the respondents which age was regarded as young or old in our setting. In addition, respondents may have a more nuanced view about age differences in numeracy skills than about gender differences. They may be aware that, for example, older respondents have a higher level of knowledge about pensions (Elinder et al. 2022), which could be seen as closely related to numeracy, and therefore respond less strongly to the treatment. This may be different when it comes to gender differences, as many studies on different numeracy aspects such as financial literacy (Bucher-Koenen et al. 2024; Bucher-Koenen et al. 2017) and pension knowledge (Elinder et al. 2022) all come to the same conclusion as the PIAAC results, that women appear to be less knowledgeable.

At first glance providing information about group differences in numeracy skills has a limited impact on respondents. There are no differences in treatment effects between age groups. However, when we look at gender differences in treatment effects, male respondents seem to experience a stereotype boost, particularly when we contradict their prior beliefs and positively reinforce stereotypes about gender and numeracy in favor of men. On average, women do not seem to respond to the treatment. Still, stereotypes seem to have a greater negative impact on women with less education. It is therefore important to target financial literacy interventions towards specific groups. In addition, it seems important to abstain from reinforcing existing stereotypes. Overall, understanding these dynamics can help educators and policymakers design more effective financial literacy initiatives that not only convey knowledge but also empower individuals, particularly those from vulnerable groups, to confidently manage their finances.

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## Appendix A Variable description

Table A.1: Variable description

Variable Name	Type	Description
<b>Prior beliefs:</b>		
Prior Belief: Age	Categorical	“Which of these groups do you think has a higher level of numeracy skills?” Answer options: Younger people, older people, both the same
Prior Belief: Gender	Categorical	“Which of these groups do you think has a higher level of numeracy skills?” Answer options: Women, men, both the same
Prior Belief: International	Categorical	“How do you think adults in Germany perform in an international comparison of everyday skills?”
<b>Outcomes:</b>		
FinLit score	Numerical (0–3)	Sum of correct answers to the three financial literacy questions.
FinLit don’t know	Numerical (0–3)	Sum of “Don’t know” answer option.
FinLit subject	Numerical (0–3)	“What do you think, how many of the three questions did you answer correctly?”
Rel. position	Numerical (1–5)	“What do you think, how many people who also took part in this survey answered more questions correctly than you did?”
Conf. answers	Numerical (1–5)	Index of average confidence per answer. After each financial literacy question the question “How certain are you of your answer?” was asked.
Overconf.	Numerical (–3–3)	Measure of overconfidence as the difference between actual ( <i>FinLit score</i> ) and subjective ( <i>FinLit subject</i> ) financial literacy
Saving	Numerical	Share of hypothetical lottery winnings allocated to savings options (savings account or cash savings), based on the following question: “Suppose you win 100,000 Euro in a lottery tomorrow. How would you distribute this as a percentage among the following options?” Answer options: Savings account or cash savings, private pension, shares/funds/ETFs, immediate consumption, gifting money to relatives, gifting money to other people, donating money
Investment	Numerical	Share of hypothetical lottery winnings allocated to investment options (private pension or shares/funds/ETFs), based on the following question: “Suppose you win 100,000 Euro in a lottery tomorrow. How would you distribute this as a percentage among the following options?” Answer options: Savings account or cash savings, private pension, shares/funds/ETFs, immediate consumption, gifting money to relatives, gifting money to other people, donating money

Variable Name	Type	Description
Info. index	Numerical	Index of demand for information and education
<b>Control variables:</b>		
Old	Binary	Indicator that takes the value 1 for individuals over the age of 45
Female	Binary	Indicator that takes the value 1 for individuals who are female
East Germany	Binary	Indicator that takes the value 1 for individuals who live in East Germany (excluding Berlin)
Education	Categorical	Respondent's education based on highest school-leaving certificate according to the ranges: low ( $\leq 9$ years of schooling), medium (10 years of schooling), high ( $\geq 12$ years of schooling).
Risk	Numerical (1-5)	Agreement with the statement: "I'm generally a risk-taking person."
Patience	Numerical (1-5)	Agreement with the statement: "I'm generally a patient person."
Trust in public institutions	Numerical (1-5)	Agreement with the statement: "Most public institutions in Germany can be trusted."
Trust in public statistics	Numerical (1-5)	Agreement with the statement: "Most statistics and scientific findings in Germany can be trusted."
Married	Binary	Indicator that takes the value 1 for individuals who are married.
Employed	Binary	Indicator that takes the value 1 for individuals who are employed.
Income	Categorical	Respondent's household net income in Euro according to the ranges: Below 1000, 1000–2000, 2000–3000, 3000–4000, 4000–5000, 5000 and above.
Household size	Numerical	Number of persons living in a respondent's household
Migration Background	Binary	Indicator that takes the value 1 if an individual or one of their parents was born outside of Germany.
Conservative	Binary	Indicator that takes the value 1 for individuals who would vote for a conservative party if there would be a federal election next Sunday.
Non-voter	Binary	Indicator that takes the value 1 for individuals who would not go to vote if there would be a federal election next Sunday.
Numeracy skills	Numerical (1-5)	"How would you rate your personal everyday numeracy skills?"
Fin. skills	Numerical (1-5)	"How would you rate your overall financial skills?"
Reading skills	Numerical (1-5)	"How would you rate your personal reading skills?"

## Appendix B Balance tests and representativity

Table B.1: Balance

	Mean				Mean difference		
	All	C	T1	T2	C vs T1	C vs T2	T1 vs T2
Old	0.60	0.60	0.61	0.59	-0.01	0.01	0.02
Female	0.51	0.53	0.51	0.50	0.02	0.03	0.01
East/ West	0.16	0.14	0.18	0.16	-0.04 *	-0.01	0.02
Education	1.98	2.01	1.95	1.98	0.06	0.03	-0.03
Risk	2.59	2.58	2.58	2.61	0.00	-0.02	-0.03
Patience	3.58	3.58	3.52	3.65	0.07	-0.07	-0.13 **
Trust in public institutions	3.32	3.32	3.32	3.31	-0.01	0.01	0.02
Trust in public statistics	3.26	3.24	3.26	3.29	-0.02	-0.05	-0.03
Married	0.44	0.44	0.43	0.46	0.01	-0.02	-0.03
Employed	0.55	0.54	0.56	0.56	-0.02	-0.02	-0.00
Income	3.20	3.21	3.08	3.31	0.13 *	-0.10	-0.23 ***
Household size	2.15	2.19	2.10	2.16	0.08	0.02	-0.06
Migration background	0.32	0.33	0.32	0.32	0.01	0.01	-0.01
Conservative	0.44	0.43	0.45	0.44	-0.02	-0.01	0.01
Non-voter	0.13	0.15	0.13	0.11	0.03 *	0.04 **	0.01
Need to save	0.34	0.33	0.34	0.36	-0.01	-0.03	-0.02
Numeracy skills	3.52	3.49	3.51	3.56	-0.02	-0.06	-0.05
Financial skills	3.08	3.02	3.06	3.16	-0.04	-0.14 ***	-0.10 **
Reading skills	4.18	4.19	4.16	4.18	0.03	0.01	-0.03
Observations	2498	821	832	845	1653	1666	1677

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .



Table B.2: Comparison to German population

	Mean	
	Population	Sample
Age: 18-29	0.16	0.16
Age: 30-39	0.16	0.16
Age: 40-49	0.14	0.14
Age: 50-59	0.19	0.19
Age: 60+	0.35	0.36
Female	0.51	0.51
East/ West	0.15	0.16
Low education	0.36	0.36
Medium education	0.30	0.30
High education	0.34	0.34
Married	0.50	0.44
Employed	0.51	0.55
Household size	2.02	2.15
Conservative	0.31	0.44
Observations		2498

Notes: The means for the German population are calculated using data from the Federal Statistical Office (2022b; 2022c; 2022a; 2022d; 2022e; 2021) and Bundeswahlleiterin (2021).

## Appendix C Descriptives

Table C.1: Summary statistics

	Mean	SD	Minimum	Maximum
<b>Outcomes</b>				
FinLit score	2.11	0.96	0.00	3.00
FinLit don't know	0.51	0.77	0.00	3.00
FinLit subject.	2.04	0.95	0.00	3.00
Rel. position	2.90	1.24	1.00	5.00
Conf. answers	3.90	1.05	1.00	5.00
Overconf.	-0.07	0.88	-3.00	3.00
Saving	38.75	30.98	0.00	100.00
Investment	28.80	28.34	0.00	100.00
Info index	-0.00	1.00	-3.77	2.48
<b>Controls</b>				
Prior Belief: Age	2.20	0.75	1.00	3.00
Prior Belief: Gender	2.45	0.74	1.00	3.00
Prior Belief: International	2.92	0.66	1.00	5.00
Old	0.60	0.49	0.00	1.00
Female	0.51	0.50	0.00	1.00
East/ West	0.16	0.37	0.00	1.00
<i>Education</i>				
Low education	0.36	0.48	0.00	1.00
Medium education	0.30	0.46	0.00	1.00
High education	0.34	0.47	0.00	1.00
Risk	2.59	1.16	1.00	5.00
Patience	3.58	1.14	1.00	5.00
Trust in public institutions	3.32	1.03	1.00	5.00
Trust in public statistics	3.26	1.08	1.00	5.00
Married	0.44	0.50	0.00	1.00
Employed	0.55	0.50	0.00	1.00
<i>Income</i>				
Below 1000 EUR	0.10	0.31	0.00	1.00
1000–2000 EUR	0.25	0.43	0.00	1.00
2000–3000 EUR	0.26	0.44	0.00	1.00
3000–4000 EUR	0.19	0.39	0.00	1.00
4000–5000 EUR	0.11	0.32	0.00	1.00
5000 EUR and above	0.08	0.27	0.00	1.00
Household size	2.15	1.15	0.00	11.00
Migration background	0.32	0.47	0.00	1.00
Conservative	0.44	0.50	0.00	1.00
Non-voter	0.13	0.34	0.00	1.00
Need to save	0.34	0.47	0.00	1.00
Numeracy skills	3.52	0.90	1.00	5.00
Financial skills	3.08	1.00	1.00	5.00
Reading skills	4.18	0.83	1.00	5.00
Observations	2498			

Table C.2: Correlation of prior beliefs with outcome variables

*Panel A: Prior beliefs about age differences in numeracy skills*

	(1) Higher comp.: Young	(2) Higher comp.: Old	(3) Equal comp.
FinLit score	0.001	0.072***	-0.072***
FinLit don't know	-0.053***	-0.083***	0.126***
FinLit subject.	-0.007	0.045**	-0.039**
Rel. position	-0.009	0.016	-0.008
Conf. answers	-0.053***	0.034*	0.009
Overconf.	-0.008	-0.029	0.036*
Saving	-0.054***	0.015	0.029
Investment	0.042**	0.012	-0.046**
Info index	0.028	-0.018	-0.005
Observations	2498	2498	2498

*Panel B: Prior beliefs about gender differences in numeracy skills*

	Higher comp.: Women	Higher comp.: Men	Equal comp.
FinLit score	-0.027	0.015	0.007
FinLit don't know	-0.044**	-0.068***	0.092***
FinLit subject.	-0.055***	0.021	0.022
Rel. position	-0.011	-0.005	0.012
Conf. answers	-0.066***	-0.011	0.058***
Overconf.	-0.030	0.007	0.016
Saving	-0.007	-0.029	0.031
Investment	-0.015	0.048**	-0.031
Info index	-0.026	-0.022	0.038*
Observations	2498	2498	2498

*Panel C: Prior beliefs about international differences in skills*

	Int. comp.: Better	Int. comp.: Average	Int. comp.: Worse
FinLit score	-0.036*	-0.009	0.054***
FinLit don't know	-0.093***	0.103***	-0.034*
FinLit subject.	0.023	-0.032	0.017
Rel. position	-0.074***	0.041**	0.029
Conf. answers	-0.011	-0.037*	0.064***
Overconf.	0.064***	-0.024	-0.041**
Saving	-0.050**	0.037*	0.006
Investment	0.057***	-0.047**	-0.001
Info index	0.006	-0.008	0.004
Observations	2498	2498	2498

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table C.3: Correlation of confidence outcome variables

	FinLit don't know	FinLit subject.	Rel. position	Conf. answers	Overconf.
FinLit don't know	1.000				
FinLit subject.	-0.520***	1.000			
Rel. position	-0.060***	0.107***	1.000		
Conf. answers	-0.302***	0.636***	0.157***	1.000	
Overconf.	0.218***	0.457***	-0.038*	0.160***	1.000

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## Appendix D Further results

Table D.1: Treatment effects: Different age cut-off

	FinLit	Confidence					Save. & Invest.		Info
	(1) FinLit score	(2) FinLit don't know	(3) FinLit subject.	(4) Rel. position	(5) Conf. answers	(6) Overconf.	(7) Saving	(8) Investment	(9) Info index
T1:Age	-0.049 (0.107)	0.060 (0.091)	-0.103 (0.095)	-0.058 (0.134)	-0.004 (0.120)	-0.054 (0.108)	-0.494 (3.242)	2.575 (3.084)	-0.047 (0.105)
Middle age	-0.004 (0.097)	-0.030 (0.081)	0.190** (0.088)	0.277** (0.127)	0.147 (0.106)	0.194** (0.095)	0.165 (3.031)	-2.408 (2.812)	-0.196** (0.099)
Old age	0.131 (0.114)	-0.109 (0.093)	0.295*** (0.103)	0.288* (0.159)	0.048 (0.127)	0.164 (0.111)	0.176 (3.766)	-3.651 (3.439)	-0.217* (0.121)
T1:Age × Middle age	0.052 (0.123)	-0.030 (0.103)	0.070 (0.113)	0.035 (0.160)	-0.114 (0.137)	0.018 (0.126)	0.781 (3.905)	-2.041 (3.591)	0.054 (0.124)
T1:Age × Old age	0.054 (0.129)	-0.050 (0.107)	0.212* (0.117)	-0.089 (0.178)	0.082 (0.145)	0.159 (0.128)	-4.252 (4.211)	-0.954 (3.866)	0.137 (0.131)
Observations	1628	1628	1628	1558	1628	1628	1628	1628	1628

Notes: Young age is defined as respondents aged under 31, middle age is defined as respondents aged between 31 and 60 and old age is defined as respondents aged over 60. Robust standard errors in parenthesis. All specifications include the following control variables: age, female, East/West Germany, education, risk, patience, trust in public institutions, trust in public, married, employed, income, household size, migration background, political affiliation, need to save for retirement, self-assessed numeracy, self-assessed financial knowledge, self-assessed literacy and prior beliefs about numeracy skills of gender, age, and international comparison; \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table D.2: Treatment effects: Age as a continuous variable

	FinLit	Confidence					Save. & Invest.		Info
	(1) FinLit score	(2) FinLit don't know	(3) FinLit subject.	(4) Rel. position	(5) Conf. answers	(6) Overconf.	(7) Saving	(8) Investment	(9) Info index
T1:Age	-0.080 (0.139)	0.105 (0.116)	-0.157 (0.129)	0.176 (0.189)	-0.205 (0.157)	-0.077 (0.141)	1.014 (4.457)	-0.202 (4.127)	-0.108 (0.138)
Age	0.006* (0.003)	-0.004 (0.003)	0.010*** (0.003)	0.011** (0.004)	-0.000 (0.004)	0.004 (0.003)	-0.038 (0.107)	-0.093 (0.096)	-0.003 (0.003)
T1:Age × Age	0.001 (0.003)	-0.002 (0.002)	0.003 (0.002)	-0.005 (0.004)	0.004 (0.003)	0.002 (0.003)	-0.049 (0.088)	0.029 (0.080)	0.003 (0.003)
Observations	1653	1653	1653	1582	1653	1653	1653	1653	1653

Notes: In this regression age is included as a continuous variable. Robust standard errors in parenthesis. All specifications include the following control variables: age, female, East/West Germany, education, risk, patience, trust in public institutions, trust in public, married, employed, income, household size, migration background, political affiliation, need to save for retirement, self-assessed numeracy, self-assessed financial knowledge, self-assessed literacy and prior beliefs about numeracy skills of gender, age, and international comparison; \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table D.3: Treatment effects on investment and saving decisions

	(1) Saving	(2) Privat pension	(3) Stocks	(4) Consume	(5) Gift relatives	(6) Gift others	(7) Donate
<i>Panel A: Treatment effects of information provision</i>							
Treat Age	-1.488 (1.494)	0.881 (0.742)	0.405 (1.136)	-0.367 (1.038)	0.492 (0.642)	-0.083 (0.319)	-0.314 (0.378)
Treat Gender	-0.388 (1.500)	0.285 (0.734)	-0.011 (1.160)	-0.104 (0.986)	0.078 (0.620)	-0.038 (0.343)	-0.171 (0.375)
Mean Control Group	39.470	9.429	18.609	18.308	7.931	2.289	3.222
Observations	2498	2498	2498	2498	2498	2498	2498
<i>Panel B: Treatment effects by age</i>							
T1:Age	-1.746 (2.166)	1.543 (1.127)	-0.324 (1.754)	-0.060 (1.417)	-0.138 (0.709)	0.052 (0.549)	-0.183 (0.656)
Old	-0.179 (2.304)	-0.799 (1.152)	0.084 (1.797)	1.705 (1.573)	1.122 (0.922)	-0.316 (0.505)	-0.932 (0.630)
T1:Age × Old	0.521 (2.961)	-1.256 (1.501)	1.278 (2.296)	-0.419 (2.015)	0.903 (1.194)	-0.179 (0.671)	-0.200 (0.796)
T1:Age + T1:Age x Old	-1.225 (2.025)	0.287 (0.986)	0.954 (1.488)	-0.479 (1.450)	0.765 (0.960)	-0.127 (0.386)	-0.383 (0.462)
Control Mean Young	37.780	11.320	20.180	16.735	6.579	2.820	3.640
Observations	1653	1653	1653	1653	1653	1653	1653
<i>Panel C: Treatment effects by gender</i>							
T2:Gender	2.267 (2.195)	-0.301 (0.951)	0.206 (1.777)	-0.741 (1.543)	-0.492 (0.760)	-0.023 (0.578)	-1.044* (0.596)
Female	3.660* (2.218)	1.479 (1.051)	-4.385*** (1.675)	-1.187 (1.560)	1.251 (0.911)	-0.449 (0.558)	-0.440 (0.557)
T2:Gender × Female	-5.404* (3.000)	1.285 (1.457)	-0.502 (2.353)	1.326 (2.004)	1.172 (1.274)	-0.001 (0.710)	1.715** (0.750)
T2:Gender + T2:Gender x Female	-3.137 (2.053)	0.984 (1.111)	-0.296 (1.524)	0.585 (1.263)	0.680 (0.997)	-0.024 (0.391)	0.670 (0.463)
Mean Male	37.201	8.319	21.941	18.663	7.005	2.558	3.542
Observations	1666	1666	1666	1666	1666	1666	1666

Notes: Robust standard errors in parenthesis. All specifications include the following control variables: age, female, East/West Germany, education, risk, patience, trust in public institutions, trust in public, married, employed, income, household size, migration background, political affiliation, need to save for retirement, self-assessed numeracy, self-assessed financial knowledge, self-assessed literacy and prior beliefs about numeracy skills of gender, age, and international comparison; \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table D.4: Treatment effects on information and education outcomes

	(1) Information	(2) Online platform	(3) Courses	(4) Necessity	(5) Schools	(6) Private provision
<i>Panel A: Treatment effects of information provision</i>						
Treat Age	-0.030 (0.047)	-0.046 (0.047)	0.007 (0.046)	0.047 (0.054)	0.022 (0.043)	0.099* (0.059)
Treat Gender	-0.033 (0.045)	0.002 (0.046)	0.029 (0.045)	0.007 (0.055)	0.013 (0.042)	0.070 (0.059)
Mean Control Group	3.909	3.373	3.605	2.609	4.105	2.806
Observations	2498	2498	2498	2498	2498	2498
<i>Panel B: Treatment effects by age</i>						
T1:Age	-0.030 (0.075)	-0.072 (0.073)	-0.083 (0.073)	0.081 (0.087)	0.047 (0.074)	0.087 (0.088)
Old	0.140* (0.071)	-0.071 (0.070)	-0.037 (0.071)	-0.285*** (0.089)	0.065 (0.072)	-0.062 (0.091)
T1:Age × Old	-0.007 (0.095)	0.038 (0.094)	0.142 (0.094)	-0.054 (0.111)	-0.041 (0.091)	0.013 (0.119)
T1:Age + T1:Age x Old	-0.038 (0.059)	-0.034 (0.060)	0.060 (0.059)	0.027 (0.070)	0.006 (0.053)	0.099 (0.080)
Mean Young	3.838	3.448	3.637	2.927	4.076	2.881
Observations	1653	1653	1653	1653	1653	1653
<i>Panel C: Treatment effects by gender</i>						
T2:Gender	0.037 (0.063)	-0.016 (0.068)	0.103 (0.065)	0.046 (0.078)	0.085 (0.061)	0.088 (0.084)
Female	0.009 (0.066)	0.041 (0.068)	0.108 (0.067)	0.099 (0.081)	0.113* (0.063)	-0.142* (0.085)
T2:Gender × Female	-0.136 (0.090)	0.037 (0.092)	-0.134 (0.090)	-0.080 (0.110)	-0.139* (0.084)	-0.031 (0.118)
T2:Gender + T2:Gender x Female	-0.099 (0.065)	0.021 (0.063)	-0.031 (0.062)	-0.034 (0.077)	-0.054 (0.058)	0.057 (0.082)
Mean Male	3.897	3.370	3.548	2.566	4.044	2.841
Observations	1666	1666	1666	1666	1666	1666

Notes: Robust standard errors in parenthesis. All specifications include the following control variables: age, female, East/West Germany, education, risk, patience, trust in public institutions, trust in public, married, employed, income, household size, migration background, political affiliation, need to save for retirement, self-assessed numeracy, self-assessed financial knowledge, self-assessed literacy and prior beliefs about numeracy skills of gender, age, and international comparison; \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table D.5: Mechanism for the age treatment: Prior beliefs about age differences in numeracy skills

	FinLit	Confidence					Save. & Invest.		Info
	(1) FinLit score	(2) FinLit don't know	(3) FinLit subject.	(4) Rel. position	(5) Conf. answers	(6) Overconf.	(7) Saving	(8) Investment	(9) Info index
<i>Panel A: Prior Belief: Younger people have higher numeracy skills</i>									
<i>A1: Average treatment effects</i>									
T1:Age	-0.074 (0.099)	0.108 (0.083)	-0.083 (0.096)	-0.129 (0.142)	-0.140 (0.111)	-0.009 (0.084)	0.353 (3.414)	1.126 (2.995)	-0.207* (0.106)
<i>A2: Treatment effects by age</i>									
T1:Age	-0.047 (0.144)	0.080 (0.116)	-0.055 (0.133)	-0.243 (0.186)	-0.144 (0.166)	-0.009 (0.125)	6.428 (4.007)	-3.330 (3.899)	-0.232 (0.142)
Old	0.339** (0.162)	-0.250* (0.132)	0.383** (0.150)	0.036 (0.217)	0.143 (0.160)	0.044 (0.142)	9.247* (5.089)	-6.770 (5.261)	-0.103 (0.173)
T1:Age × Old	-0.057 (0.195)	0.058 (0.158)	-0.057 (0.190)	0.228 (0.278)	0.007 (0.220)	-0.000 (0.179)	-12.575* (6.455)	9.224 (6.162)	0.052 (0.202)
T2:Age + T2:Age x Old	-0.103 (0.133)	0.138 (0.114)	-0.112 (0.138)	-0.016 (0.211)	-0.137 (0.145)	-0.009 (0.120)	-6.146 (5.309)	5.894 (4.667)	-0.180 (0.152)
Mean Young	2.244	0.378	2.219	2.957	4.029	-0.026	37.201	30.260	-0.055
Observations	331	331	331	317	331	331	331	331	331
<i>Panel B: Prior Belief: Younger people do not have higher numeracy skills</i>									
<i>B1: Average treatment effects</i>									
T1:Age	0.006 (0.047)	0.007 (0.039)	0.018 (0.047)	-0.060 (0.070)	-0.007 (0.054)	0.012 (0.049)	-1.677 (1.683)	0.905 (1.436)	0.081 (0.051)
<i>B2: Treatment effects by age</i>									
T1:Age	-0.059 (0.082)	0.051 (0.070)	-0.066 (0.080)	0.068 (0.104)	-0.104 (0.092)	-0.008 (0.090)	-4.495* (2.584)	2.664 (2.334)	0.072 (0.078)
Old	0.162** (0.076)	-0.037 (0.063)	0.235*** (0.074)	0.255** (0.107)	0.304*** (0.089)	0.073 (0.079)	-2.777 (2.629)	1.025 (2.268)	-0.058 (0.079)
T1:Age × Old	0.103 (0.101)	-0.070 (0.085)	0.134 (0.098)	-0.202 (0.138)	0.153 (0.113)	0.031 (0.107)	4.448 (3.393)	-2.776 (2.962)	0.014 (0.102)
T2:Age + T2:Age x Old	0.044 (0.058)	-0.018 (0.046)	0.067 (0.057)	-0.134 (0.092)	0.049 (0.066)	0.023 (0.058)	-0.046 (2.198)	-0.112 (1.823)	0.086 (0.066)
Mean Young	2.244	0.378	2.219	2.957	4.029	-0.026	37.201	30.260	-0.055
Observations	1322	1322	1322	1265	1322	1322	1322	1322	1322

Notes: Robust standard errors in parenthesis. In this sample we have 423 old respondents who said that older people have higher numeracy skills. All specifications include the following control variables: age, female, East/West Germany, education, risk, patience, trust in public institutions, trust in public, married, employed, income, household size, migration background, political affiliation, need to save for retirement, self-assessed numeracy, self-assessed financial knowledge, self-assessed literacy and prior beliefs about numeracy skills of gender, age, and international comparison; \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .



Table D.6: Mechanism for the gender treatment: Prior beliefs about gender differences in numeracy skills

	FinLit	Confidence					Save. & Invest.		Info
	(1) FinLit score	(2) FinLit don't know	(3) FinLit subject.	(4) Rel. position	(5) Conf. answers	(6) Overconf.	(7) Saving	(8) Investment	(9) Info index
<i>Panel A: Prior Belief: Men have higher numeracy skills</i>									
<i>A1: Average treatment effects</i>									
T2:Gender	-0.067 (0.087)	0.035 (0.063)	-0.047 (0.083)	-0.121 (0.131)	0.022 (0.098)	0.020 (0.082)	0.417 (3.209)	2.117 (2.863)	-0.076 (0.090)
<i>A2: Treatment effects by gender</i>									
T2:Gender	-0.091 (0.117)	0.055 (0.068)	0.091 (0.100)	-0.154 (0.188)	0.139 (0.127)	0.182 (0.120)	2.954 (4.496)	-0.139 (4.005)	-0.063 (0.124)
Female	-0.265** (0.130)	0.262*** (0.087)	-0.277** (0.121)	0.050 (0.181)	-0.280** (0.141)	-0.012 (0.130)	2.785 (4.549)	-2.900 (4.059)	0.135 (0.134)
T2:Gender × Female	0.049 (0.169)	-0.041 (0.122)	-0.281* (0.153)	0.066 (0.239)	-0.237 (0.184)	-0.330** (0.161)	-5.172 (6.188)	4.601 (5.526)	-0.026 (0.176)
T2:Gender + T2:Gender x Female	-0.042 (0.126)	0.014 (0.104)	-0.190 (0.125)	-0.088 (0.167)	-0.099 (0.142)	-0.148 (0.109)	-2.218 (4.417)	4.462 (3.950)	-0.089 (0.128)
Mean Male	2.244	0.378	2.219	2.957	4.029	-0.026	37.201	30.260	-0.055
Observations	415	415	415	402	415	415	415	415	415
<i>Panel B: Prior Belief: Men do not have higher numeracy skills</i>									
<i>B1: Average treatment effects</i>									
T2:Gender	0.025 (0.049)	-0.057 (0.039)	0.069 (0.047)	-0.110 (0.072)	0.121** (0.054)	0.044 (0.050)	-0.892 (1.742)	-0.012 (1.506)	0.057 (0.053)
<i>B2: Treatment effects by gender</i>									
T2:Gender	0.054 (0.069)	-0.060 (0.052)	0.121* (0.067)	-0.070 (0.107)	0.229*** (0.075)	0.066 (0.069)	1.845 (2.532)	0.287 (2.211)	0.146** (0.073)
Female	-0.251*** (0.073)	0.189*** (0.061)	-0.360*** (0.071)	-0.059 (0.104)	-0.274*** (0.080)	-0.109 (0.073)	3.836 (2.568)	-2.975 (2.204)	0.044 (0.079)
T2:Gender × Female	-0.056 (0.098)	0.007 (0.079)	-0.100 (0.095)	-0.078 (0.143)	-0.210** (0.106)	-0.043 (0.100)	-5.299 (3.471)	-0.580 (3.027)	-0.172 (0.105)
T2:Gender + T2:Gender x Female	-0.002 (0.070)	-0.053 (0.059)	0.021 (0.067)	-0.148 (0.097)	0.019 (0.076)	0.023 (0.072)	-3.453 (2.385)	-0.293 (2.060)	-0.027 (0.075)
Mean Male	2.244	0.378	2.219	2.957	4.029	-0.026	37.201	30.260	-0.055
Observations	1251	1251	1251	1204	1251	1251	1251	1251	1251

Notes: Robust standard errors in parenthesis. In this sample we have 151 women who said that women have higher numeracy skills. All specifications include the following control variables: age, female, East/West Germany, education, risk, patience, trust in public institutions, trust in public, married, employed, income, household size, migration background, political affiliation, need to save for retirement, self-assessed numeracy, self-assessed financial knowledge, self-assessed literacy and prior beliefs about numeracy skills of gender, age, and international comparison; \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table D.7: Mechanism for the age treatment: Education

	FinLit	Confidence					Save. & Invest.		Info
	(1) FinLit score	(2) FinLit don't know	(3) FinLit subject.	(4) Rel. position	(5) Conf. answers	(6) Overconf.	(7) Saving	(8) Investment	(9) Info index
<i>Panel A: High education</i>									
<i>A1: Average treatment effects</i>									
T1:Age	0.026 (0.052)	0.037 (0.040)	0.021 (0.050)	-0.080 (0.080)	-0.027 (0.059)	-0.005 (0.049)	-1.555 (1.806)	0.548 (1.710)	0.021 (0.057)
<i>A2: Treatment effects by age</i>									
T1:Age	-0.000 (0.081)	0.044 (0.062)	-0.036 (0.076)	0.036 (0.108)	-0.082 (0.091)	-0.035 (0.078)	-1.777 (2.529)	1.181 (2.506)	-0.009 (0.082)
Old	0.222*** (0.080)	-0.117* (0.062)	0.270*** (0.076)	0.334*** (0.123)	0.270*** (0.090)	0.048 (0.073)	-2.557 (2.730)	-0.038 (2.685)	-0.100 (0.091)
T1:Age × Old	0.049 (0.105)	-0.013 (0.081)	0.104 (0.100)	-0.211 (0.158)	0.102 (0.117)	0.055 (0.099)	0.411 (3.588)	-1.170 (3.408)	0.056 (0.113)
T2:Age + T2:Age x Old	0.048 (0.066)	0.031 (0.051)	0.069 (0.066)	-0.175 (0.115)	0.020 (0.076)	0.020 (0.061)	-1.366 (2.553)	0.011 (2.327)	0.047 (0.079)
Mean Young	2.244	0.378	2.219	2.957	4.029	-0.026	37.201	30.260	-0.055
Observations	1047	1047	1047	1013	1047	1047	1047	1047	1047
<i>Panel B: Low education</i>									
<i>B1: Average treatment effects</i>									
T1:Age	-0.045 (0.073)	0.008 (0.066)	-0.013 (0.075)	-0.059 (0.099)	-0.040 (0.084)	0.032 (0.083)	-1.009 (2.689)	2.655 (1.997)	0.054 (0.077)
<i>B2: Treatment effects by age</i>									
T1:Age	-0.164 (0.145)	0.112 (0.133)	-0.078 (0.143)	-0.163 (0.167)	-0.161 (0.162)	0.086 (0.173)	-1.419 (4.374)	1.889 (3.147)	0.044 (0.133)
Old	0.209 (0.133)	-0.015 (0.122)	0.306** (0.132)	-0.021 (0.162)	0.257* (0.149)	0.097 (0.157)	4.585 (4.430)	-1.067 (3.069)	-0.023 (0.132)
T1:Age × Old	0.168 (0.169)	-0.147 (0.151)	0.091 (0.168)	0.146 (0.206)	0.171 (0.190)	-0.077 (0.195)	0.581 (5.457)	1.087 (4.030)	0.014 (0.165)
T2:Age + T2:Age x Old	0.004 (0.085)	-0.035 (0.074)	0.013 (0.087)	-0.017 (0.122)	0.010 (0.098)	0.009 (0.092)	-0.838 (3.324)	2.975 (2.512)	0.058 (0.095)
Mean Young	2.244	0.378	2.219	2.957	4.029	-0.026	37.201	30.260	-0.055
Observations	606	606	606	569	606	606	606	606	606

Notes: Robust standard errors in parenthesis. In this sample we have 433 old respondents with low education. All specifications include the following control variables: age, female, East/West Germany, education, risk, patience, trust in public institutions, trust in public, married, employed, income, household size, children, migration background, political affiliation, need to save for retirement, self-assessed numeracy, self-assessed financial knowledge, self-assessed literacy and prior beliefs about numeracy skills of gender, age, and international comparison; \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table D.8: Mechanism for the gender treatment: Education

	FinLit	Confidence					Save. & Invest.		Info
	(1) FinLit score	(2) FinLit don't know	(3) FinLit subject.	(4) Rel. position	(5) Conf. answers	(6) Overconf.	(7) Saving	(8) Investment	(9) Info index
<i>Panel A: High education</i>									
<i>A1: Average treatment effects</i>									
T2:Gender	0.053 (0.050)	-0.019 (0.037)	0.087* (0.047)	-0.140* (0.078)	0.146*** (0.054)	0.034 (0.047)	0.253 (1.777)	-0.039 (1.688)	0.010 (0.056)
<i>A2: Treatment effects by gender</i>									
T2:Gender	0.041 (0.070)	0.004 (0.046)	0.105 (0.066)	-0.209* (0.120)	0.186** (0.076)	0.064 (0.068)	3.054 (2.701)	-1.118 (2.509)	0.054 (0.079)
Female	-0.240*** (0.077)	0.197*** (0.059)	-0.343*** (0.073)	-0.127 (0.117)	-0.310*** (0.082)	-0.103 (0.071)	2.775 (2.702)	-2.492 (2.507)	0.103 (0.084)
T2:Gender × Female	0.022 (0.100)	-0.043 (0.075)	-0.032 (0.096)	0.127 (0.157)	-0.074 (0.107)	-0.054 (0.095)	-5.115 (3.580)	1.970 (3.390)	-0.080 (0.110)
T2:Gender + T2:Gender x Female	0.063 (0.070)	-0.039 (0.057)	0.073 (0.068)	-0.082 (0.102)	0.112 (0.076)	0.010 (0.066)	-2.062 (2.352)	0.852 (2.282)	-0.026 (0.077)
Mean Male	2.244	0.378	2.219	2.957	4.029	-0.026	37.201	30.260	-0.055
Observations	1079	1079	1079	1052	1079	1079	1079	1079	1079
<i>Panel B: Low education</i>									
<i>B1: Average treatment effects</i>									
T2:Gender	-0.066 (0.076)	-0.036 (0.065)	-0.028 (0.075)	-0.055 (0.100)	0.004 (0.087)	0.038 (0.083)	-2.512 (2.813)	1.855 (2.084)	0.056 (0.080)
<i>B2: Treatment effects by gender</i>									
T2:Gender	0.000 (0.100)	-0.042 (0.080)	0.144 (0.097)	0.128 (0.143)	0.236** (0.111)	0.144 (0.108)	-0.995 (3.798)	3.994 (3.019)	0.153 (0.108)
Female	-0.242** (0.111)	0.255*** (0.096)	-0.311*** (0.106)	0.080 (0.145)	-0.177 (0.121)	-0.069 (0.121)	3.797 (3.899)	-1.957 (2.861)	0.005 (0.113)
T2:Gender × Female	-0.148 (0.155)	0.014 (0.129)	-0.381** (0.148)	-0.404** (0.194)	-0.513*** (0.167)	-0.234 (0.169)	-3.359 (5.627)	-4.734 (4.192)	-0.215 (0.163)
T2:Gender + T2:Gender x Female	-0.147 (0.118)	-0.028 (0.103)	-0.237** (0.113)	-0.277** (0.135)	-0.277** (0.130)	-0.090 (0.129)	-4.354 (4.167)	-0.740 (2.862)	-0.062 (0.121)
Mean Male	2.244	0.378	2.219	2.957	4.029	-0.026	37.201	30.260	-0.055
Observations	587	587	587	554	587	587	587	587	587

Notes: Robust standard errors in parenthesis. Low education is defined as having a lower secondary degree or no educational degree. In this sample we have 264 women with low education. All specifications include the following control variables: age, female, East/West Germany, education, risk, patience, trust in public institutions, trust in public, married, employed, income, household size, migration background, political affiliation, need to save for retirement, self-assessed numeracy, self-assessed financial knowledge, self-assessed literacy and prior beliefs about numeracy skills of gender, age, and international comparison; \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01.

Table D.9: Mechanism for the age treatment: Risk preferences

	FinLit	Confidence					Save. & Invest.		Info
	(1) FinLit score	(2) FinLit don't know	(3) FinLit subject.	(4) Rel. position	(5) Conf. answers	(6) Overconf.	(7) Saving	(8) Investment	(9) Info index
<i>Panel A: High risk preference</i>									
<i>A1: Average treatment effects</i>									
T1:Age	0.062 (0.061)	0.001 (0.049)	0.013 (0.059)	-0.135 (0.088)	0.008 (0.070)	-0.049 (0.064)	0.505 (2.102)	0.845 (1.897)	0.067 (0.064)
<i>A2: Treatment effects by age</i>									
T1:Age	0.048 (0.098)	0.011 (0.080)	-0.039 (0.092)	-0.000 (0.119)	-0.043 (0.107)	-0.086 (0.104)	-1.282 (2.795)	-0.367 (2.702)	0.040 (0.091)
Old	0.305*** (0.101)	-0.130 (0.082)	0.329*** (0.095)	0.177 (0.139)	0.373*** (0.115)	0.024 (0.100)	-2.384 (3.221)	-0.250 (3.023)	0.023 (0.101)
T1:Age × Old	0.026 (0.126)	-0.019 (0.101)	0.094 (0.119)	-0.245 (0.177)	0.093 (0.141)	0.068 (0.131)	3.271 (4.089)	2.219 (3.805)	0.050 (0.126)
T2:Age + T2:Age x Old	0.073 (0.079)	-0.007 (0.060)	0.056 (0.076)	-0.245* (0.129)	0.051 (0.092)	-0.018 (0.080)	1.989 (3.031)	1.852 (2.665)	0.090 (0.089)
Mean Young	2.244	0.378	2.219	2.957	4.029	-0.026	37.201	30.260	-0.055
Observations	834	834	834	782	834	834	834	834	834
<i>Panel B: Low risk preference</i>									
<i>B1: Average treatment effects</i>									
T1:Age	-0.056 (0.058)	0.044 (0.051)	0.003 (0.060)	-0.006 (0.088)	-0.059 (0.068)	0.059 (0.058)	-3.480 (2.192)	1.944 (1.787)	-0.005 (0.068)
<i>B2: Treatment effects by age</i>									
T1:Age	-0.135 (0.100)	0.098 (0.090)	-0.046 (0.103)	-0.023 (0.139)	-0.146 (0.122)	0.089 (0.104)	-2.898 (3.547)	4.849 (3.041)	-0.011 (0.107)
Old	0.134 (0.092)	-0.064 (0.077)	0.229** (0.092)	0.223* (0.133)	0.182* (0.107)	0.096 (0.093)	1.930 (3.381)	-0.854 (2.886)	-0.139 (0.105)
T1:Age × Old	0.119 (0.124)	-0.081 (0.108)	0.074 (0.127)	0.026 (0.177)	0.132 (0.146)	-0.045 (0.125)	-0.882 (4.474)	-4.397 (3.746)	0.010 (0.136)
T2:Age + T2:Age x Old	-0.016 (0.072)	0.017 (0.061)	0.028 (0.073)	0.003 (0.111)	-0.015 (0.081)	0.044 (0.069)	-3.779 (2.760)	0.452 (2.202)	-0.001 (0.086)
Mean Young	2.244	0.378	2.219	2.957	4.029	-0.026	37.201	30.260	-0.055
Observations	819	819	819	800	819	819	819	819	819

Notes: Robust standard errors in parenthesis. In this sample we have 543 old respondents with low risk preferences. All specifications include the following control variables: age, female, East/West Germany, education, risk, patience, trust in public institutions, trust in public, married, employed, income, household size, migration background, political affiliation, need to save for retirement, self-assessed numeracy, self-assessed financial knowledge, self-assessed literacy and prior beliefs about numeracy skills of gender, age, and international comparison; \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table D.10: Mechanism for the gender treatment: Risk preference

	FinLit	Confidence					Save. & Invest.		Info
	(1) FinLit score	(2) FinLit don't know	(3) FinLit subject.	(4) Rel. position	(5) Conf. answers	(6) Overconf.	(7) Saving	(8) Investment	(9) Info index
<i>Panel A: High risk preference</i>									
<i>A1: Average treatment effects</i>									
T2:Gender	0.063 (0.059)	-0.025 (0.045)	0.066 (0.056)	-0.214** (0.089)	0.172** (0.067)	0.004 (0.062)	3.155 (2.062)	-1.315 (1.908)	0.071 (0.064)
<i>A2: Treatment effects by gender</i>									
T2:Gender	0.040 (0.078)	-0.027 (0.057)	0.075 (0.074)	-0.211* (0.122)	0.154* (0.088)	0.035 (0.083)	4.976* (2.721)	-1.579 (2.522)	0.099 (0.080)
Female	-0.269*** (0.091)	0.138* (0.071)	-0.389*** (0.086)	-0.029 (0.132)	-0.305*** (0.104)	-0.120 (0.090)	5.184* (3.065)	-3.470 (2.797)	0.068 (0.095)
T2:Gender × Female	0.053 (0.122)	0.005 (0.092)	-0.021 (0.115)	-0.009 (0.174)	0.041 (0.137)	-0.074 (0.128)	-4.268 (4.187)	0.619 (3.822)	-0.067 (0.131)
T2:Gender + T2:Gender x Female	0.093 (0.092)	-0.022 (0.072)	0.054 (0.086)	-0.220* (0.126)	0.196* (0.105)	-0.039 (0.095)	0.707 (3.172)	-0.960 (2.894)	0.032 (0.104)
Mean Male	2.244	0.378	2.219	2.957	4.029	-0.026	37.201	30.260	-0.055
Observations	838	838	838	798	838	838	838	838	838
<i>Panel B: Low risk preference</i>									
<i>B1: Average treatment effects</i>									
T2:Gender	-0.030 (0.060)	-0.022 (0.049)	0.000 (0.058)	-0.001 (0.086)	0.018 (0.063)	0.030 (0.059)	-3.490 (2.223)	1.441 (1.813)	-0.004 (0.064)
<i>B2: Treatment effects by gender</i>									
T2:Gender	0.013 (0.090)	-0.004 (0.065)	0.139 (0.084)	0.131 (0.139)	0.274*** (0.090)	0.125 (0.083)	-1.110 (3.670)	1.892 (2.970)	0.108 (0.104)
Female	-0.259*** (0.088)	0.292*** (0.072)	-0.300*** (0.086)	0.041 (0.126)	-0.268*** (0.094)	-0.041 (0.085)	0.132 (3.359)	-0.714 (2.692)	0.006 (0.098)
T2:Gender × Female	-0.073 (0.119)	-0.031 (0.096)	-0.234** (0.117)	-0.224 (0.179)	-0.435*** (0.123)	-0.162 (0.115)	-4.033 (4.566)	-0.764 (3.831)	-0.190 (0.131)
T2:Gender + T2:Gender x Female	-0.059 (0.080)	-0.035 (0.070)	-0.096 (0.080)	-0.093 (0.111)	-0.161* (0.085)	-0.036 (0.080)	-5.143* (2.752)	1.128 (2.337)	-0.082 (0.081)
Mean Male	2.244	0.378	2.219	2.957	4.029	-0.026	37.201	30.260	-0.055
Observations	828	828	828	808	828	828	828	828	828

Notes: Robust standard errors in parenthesis. In this sample we have 494 women with low risk preference. All specifications include the following control variables: age, female, East/West Germany, education, risk, patience, trust in public institutions, trust in public, married, employed, income, household size, migration background, political affiliation, need to save for retirement, self-assessed numeracy, self-assessed financial knowledge, self-assessed literacy and prior beliefs about numeracy skills of gender, age, and international comparison; \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## Appendix E    Wording

This section presents the wording of the questions most central to our analysis: self-assessed skills, prior beliefs, the information treatments and the financial literacy questions.

### E.1    Self-assessed skills

#### **Self-assessed numeracy skills**

Question: How would you rate your personal everyday numeracy skills?

Answer options: very good, good, satisfactory, sufficient, insufficient

#### **Self-assessed financial skills**

Question: How would you rate your overall financial knowledge?

Answer options: very good, good, satisfactory, sufficient, insufficient

#### **Self-assessed financial skills**

Question: How would you rate your personal reading skills?

Answer options: very good, good, satisfactory, sufficient, insufficient

### E.2    Prior beliefs

#### **Prior beliefs about age differences**

Question: In your opinion, which of these groups has a higher level of numeracy?

Answer options: Younger people, older people, both equal

#### **Prior beliefs about gender differences**

Question: In your opinion, which of these groups has a higher level of numeracy?

Answer options: Women, men, both equal

#### **Prior beliefs about international comparison**

Question: How do you think adults in Germany compare internationally in terms of everyday skills?

Answer options: Much better, better, average, worse, much worse

### E.3 Information treatment

Figure E.1: Information treatments

Deutschland nimmt regelmäßig an einer internationalen Erhebung über die Fähigkeiten und Fertigkeiten Erwachsener (PIAAC) teil. In der letzten Erhebung wurde unter anderem folgendes Ergebnis erzielt:


Erwachsene in Deutschland verfügen im internationalen Vergleich über durchschnittliche Alltagskompetenzen.



(a) Active Control Group

Deutschland nimmt regelmäßig an einer internationalen Erhebung über die Fähigkeiten und Fertigkeiten Erwachsener (PIAAC) teil. In der letzten Erhebung wurde unter anderem folgendes Ergebnis erzielt:

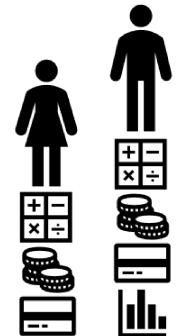
In Deutschland verfügen junge Erwachsene über höhere alltagsmathematische Kenntnisse als ältere Erwachsene.



(b) Treatment Age

Deutschland nimmt regelmäßig an einer internationalen Erhebung über die Fähigkeiten und Fertigkeiten Erwachsener (PIAAC) teil. In der letzten Erhebung wurde unter anderem folgendes Ergebnis erzielt:

In Deutschland verfügen Männer über höhere alltagsmathematische Kenntnisse als Frauen.



(c) Treatment Gender

#### E.4 Financial literacy

These questions were established by Lusardi and Mitchell (2008). Correct answers are shown in bold.

##### Interest rate

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

- **More than 102 EUR**
- Exactly 102 EUR
- Less than 102 EUR
- I don't know

##### Inflation

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

- More than today
- Exactly the same as today
- **Less than today**
- I don't know

##### Risk

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

- Agree
- **Disagree**
- I don't know



## Appendix F Text analysis

We used the following grouping of words to analyze the reasoning behind respondents' prior beliefs.

- experience = “erfahrung”, “lebenserfahrung”, “erfahrungswert”, “erfahrungswerte”, “beobachtung”
- perception = “gefühl”, “bauchgefühl”, “bauch”, “vermutung”, “intuition”, “spekulation”, “eindruck”
- school = “schule”, “schulbildung”, “schulsystem”, “schulwesen”, “lehrer”, “schulausbildung”, “schüler”
- german = “deutsch”, “deutsche”, “deutschen”
- guess = “einschätzung”, “schätzung”
- education = “bildung”, “bildungssystem”, “bildungsstand”, “allgemeinbildung”, “bildungswesen”, “bildungsniveau”, “wissen”, “allgemeinwissen”
- maths = “rechnen”, “kopfrechnen”, “mathematik”, “zinsrechnung”
- society = “gesellschaft”, “bevölkerung”, “volk”
- media = “medium”, “bericht”, “tv”, “berichterstattung”, “medien”, “radio”
- smartphone = “smartphone”, “handy”
- study = “studie”, “umfrage”, “ranking”, “pisastudie”

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