Sources of educational inequality and redistributive behavior: Experimental evidence

Pre-Analysis Plan

Date – 8 July 2022

We provide causal evidence on how beliefs about the sources of educational inequalities support for policies or initiatives that reduce education-related inequalities. We first elicit participants' beliefs about how college attendance varies by socioeconomic status. Half of the participants will then receive the actual statistics, taken from Chetty et al. (2020). We then measure participants' support for reducing income inequality between college and non-college graduates, support for educational reform policies, and willingness to donate to charities that promote access to higher education. This document outlines our plan for data analysis.

JEL codes: D63, D64, D83, I24
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1. Introduction

Education is an important determinant of economic outcomes, but access to education is highly unequal. Across OECD countries, compared to individuals whose parents do not have a high-school diploma, the likelihood of attending a tertiary institution doubles if one parent has at least a high-school diploma, and more than quadruples if one parent has also attained tertiary education (OECD, 2013). These differences in educational attainment by socieoeconomic status cannot be explained by differences in intelligence alone (Bukodi et al., 2015; Damian et al., 2015). Nationally representative surveys find that almost three-quarters of Americans believe hard work, rather than luck or help from others, is more important for success (Pew Research Center, 2022; Smith et al., 2018) and this belief is especially common in the context of educational attainment. Many Americans perceive educational attainment as primarily the product of one's own talent and effort (Case and Deaton, 2021; Sandel, 2020). These beliefs about the sources of educational inequalities may affect real outcomes via (lack of) support for equalizing policies, because educational differences and the resulting economic outcomes are seen as fair.

Our study uses a randomized experiment involving US participants to understand how beliefs about the sources of educational inequality affect support for equalizing policies. We also investigate the effectiveness of a relatively costless information treatment aimed at correcting misperceptions about the sources of educational inequality (specifically, the role of parental income).

In our experiment, we first elicit participants' beliefs about inequality in college attendance, measured by the percentage of 4-year-college attendees in a given birth cohort who grew up in each quintile of the income distribution. Using a between-subjects design, we then randomly allocate participants to a treatment or control group. The treatment group receives information about the true percentages of college attendees who grew up in households whose income is in the bottom or top quintile of the distribution. The control group receives information about college attendees that is unrelated to sources of inequality in educational attainment. Both sets of information are computed using deidentified administrative data by Chetty et al. (2020).

We then measure two self-reported outcomes - the preferred wage ratio between college and non-college graduates ("ex-post" redistribution) and support for policies that reduce financial barriers to

attending college ("ex-ante" policy support) - and one real outcome (the choice to make an actual donation to an education-related charity). To understand the mechanisms through which the information treatment affects these outcomes (conscious information processing vs heuristic thinking), we also measure implicit stereotypes and explicit attitudes towards the less-educated.

Finally, we conduct an obfuscated follow-up study, in which participants are purposely not told the relationship between the main study and follow-up, to investigate the persistence of any treatment effects and mitigate concerns that the main study results are driven by experimenter demand effects (De Quidt et al., 2018; Haaland et al., 2020).

2. Experimental design

Figure 1 shows a flowchart of the experiment.

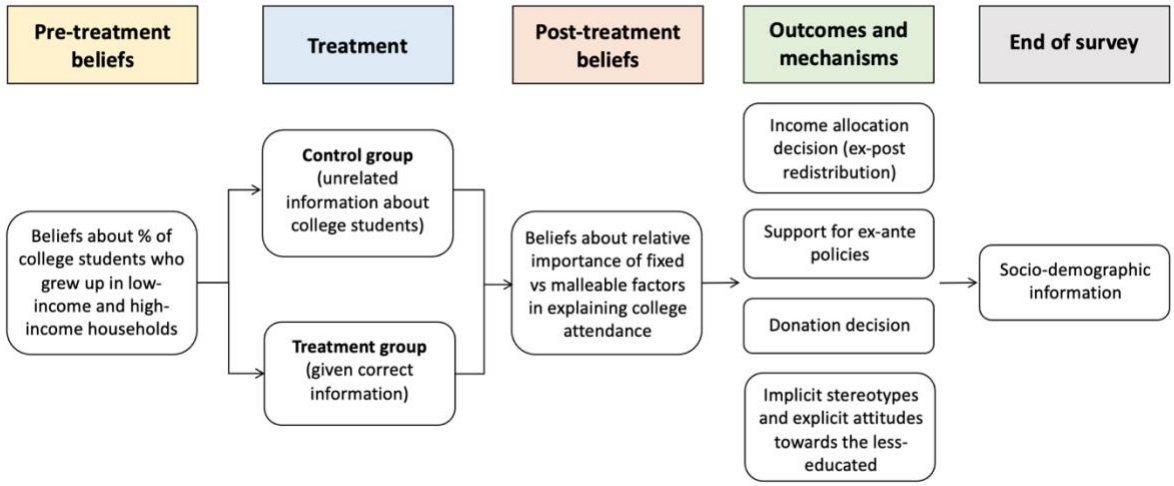

Figure 1. Illustration of survey experiment

2.1. Pre-treatment beliefs about socioeconomic inequality in college attendance

Participants will be asked to estimate how access to higher education varies across socioeconomic status. Specifically, participants are asked to consider 100 four-year-college attendees born in 1980-1982 and estimate how many come from each quintile of the income distribution. If children from each quintile of the income distribution are equally likely to attend college when they grow up (i.e. external circumstances ("fixed" factors) play a small role in influencing academic outcomes), then each quintile should be represented equally in the college student population. The correct answer to this question is provided by Chetty et al. (2020), who use federal data on college attendance.

To ensure that participants pay sufficient attention to answering these questions, we will provide monetary incentives. Specifically, participants will be told that they are automatically entered into a lottery to win $50 and that their chances of winning this lottery increases the closer their answers are to the correct answer. Note that the answers to these questions are difficult to find online because the statistics are computed using the statistics reported in Table VI of Chetty et al. (2020) (using the relevant rows for four-year colleges). To prevent participants from rushing through this part of the survey, we set a timer so that participants have to spend at least one minute on this question before progressing. We ask participants how confident they feel about their responses on a 5-point scale, ranging from 1 (not confident at all) to 5 (extremely confident).

2.2. Treatment: Information about socioeconomic inequality in college attendance

Participants will be randomly assigned to a control group or a treatment group. The treatment group will be given feedback on their response (whether it is an over or underestimate), the correct answers to the college attendance questions for the bottom and top quintile (in the form of an infographic), and a non-technical interpretation of these statistics.

2.3. Control group

The control group will receive some information that is unrelated to sources of inequalities in educational attainment (the average employment rate of college attendees at age 30 and the different types of colleges that this cohort attended), as reported in Chetty et al. (2020).

2.4. Post-treatment beliefs in the sources of educational inequality

Participants are asked about the importance of "fixed" and "malleable" factors in explaining variation in college attendance. "Fixed" factors are defined as factors that are outside one's control (e.g. parents' socioeconomic status). "Malleable" factors are defined as factors that are within one's control (e.g. how hard an individual works). Aside from this guidance, participants are free to interpret "fixed" and "malleable" as they wish.

2.5. Outcomes: Income redistribution decision

Participants will be given the current income difference (expressed as a ratio) between the average college graduate and average non-college graduate and asked what they think the income ratio between these two individuals should be.

In addition to beliefs about sources of educational inequality, preferences over redistribution may be influenced by various factors, including perceived productivity differences between college and non-college graduates. We measure participants' perception about the relative productivity differences between a college and noncollege graduate.

2.6. Outcomes: Real charitable donation decision

Participants will be told they have been automatically enrolled in a lottery for $100 and, if they win, they can choose to donate some (or all or none) of their winnings to a charity whose primary mission is to tackle inequalities in educational attainment at the tertiary level.

2.7. Outcomes: Support for ex-ante equalizing policies

We present participants with information on one of two policies that aim to increase equality of college attendance by reducing financial barriers: expanding the size of the Pell Grant, and encouraging colleges to offer automatic application fee waivers for low-income students. Participants are shown one of these policies for the main survey and the other for the follow-up survey. They are then asked how much they would support the given policy. We ask participants whether they believe the policy will be effective in increasing opportunities to access higher education and how they think various groups, including themselves/people they care about, would personally be affected if such policies were implemented.

To assess whether these effects are limited to education policies, we also present participants with information on a non-education related policy (e.g. positive discrimination towards women in the

workplace). We ask them corresponding questions about perceived effectiveness of these non-educational related policies and how it is likely to affect various groups.

2.8. Mechanisms: Implicit stereotypes and explicit attitudes towards the less educated

We design an implicit measure of stereotypes about the less-educated based on the Implicit Association Test (IAT). The IAT is a computer-based tool developed by psychologists (Greenwald et al., 1998) and recently used by economists to study discrimination in the context of gender and race (Carlana, 2019; Glover et al., 2017; Lowes et al., 2015). In our version of the IAT, we assess the ease with which participants make pleasant or unpleasant associations between typically white male names, which are either listed with or without an educational qualification (e.g. BSc, J.D., PhD).

To assess whether participants are aware of their implicit stereotypes and/or are reluctant to express their true opinions due to social desirability bias, we also collect two explicit attitude measures: 1) a "feeling thermometer" indicator of "warmness" towards college graduates and non-college graduates, and 2) the extent to which participants trust college graduates compared to non-college graduates, using the "trust point" allocation question of (Enke et al., 2022). One measure will be used for the main study and another measure will be used for the follow-up study.

2.9. Demographic information

We ask participants the following information: gender, year of birth, ethnicity, educational attainment, party affiliation, number of children, participants' household income, state in which they reside.

We also collect the following variables to use as controls or potential dimensions of heterogeneity: parents' highest educational attainment, the socioeconomic status of the household in which they grew up, whether the participant considers particular socio-demographic factors (such as ethnicity or education level) important for their identity, participants' level of numeracy (Lipkus et al., 2001; Schwartz et al., 1997), self-reported altruism (Falk et al., 2018), and a version of the locus of control measure (Cobb-Clark and Schurer, 2013).

2.10. Follow-up study

We will conduct an "obfuscated follow-up study" approximately two weeks after the main study, to assess the persistence of any treatment effects and mitigate concerns that results from the main study are driven by experimenter demand effects (De Quidt et al., 2018; Zizzo, 2010). We chose a two-week time lag so that participants will have completed several other unrelated surveys between our main and follow-up study, so are less likely to remember completing the main survey.

To make the follow-up seem like an independent study, we will undertake the following measures:

1. Using a vague study title and study description in the recruitment notice, to avoid reminding participants of the main study's content
2. Changing the survey's layout and appearance, such as the illustrative images used and the font.
3. Using different consent forms (from different universities)
4. Asking participants a series of typical demographic questions
5. Asking participants questions about other topics first, leaving the main outcome questions to the end. Doing so will help obscure the purpose of the study.

3. Sample and main hypotheses

3.1. Sample size and power analysis

We will use the survey platform Prolific to recruit 2000 individuals who are over 25 and are normally resident in the US. Prolific is a reputable survey company used primarily by academic researchers, and has been shown to deliver higher or comparable data quality compared to in-person data collection methods or similar platforms such as MTurk (Palan and Schitter, 2018; Peer et al., 2017).

For the follow-up study, we will collect data from as many participants as possible. A review of longitudinal studies conducted on Prolific gives estimated retention rates of 70-90% for similar intervals between surveys, so we expect to have between 1400 to 1800 participants for the follow-up study (Kothe and Ling, 2019).

1400 participants will give us 0.8 power to detect an effect size of 0.10 of a standard deviation between the treatment and the control group in the main study at a .05 significance level. Therefore, the 2000 participants from the main study will give us more than 0.8 power to detect the same effect size.

3.2 Main hypotheses

Our main hypotheses are stated below.

Hypothesis 1. Compared to participants in the control group, participants in the treatment group will (after receiving the information treatment) prefer a more equal distribution of income between college and non-college graduates.

Hypothesis 2. Compared to participants in the control group, donations to education-related charities will be higher among participants in the treatment group, both on the extensive (whether to donate at all) and intensive (how much to donate) margin.

Hypothesis 3. Compared to participants in the control group, participants in the treatment group will express greater support for equalizing policies that are education-related, but not for policies that are not education-related.

4. Definition of main variables

4.1. Outcome variables

We construct the dependent variables for our regressions as follows:

- Importance of fixed factors vs malleable factors in explaining variation in college attainment (used to assess effect of treatment on beliefs): Measured on a 0-100 scale (reverse-coded from the survey question), where numbers in the range 0-49 mean that differences in malleable factors are more important, 50 means both types of factors are equally important, and 51-100 mean that differences in fixed factors are more important.
- Preferred earnings gap between college and non-college graduates: We use the preferred earnings ratio or the income share going to the non-college graduate.
- Charitable donations: We use the amount donated (out of 100 USD) that the participant chose to donate to the education-related charity.
- Support for equalizing educational policies: We construct a variable to measure participant's support for equalizing educational policies (e.g. expanding the size of the Pell Grant) where higher numbers indicate stronger support.

To make results easier to interpret, we standardize all dependent variables using the mean and standard deviation in the control group.

4.2. Control variables

For the regressions, the control variables will be coded in the following way:

- Gender: Indicators for "Female" and "Other"
- Age: We calculate the participant's age by subtracting their year of birth from 2022. We will treat age as a categorical variable with the following bands: 25-34, 35-44, 45-55, 55 and above.
- Ethnicity: Indicator variables for Black, Hispanic, Asian, and other race groups (e.g. American Indian, Pacific Islander). "White" is the omitted category.
- Participants' educational attainment: An indicator where 1 equals college graduate (bachelor's degree, or equivalent, and above) and 0 otherwise.
- Political identity: Indicators for Democrat and Republican. The omitted category is "independent"/"other party".
- Participants' household income: An indicator that equals 1 if the participants earns above median income and 0 otherwise.
- US region in which participant resides: US states of residence will be coded into three region indicators (3 of the following from Northeast, Midwest, South, and West)

The following variables, when used in our analysis, will be coded as follows:

- Perceived productivity differences between college and non-college graduates: A continuous variable measuring how much out of $100 of output, produced together by a college and non-college grad, can be attributed to the college graduate.
- Number of children: Indicator variable that equals 1 if the participant has one or more children and 0 otherwise.
- Parents' highest educational attainment: Coded in the same way as participants' educational attainment.
- Participants' experience of educational mobility: Indicator variable that equals 1 if the participant attended college but neither parent did, and 0 otherwise.
- Strength of attachment to identities: Measured on a 1-4 scale, where 1 = Not strong at all, and 4 = Very strong. The identities of interest are: nationality, race/ethnicity, educational qualifications, and gender.
- Employment status: Coded as an indicator that equals 1 if the participant is in full-time work and 0 otherwise.
- Numeracy: Measured as the number of numeracy questions (out of 3) the participant answered correctly.
- Altruism: The standardized answer to the altruism question, where higher numbers indicate greater levels of altruism.
- Locus of control measure: Measured on a 1-7 scale for 7 statements where 1 = strongly disagree and 7 = strongly agree. We will follow procedures in the literature to construct a measure of locus of control (Cobb-Clark and Schurer, 2013).

4.3. Mechanisms

We explore two mechanisms through which information provision can affect behavior: beliefs about the sources of educational inequalities, and stereotypes about the less-educated. The conceptual underpinning of these mechanisms is the dual process theory of human reasoning, which is used in the psychology literature to distinguish between two types of thinking: fast and heuristic-based ("System 1"; stereotypes) vs slower and consciously controlled ("System 2"; beliefs derived from information) (Evans, 2008; Kahneman, 2011).

Beliefs about the sources of educational inequalities are constructed as in Section 2.4. Implicit stereotypes about the less-educated are measured using the participant's IAT score, expressed in terms of standard deviations. Positive numbers indicate negative stereotypes about the less-educated (non-college graduates), and negative numbers indicate positive stereotypes about the less-educated (college graduates). We use the R package "iatgen" to calculate the IAT score.

4.4. Outliers and exclusion criteria

For our sensitivity analysis, we will investigate whether our results are robust to excluding participants who provided low quality responses to the survey questions. Indicators of low-quality responses include: failing attention checks, taking too long to complete the IAT or making too many mistakes on the IAT, and providing extreme numerical answers to survey questions (e.g. the desired wage ratio between college and non-college graduates).

5. Analysis

5.1. Treatment effects

We first assess whether the information treatment has shifted beliefs about the sources of educational inequality in the desired direction (the first stage) by estimating the following equation:

$$y_i = \alpha_0 + \alpha_1 \text{Treated}_\text{i} + \boldsymbol{\gamma}' \boldsymbol{X}_i + \epsilon_i \quad (1)$$

where

- y_i is the attribution of college degree attainment to fixed factors relative to malleable factors (measured on a 0-100 scale, where higher numbers indicate that fixed factors are more important),
- Treated_i is an indicator that equals 1 if the participant was in the treatment group,
- $\boldsymbol{X}_i$ is a vector of the control variables described in Section 4.2,
- ϵ_i is the error term. We use robust standard errors for all regression specifications.

To test hypothesis 1, we estimate equation (1), where y_i is the income that the college graduate should earn (for every $100 that the non-college graduate earns).

To test hypothesis 2, we estimate equation (1), where y_i is the amount (in dollars) that the participant chose to donate to the education-related charity (conditional on donating at all). To further examine the extensive and intensive margins, we will also conduct two-sided t-tests (control vs treatment) on the percentage of participants that chose to donate anything at all and the amount donated (conditional on donating), respectively.

To test hypothesis 3, we estimate equation (1), where y_i is the participant's responses to the education-related policy support questions (described in Section 4.1). Higher numbers indicate stronger support for the stated policies. To assess whether the treatment specifically affects support for education-related policies rather than policies in general, we also estimate equation (1) using support for the non-educated-related policies as the dependent variable. As a robustness check, we include in these regressions controls for how effective the participant thinks the given policy is and whether how they think various groups (e.g. themselves or people they care about) would be personally affected if such policies were implemented.

In all regressions described above, if the coefficient $\alpha_1 < 0$ at the 5% level (using a two-sided t-test), this finding would be consistent with the stated hypotheses. For all regressions, we use robust standard errors.

5.2. Heterogeneous treatment effects

To investigate whether treatment effects differ by prior beliefs, we estimate the previous equations and include an interaction term between treatment and prior beliefs:

$$y_i = \alpha_0 + \alpha_1 \text{Treated}_\text{i} + \alpha_2 \text{Het}_\text{i} + \alpha_3 (\text{Treated}_i \times \text{Het}_i) + \boldsymbol{\gamma}' \boldsymbol{X}_i + \epsilon_i \quad (2)$$

where Het_i is the dimension of interest and the other terms in equation (2) are as described in Section 5.1. We consider two main dimensions of heterogeneity:

- Prior beliefs, where Het_i is an indicator that equals 1 if the participant underestimated the ratio of high-income to low-income college attendees and 0 otherwise. Since overestimating the ratio can be driven by various types of misperceptions about the parental income distribution of college attendees, the regressions examining heterogeneity by prior beliefs include additional interactions between treatment status and an indicator for whether the participant underestimated the percentage of high-income college attendees, and an interaction term between treatment status and an indicator for whether the participant overestimated the percentage of low-income college attendees.
- Educational attainment, where Het_i is an indicator that equals 1 for college graduates and 0 otherwise.

As secondary analysis, we also investigate whether treatment effects vary by other participant characteristics such as parental education, household income, and political affiliation.

5.3. Mediation analysis

We aim to decompose the total effect of information provision into a direct effect (information affects inputs used in conscious decision-making) and an indirect effect (information changes stereotypes used in heuristic decision-making). We conduct causal mediation analysis using the estimation procedure described in Keele et al. (2015) to estimate the relative size of the indirect effect, as a percentage of the total effect. We use the "mediation" package in R to implement this procedure for all three outcomes in the main and follow-up survey, where the standardized IAT score is the mediating variable.

5.4. Additional Analysis

To investigate potential sources of misperceptions about the sources of educational inequality, we investigate how prior beliefs are correlated with parental socioeconomic status and parental educational attainment.

In addition to the implicit stereotypes about the less educated, we also collect measures of explicit attitudes towards the less educated. We examine how implicit and explicit attitudes are correlated.

We collect two different explicit attitude measures, one from the psychology literature and one from the economics literature:

- A "feeling thermometer" indicator of "warmness" towards college graduates and non-college graduates. The scale ranges from 0-100, where higher numbers indicate "warmer" feelings towards the group in question.

- The extent to which participant trust college graduates compared to non-college graduates, measured by asking participants to allocate 100 “trust points” between a representative member of each group. We will code this variable so that higher numbers indicate greater trust for the college graduate. This approach follows Enke et al., (2021).

To provide a natural benchmark for comparison, we also elicit participants’ attitudes towards Americans who identify as black and Americans who identify as white.

5.5. Analysis for the follow-up experiment

The analysis of the follow-up experiment will use the same regression specifications as that of the main experiment.

5.6. Attrition in the follow-up study

There will likely be attrition between the main study and the follow-up. To account for potential bias arising from such attrition, we will use inverse probability weights to re-weight our regression sample. Specifically, we run a probit regression where the outcome variable equals 1 for participant that participated in both surveys and 0 otherwise, using the socio-demographic characteristics from Section 2.9 as covariates. We use the probit estimates to obtain predicted probabilities of each participant appearing in both surveys, conditional on these socio-demographic characteristics. We then use the inverse of the predicted probability as that participant’s weight.

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A. Survey questionnaire: Main experiment

A. Start of survey

A.1. Survey information

We are a group of non-partisan researchers. In this study, our goal is to understand your views about education and attitudes towards different groups in society. Our survey will give you an opportunity to express your own views.

It is very important for the success of our research that you answer honestly and read the questions very carefully before answering. Whenever you don't know an answer, just give your best guess. To ensure the quality of the survey data, your responses will be subject to sophisticated statistical control methods. **Responding without adequate effort may result in your responses being flagged for low quality.**

To take part, you must ordinarily **be a resident in the US** and be **at least 25 years old**. If you do not fulfil these requirements, please do not continue any further.

It is very important for the success of our research project that you **complete the entire survey**. This study will take you around **20 minutes**. We will compensate you via a bonus if you need significantly more than 20 minutes to complete this study. If you have already completed this survey, only your first complete response will be counted and be paid.

Please complete this study on a computer or laptop, not a tablet or phone. This study requires you to look at some images and they may not appear clearly on a small screen.

Your participation is entirely voluntary. If you do decide to take part, you can still withdraw at any point for any reason by closing the browser. If you choose to withdraw, your responses will not be recorded or used for the study.

To proceed, please tick the box that applies to you

- No, I would not like to participate
- Yes, I would like to participate and confirm that **I live in the US** and am **25 years old or older**

A.2. Attention check

Most modern theories of decision making recognize that decisions do not take place in a vacuum. Individual preferences and knowledge, along with situational variables can greatly impact the decision process. To demonstrate that you've read this much, just go ahead and select both "Strongly disagree" and "Strongly agree" among the alternatives below, no matter what your opinion is.

Do you agree or disagree with the following statement: *"It is easy to find accurate and reliable information in the media these days"*?

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

B. Beliefs about college attendance

B.1. Pre-treatment belief elicitation question

Opportunity to win a bonus: By answering this question, you are automatically entered into a lottery to win a bonus of $50. Your chance of winning this lottery depends on how close your answers are to the correct answers. The closer your numbers are to the correct answers, the higher your chance of winning.

A group of researchers are studying the higher education system in the U.S. They looked at data on individuals born between 1980 and 1982. Among this group, over 3.5 million individuals (around 1 out of 3 individuals) attended a 4-year college.

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Think about 100 random individuals from this group of students who attended a 4-year college ("college attendees").

These 100 college attendees grew up in one of the following households:
a.) A ***low-income*** household (<$30,000 per year)
b.) A ***below-middle-income*** household ($30,000-$55,800 per year)
c.) A ***middle-income*** household ($55,801-$89,700 per year)
d.) An ***above-middle-income*** household ($89,701 -$135,500 per year)
e.) A ***high-income*** household (>$135,501 per year)

Please fill in how many of these 100 college attendees grew up in each of these household groups.

According to these income group definitions, across the U.S. there is an equal number of households in each group. For example, 20% of households in the U.S. are low-income, 20% of households in the U.S. are below-middle-income, and so on. You can assume that across the U.S. all household income groups have the same number of children.

This means that: If you think that everyone is ***equally likely*** to attend a 4-year college, then ***20 out of 100*** college attendees would come from each of these groups. If you think that

individuals who grew up in certain households are ***more likely*** to attend a 4-year college, ***more than 20 out of 100*** college attendees would come from that group.

There is at least 1 college attendee from each household income group. Since there are 100 college attendees, the numbers in each household income group must total 100.

[5 boxes for low income, below-middle income, middle-income, above-middle income, high income, and a 'total' box that sums the findings]

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B.2. Confidence Questions

You said that out of 100 college attendees, [respondent answer] grew up in a ***low-income*** household.

How confident are you about your answer?

- Not confident at all
- Slightly confident
- Moderately confident
- Very confident
- Extremely confident

You said that out of 100 college attendees, [respondent answer] grew up in a ***high-income*** household.

How confident are you about your answer?

- Not confident at all
- Slightly confident
- Moderately confident
- Very confident
- Extremely confident

C. Control group

C.1. Information treatment

What did the researchers find?
When the researchers looked at the earnings of these 100 college attendees in 2014 (when the individuals were 32-34 years old), they found that on average over 90% were in full-time or part-time employment.

The researchers found that individuals in this cohort attended various types of colleges. For example, some attended selective public colleges, some attended non-selective public colleges, and others attended for-profit colleges.

C.2. Comprehension check

The researchers found that among a group of individuals born between 1980 and 1982 who attended college...

- 50% were in full-time or part-time employment
- 60% were in full-time or part-time employment
- 70% were in full-time or part-time employment
- 80% were in full-time or part-time employment
- Over 90% were in full-time or part-time employment

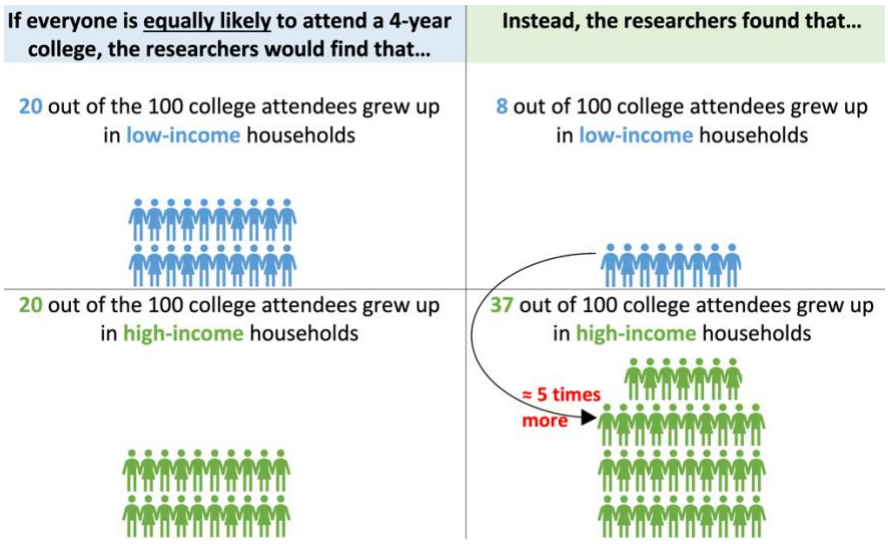
D. Treatment group

D.1. Information treatment

[Feedback]
You said that if you met 100 random individuals who attended a 4-year college, you expect to find that...
[Respondent's answer here] of them grew up in a low-income household. This is correct/You have underestimated/overestimated the number of college attendees who grew up in a low-income household.
[Respondent's answer here] of them grew up in a high-income household. This is correct/You have underestimated/overestimated the number of college attendees who grew up in a low-income household.

{page break}

[Information]
What did the researchers find?



This means students from high-income families are almost **5 times more likely** to attend a 4-year college than those from low-income families.

Some people may think that this difference in college-related outcomes is due to low-income students not having good enough grades to go to college.

But the researchers found that when we look at low-income and high-income students with *the same test scores*, high-income students are still more likely to attend 4-year colleges than low-income students.

The researchers concluded that *almost two-thirds* of the difference in college-related outcomes between low-income and high-income students are due to factors related to parental income, even after controlling for how prepared the students are for college.

There are many reasons why parental income matters. Prior research has shown that among low-income students who get good enough test scores to apply to good colleges, the following factors are important *barriers to attending* college:

- **Lack of support** and guidance to apply to college
- Not being able to pay for college **application fees**
- Not being able to pay for college costs like **tuition fees**

D.2. Comprehension check

The researchers found that if you met 100 random individuals who attended a 4-year college, you would find that...

- 15 grew up in a *low-income* household and 50 grew up in a *high-income* household
- 12 grew up in a *low-income* household and 46 grew up in a *high-income* household
- 8 grew up in a *low-income* household and 37 grew up in a *high-income* household
- 5 grew up in a *low-income* household and 25 grew up in a *high-income* household

E. Post-Treatment Belief Elicitation

Consider two groups of individuals. All individuals in group 1 attended college. All individuals in group 2 did **not** attend college.

How important are the following factors in explaining this difference in college attendance between groups 1 and 2?

- **Fixed factors:** Factors that are *fixed* at birth (e.g. whether they are born into a rich or poor household)
- **Malleable factors:** Factors that are *not fixed* at birth (e.g. their mindset towards hard work)

Please use the slider below to indicate how important you think each factor is. Drag the slider to the *right* if you think *malleable* factors are more important. Drag the slider to the *left* if you think *fixed* factors are more important.

[Slider with 3 labels (“differences in malleable factors more important” (left), “differences in malleable and fixed factors equally important” (center), “differences in fixed factors more important” (right))

Note: Slider order is randomized across participants. Some participants get a slider where malleable factors are on the left and fixed factors are on the right. Other participants get a slider where malleable factors are on the right and fixed factors are on the left.

F. Outcomes

F.1. Income allocation

Generally speaking, college graduates earn more than non-college graduates.

According to recent data provided by the US Bureau of Labor Statistics, before taxes, for every $100 that the typical non-college graduate makes, the typical college graduate makes $173.

Some people consider this difference in earnings as fair. Other people consider this difference in earnings as unfair. One way to address unfair differences in earnings is through taxation (e.g. by increasing taxes on those who earn over a certain amount).

For every $100 that the typical non-college graduate makes, do you think the typical college graduate should make less than, equal to, or more than $173?

- **Less than $173**(Earnings difference should be **smaller**)
- **Equal to $173**(Earnings difference **doesn't need to change**)
- **More than $173**(Earnings difference should be **larger**)

{page break}

(If respondent selected “should be smaller”)
You suggested that for every $100 that the non-college graduate makes, the typical college graduate should make **less than** $173.

How much do you think the typical college graduate should earn relative to the typical non-college graduate? (Please enter a number below $173)

(If respondent selected “should be larger”)
You suggested that for every $100 that the non-college graduate makes, the typical college graduate should make **more than** $173.

How much do you think the typical college graduate should earn relative to the typical non-college graduate? (Please enter a number above $173)

F.2. Donation

By taking this survey, you are automatically enrolled in a lottery to win $100.

If you win the lottery, would you be willing to donate some of this money to the National College Attainment Network (NCAN)?

The NCAN is a charity that aims to increase access to college, especially among students underrepresented in postsecondary education. The NCAN does this by helping students prepare for and apply to college.

You can find out more about the NCAN by clicking here.

If you win the lottery, we will contact you in a few days to let you know. You will be paid this extra money (minus your donations) in addition to your payment for participating in the survey.

Use the slider below to indicate how much you would like to donate to the charity:
[Slider ranging from $0 to $100]

F.3. Policy Support

Pell Grant Question
[Note: Participants randomly receive information on either this question or the next one]

Even after they've been accepted to college, many low-income students cannot attend college because they cannot afford it. The **Pell Grant** is the federal government's financial aid program for low-income students who need help to pay for college costs (e.g. tuition, fees, room and board).

In 2022, the maximum size of the Pell Grant was $6,495. This covers roughly 25% of the average cost of attendance at a public four-year institution.

Some argue the federal government should **double the size of the Pell Grant** so that more low-income students can afford to attend college. By clicking here, you can find out more about organizations such as ***#DoublePell*** that aim to expand the Pell Grant.

Others argue that the government should spend the fiscal budget on other issues instead.

Do you think think the government should double the size of the Pell Grant?
[Slider from 0 "definitely should not" (0) to 10 "definitely should"]

Fee Waiver Question
[Note: Participants randomly receive information on either this question or the previous one]

One of the barriers to applying to college for low-income students is application fees. US colleges charge an average of $45 for each application and application fees can be as high as $90 for some colleges (e.g. Stanford). By clicking here, you can find out more about college

application fees across the US.

Some argue that one way to address this issue is for colleges to provide automatic fee waivers to low-income students. When students apply to colleges, the application system detects their eligibility for an application fee waiver so low-income students can apply without any costs and without filling in any additional paperwork.

Others argue that these fees are required by colleges to cover the administrative costs of reviewing and evaluating applications, so everyone should pay for them.

Do you think colleges should automatically exempt low-income students from paying an application fee? [Slider from 0 "definitely should not" (0) to 10 "definitely should"]

Women quota question

[Note: All participants get the following placebo question]

Generally speaking, female workers earn less than male workers. Some people argue that to reduce earning differences between male and female workers, employers should make special efforts to hire and promote qualified women. Others argue there is no need to do so.

Do you think employers should make special efforts to hire and promote qualified women? [Slider from 0 "definitely should not" (0) to 10 "definitely should"]

Policy Effectiveness

[Note: Participants get the following question for the policy they were asked about and for the women quota question]

Previously, we asked you [explain policy here]. **If [policy description] were implemented, how do you think the following groups would be affected?** [5 options: Very negatively affected, negatively affected, unlikely to be affected, positively affected, very positively affected]

- White Americans
- Black Americans
- Women
- Men
- You and/or people you care about

If colleges automatically exempt low-income students from paying an application fee, how effective would it be in improving everyone's likelihood of attending college if they wish to?

- Not effective at all
- Slightly effective
- Moderately effective
- Very effective

- Extremely effective

F.4. Implicit Association Test

Background information

In this section, you will see items that represent the names of individuals with and without a **college degree** and some **positive or negative words**.

As each item appears, you will be asked to categorize the items to the left or right side of the screen using the 'E' (left side) and 'I' (right side) keys on your keyboard.

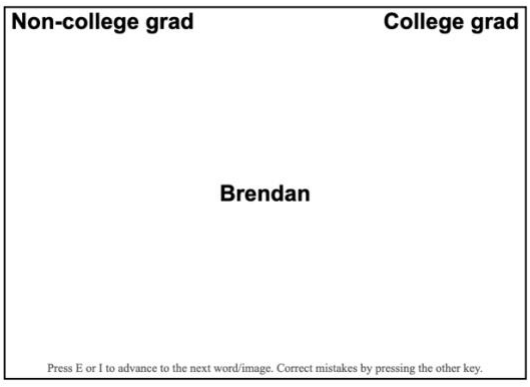
All of the following abbreviations indicate that someone has a college degree. If the item does not have any of the following abbreviations, you can assume that the individual does not have a college degree.

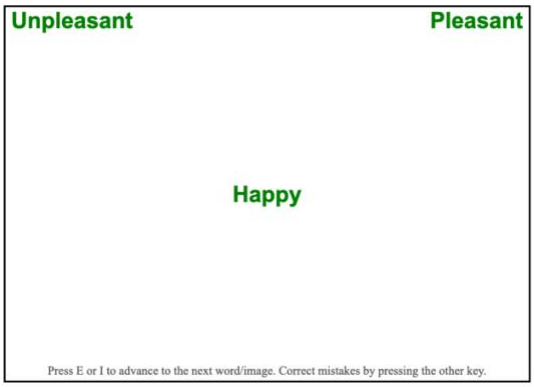
- BSc, J.D, MBA, MSc, M.D., PhD

Here are the positive and negative words you may see:

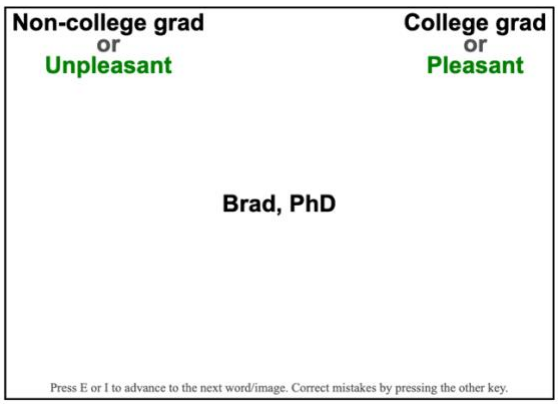
- **Positive** words: Gentle, Enjoy, Heaven, Cheer, Happy, Love, Friend
- **Negative** words: Poison, Evil, Gloom, Damage, Vomit, Ugly, Hurt

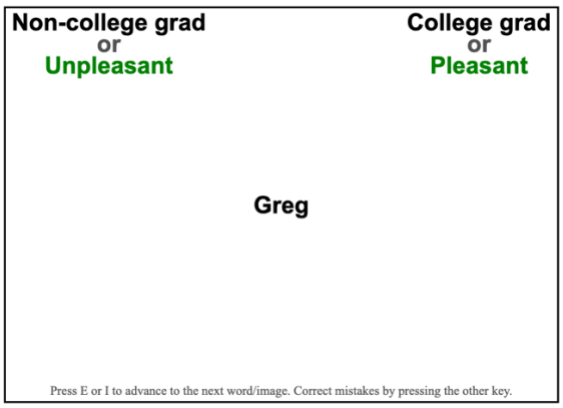
Examples of practice blocks



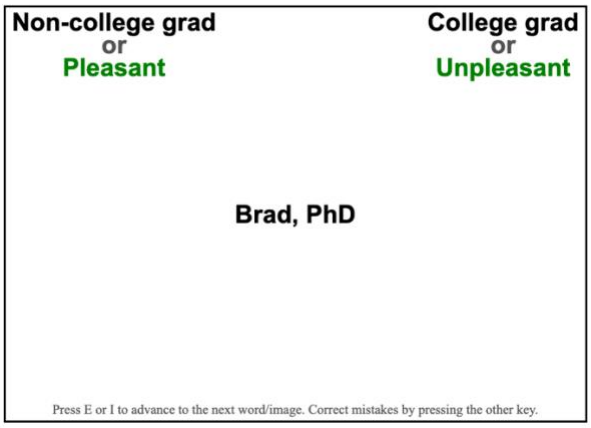


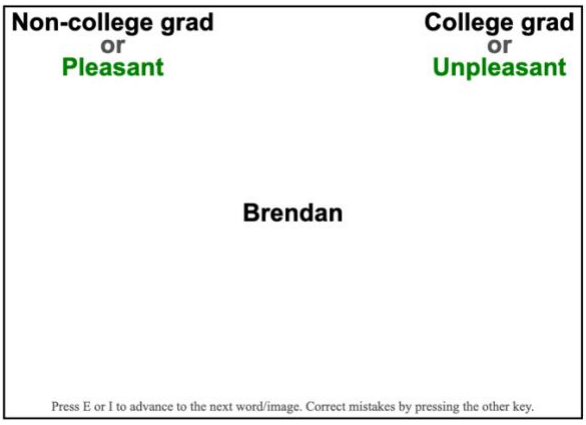
Example of stereotypical block





Examples of non-stereotypical block





F.5. Explicit Attitudes (Feelings Thermometer)

We would now like to get your feelings about some groups in society. For each of the following groups, use the slider to show how warm or cold you feel towards the group.

If you don't feel particularly warm or cold toward a group, you would rate them at 50 degrees. If you feel warm toward the group, you would rate them between 50 to 100 degrees. If you feel cold toward a group, you would rate them between 0 and 50 degrees.

- Americans who identify as **black** [Slider from 0 (cold) to 100 (warm)]
- Americans who identify as **white** [Slider from 0 (cold) to 100 (warm)]
- Americans **without** a college degree [Slider from 0 (cold) to 100 (warm)]
- Americans **with** a college degree [Slider from 0 (cold) to 100 (warm)]
- Americans who identify as **female** [Slider from 0 (cold) to 100 (warm)]
- Americans who identify as **male** [Slider from 0 (cold) to 100 (warm)]

E. Other Variables

E.1. Beliefs about relative productivity

[Asked before the treatment]

Economists often measure **productivity** in terms of dollar output per hour. Think about a typical college-graduate and a typical non-college graduate, both of whom work full time. In total, they produce $100 of output per hour.

[Note: participants randomly receive one of the following questions]

Of this $100, how much output (in $) do you think the college graduate produced?
Of this $100, how much output (in $) do you think the non-college graduate produced?

E.2. Altruism

[Asked before the treatment]

How willing are you to give to good causes without expecting anything in return? [Slider from 0 (completely unwilling to do so) to 10 (very willing to do so)]

E.3. Locus of control

[Asked before the treatment]

To what extent do you agree with the following statements? [Scale from 1 (strongly disagree) to 7 (strongly agree)]

- I have little control over the things that happen to me
- There is really no way I can solve some of the problems I have
- There is little I can do to change many of the important things in my life
- I often feel helpless in dealing with the problems of life
- Sometimes I feel that I'm being pushed around in life
- What happens to me in the future mostly depends on me
- I can do just about anything I really set my mind to do

E.4. Numeracy

[Asked after the treatment]

- Imagine that we rolled a fair, 6-sided die 1000 times. Out of 1,000 rolls, how many times do you think the die would come up even (2,4, or 6)?
- In the BIG BUCKS LOTTERY, the chances of winning a $10.00 prize is 1%. What is your best guess about how many people would win a $10.00 prize if 1,000 people each buy a single ticket to BIG BUCKS?
- In the ACME PUBLISHING SWEEPSTAKES, the chance of winning a car is 1 in 1,000. What percent of tickets to ACME PUBLISHING SWEEPSTAKES win a car?

E.5. Beliefs about fixed and malleable factors

[Asked after the treatment]

In general, do you think people can change the following factors about themselves if they want to? [Slider from 0 (Can't change this factor) to 100 (Can change this factor)]

- Can people change how **hardworking** they are?
- Can people change how **ambitious** they are?
- Can people change whether they **know the right people**?
- Can people change whether they are **born in the right neighborhood**?
- Can people change how **smart** they are?
- Can people change their **race or ethnicity**?
- Can people influence whether they get a **high SAT score**?
- Can people influence whether they get a **high-paying job**?

E.6. Demographics

[Asked after the treatment]

- **How do you describe yourself? [**Male, Female, Non-binary/third gender, Prefer to self-describe]
- **In what year were you born? [**Dropdown from 1933 or earlier to 2004]
- **Which of the following do you most identify with?** [White/Caucasian, Black/African American, American Indian/Native American/Alaska Native, Asian/Asian American, Spanish/Hispanic/Latino, Native Hawaiian/Other Pacific Islander, Other]
- **How many children do you have?** [0 to 5 or more]
- **What was your total household income before taxes during the past 12 months? [**Less than $25,000, $25,000 to $44,999, $45,000 to $64,999, $65,000 to $84,999, $85,000 to $99,999, $100,000 or more, Prefer not to say]
- **What is your current employment status? [**Full-time employee, Part-time employee, Self-employed or small business owner, Unemployed and looking for work, Student, Not in labor force (e.g retired/full-time parent)]
- **Which category best describes your highest level of education? [**Some high school or less, High school diploma or GED, Some college, but no degree, 2-year college degree, 4-year college degree, Master's degree, Graduate or professional degree (e.g. JD, MD, MBA), Doctoral degree (PhD)]
- **Which category best describes your <u>father's</u> highest level of education? [**Some high school or less, High school diploma or GED, Some college, but no degree, 2-year college degree, 4-year college degree, Master's degree, Graduate or professional degree (e.g. JD, MD, MBA), Doctoral degree (PhD)]
- **Which category best describes your <u>mother's</u> highest level of education? [**Some high school or less, High school diploma or GED, Some college, but no degree, 2-year

college degree, 4-year college degree, Master's degree, Graduate or professional degree (e.g. JD, MD, MBA), Doctoral degree (PhD)]

- **When you were growing up,** compared with American families back then, would you say your family income was:[Far below average, Below average, Average, Above average, Far above average]
- **Right now,** compared with American families, would you say your own household income is: [Far below average, Below average, Average, Above average, Far above average]
- **Generally speaking, do you usually think of yourself as a Republican, Democrat, or Independent?** [Democrat, Independent, Republican, Other party]
- **In which state do you currently reside?** [Dropdown menu of US states]
- **How strong would you say your attachment is to each of the following identities?** [Not strong at all, Slightly strong, Somewhat strong, Very strong]
    - Identity based on my **nationality**
    - Identity based on my **race or ethnicity**
    - Identity based on my **educational qualifications**
    - Identity based on my **occupation**
    - Identity based on my **gender**

E.7. Questions about the study

[Asked after the treatment]

Do you feel that this survey was biased?

- Very left-wing biased
- Somewhat left-wing biased
- Neither left-wing or right-wing biased
- Somewhat right-wing biased
- Very right-wing biased

B. Survey questionnaire: Follow-up study

A. Start of survey

A.1. Survey information

We are a non-partisan group of academic researchers from the University of Cambridge. Our goal in this survey is to understand your views on various policies. No matter what your political views are, you are contributing to our knowledge as a society.

This study will take you around 10 minutes. To take part, you must ordinarily be a resident in the US and be at least 25 years old. If you do not fulfil these requirements, please do not continue any further.

Please complete this study on a computer or laptop, not a tablet or phone. This study requires you to look at some images and they may not appear clearly on a small screen. Please ensure you read each question carefully and answer honestly.

Your participation in this study is purely voluntary. Your name will never be recorded. Results may include summary data, but you will never be identified.

To proceed, please tick the box that applies to you

- No, I would not like to participate
- Yes, I would like to participate and confirm that **I live in the US** and am **25 years old or older**

A.2. Attention Check

The next question is about the following problem. In questionnaires like ours, sometimes there are subjects who do not carefully read the questions and just quickly click through the survey. This means that there are a lot of random answers which compromise the results of research studies. To show that you read our questions carefully, please choose “Not at all interested” and “Extremely interested” as your answer in the next question.

- Not at all interested
- Slightly interested
- Moderately interested
- Very interested
- Extremely interested

B. Demographics

- We hear a lot of talk these days about liberals and conservatives. Where would you place yourself on this scale? [1=Extremely liberal; 7=Extremely conservative]
- Please indicate your marital status [Single/ Married/ Other]
- Were you born in the US? [No/ Yes]
- Were both of your parents born in the US? [No/ Yes]

- If you compare your job (or your last job if you currently don't have a job) with the job your father had while you were growing up, would you say that the level of status of your job is: [Much higher than my father's, Higher than my father's, About equal to my father's, Lower than my father's, Much lower than my father's, My father did not have a job while I was growing up/My father was not present]
- If you compare your job (or your last job if you currently don't have a job) with the job your mother had while you were growing up, would you say that the level of status of your job is: [Much higher than my mother's, Higher than my mother's, About equal to my mother's, Lower than my mother's, Much lower than my mother's, My mother did not have a job while I was growing up/My mother was not present]

C. Beliefs about the sources of educational inequality

Think about two groups of people. Everyone in Group 1 attended college. Everyone in Group 2 did **not** attend college.

How important are the following factors in explaining this difference in college attendance between groups 1 and 2?

- Fixed factors: Factors that are *fixed* at birth (e.g. whether they are born into a rich or poor household)
- Malleable factors: Factors that are *not fixed* at birth (e.g. their mindset towards hard work)

Please use the slider below to indicate how important you think each factor is.

[Slider with 3 labels ("differences in malleable factors more important" (left), "differences in malleable and fixed factors equally important" (center), "differences in fixed factors more important" (right))

D. Outcomes

D.1. Income Allocation

Generally speaking, college graduates earn more than non-college graduates. According to recent data, before tax, the typical college graduate earns over $62,000 per year while the typical non-college graduate earns below $36,000 per year.

Some people argue that we should use the tax system to reduce differences in earnings between college and non-college graduates. Others argue that there is no need to reduce differences in earnings between college and non-college graduates.

Do you think that the difference in earnings between the typical college graduate and non-college graduate should decrease, stay the same, or increase? [Should decrease, should stay the same, should increase]

D.2. Donation

By taking this survey, you are automatically enrolled in a lottery to win $100.

If you win the lottery, do you want to donate some of this money to the National College Attainment Network?

The National College Attainment Network is a charity that aims to increase access to college, especially among communities underrepresented in postsecondary education. The NCAN does this by helping students prepare for and apply to college.

If you win the lottery, we will contact you in a few days to let you know. You will be paid this extra money (minus your donations) in addition to your payment for participating in the survey.

Please enter how much you would like to donate to the charity:___

D.3. Policy Support

Education-related policy
[Participants receive the policy question that they *not* get in the main survey (Pell Grant question or application fee question)]

Placebo policy
Some people think that it is the responsibility of the government in Washington to see to it that people have help in paying for doctors and hospital bills.

Others think that these matters are not the responsibility of the federal government and that people should take care of these things themselves.

Should the government help people pay for medical bills? [Slider from 0 (should not help to pay) to 7 (should help to pay)]

D.4. Implicit Association Test

[Same setup as in main survey except that (1) the names of the primes are different, (2) the positive/negative words are different, (3) the color scheme and font are different]

D.5. Explicit Attitudes

In each row below, how would you split 100 "trust points" between the two individuals displayed on either end of the slider?

The closer you drag the slider to one individual, the more you trust that individual, relative to the other individual.

- A randomly-selected **college graduate** who lives in the U.S. and a randomly-selected **non-college graduate** who lives in the U.S.
- A randomly-selected **white person** who lives in the US and a randomly-selected **black person** who lives in the U.S.
- A randomly-selected **man** who lives in the US and a randomly-selected **woman** who lives in the U.S.