



# Framing economic inequality and policy as group disadvantages (versus group advantages) spurs support for action

Pia Dietze<sup>1</sup>✉ and Maureen A. Craig<sup>2</sup>

**Given the near-historic levels of economic inequality in the United States, it is vital to understand when and why people are motivated to reduce it. We examine whether the manner in which economic inequality and policy are framed—in terms of either upper-socio-economic-class advantages or lower-socio-economic-class disadvantages—influences individuals' reactions to inequality. Across five studies, framing redistributive policy (Study 1) as disadvantage-reducing (versus advantage-reducing) and economic inequality (Studies 2–5) as lower-class disadvantages (versus upper-class advantages or a control frame) enhances support for action to reduce inequality. Moreover, increased support is partly driven by perceptions that inequality is more unjust if framed as lower-class disadvantages. Using diverse methodologies (for example, social media engagement on Facebook) and nationally representative samples of self-reported upper-class and lower-class individuals, this work suggests that the ways in which economic inequality is communicated (for example, by the media) may reliably influence people's reactions to and concern for the issue.**

In recent years, wealth and income disparities within and across countries have been the topic of bestselling books<sup>1,2</sup>, political campaigns<sup>3</sup> and shocking headlines. Despite this attention, economic inequality is persistently rising or remaining extremely high in most countries<sup>4</sup>. In 2019, 26 individuals possessed as much wealth as 50% of the world's population<sup>5</sup> and the United States in particular reached the highest level of income inequality on record<sup>6</sup>. The social and health consequences of such extreme economic inequality affect individuals across income levels. Higher income inequality in a country predicts lower financial satisfaction<sup>7</sup>, worse mental health<sup>8</sup> and lower levels of happiness and trust<sup>9</sup>.

Despite the deleterious consequences of economic inequality, Americans generally report little support for redistributive policies that are intended to reduce such inequality<sup>10–12</sup>. Some research suggests that simply providing people with straightforward information about economic disparities reduces beliefs in fair opportunity and, in turn, elicits more support for inequality-reducing policies<sup>13</sup>. However, there are many ways in which inequality information could be communicated and the effects of how economic inequality is framed are less well understood. Because inequality is an inherently comparative phenomenon (some have more or less than others), the same information about economic inequality can be accurately framed either in terms of one group's advantages (having more) or in terms of another's disadvantages (having less). For example, the statistics on global wealth inequality presented at the outset of this article used an advantage frame (focusing on what rich people have, relative to others)—a common way of describing economic inequality<sup>14</sup>. How might an alternative frame that highlights the plight of people living in poverty (that is, a disadvantage frame) fare in marshalling support for reparative action? The present research investigates how and why the manner in which economic inequality is framed—in terms of either wealthy advantages or poor disadvantages—influences individuals' support for taking action to reduce it.

How information is framed powerfully impacts how people perceive and react to it<sup>15–17</sup>. Examining racial inequality (that is, disparities) and racial inequity (that is, explicitly undeserved disparities), research has shown that societally advantaged group members (white people) react to framing in a variety of ways<sup>18–22</sup>. Robust work suggests that white advantage frames can reduce white people's group-based esteem<sup>21</sup>, elevate feelings of guilt<sup>18–20</sup> and enhance claims of personal life hardships or denial of privilege<sup>22</sup>. However, the effects of these frames for support for actions and policies to reduce racial inequities are less straightforward. For example, some research has found that racial disparities framed as white advantages (compared with Black disadvantages) can lead white people to support policies meant to alleviate inequities<sup>21</sup>, whereas other research suggests that a white advantage frame (compared with no frame) can lead white people to voice less support for reparative action<sup>22</sup>. Interestingly, some studies suggest that congruency between the inequity frame and the policy frame might be important to increase support for reparative action<sup>21,23</sup>. For example, a white advantage frame may increase support for a policy aimed at reducing white advantages but not for a policy aimed at reducing Black disadvantages<sup>21</sup>. In general, differences between studies, particularly in the content of framing manipulations (for example, whether control conditions are present and, if so, whether inequality is salient in them, or whether inequality is explicitly stated as unjust in the framing conditions) and dependent measures (for example, different policies and emotional reactions), suggest that more work is needed to clarify these nuanced reactions. Altogether, framing has been shown to have a substantial psychological impact on how individuals perceive and react to information about racial inequality.

More central to the present research, a substantially smaller literature has examined reactions to the framing of economic inequality and inequity<sup>24–26</sup>. This work typically focuses on upper-class individuals' responses (rather than the responses of members of the lower-class group). We use 'lower class' to indicate people who

<sup>1</sup>Department of Psychological Science & Blum Center for Poverty Alleviation, University of California, Irvine, Irvine, CA, USA. <sup>2</sup>Department of Psychology, New York University, New York, NY, USA. ✉e-mail: [pdietze@uci.edu](mailto:pdietze@uci.edu)

report belonging to social classes with fewer resources than those in the middle class (for example, people who identify as working class) and ‘upper class’ to signify people who report belonging to social classes with more resources than the middle class (for example, people who identify as upper-middle class). Most of the extant studies examining the effects of economic inequality and inequity framing have examined how framing can impact upper-class individuals’ views of themselves, rather than their support for actions to mitigate inequality (for example, policy outcomes and collective action). However, as in the literature on racial inequality framing, major differences in the control conditions and stimuli have produced a complicated picture. As with racial inequality framing, upper-class individuals react to information about class advantages with denial and distancing<sup>25</sup>, while information on lower-class disadvantages can morally threaten upper-class individuals and lead to highlighting discrimination experiences in other domains of identity (for example, gender and race<sup>26</sup>). The sole study (to our knowledge) that has specifically examined the effect of economic inequality framing on support for action to reduce it found that income inequality framed as rich people making more than poor people (that is, an advantage frame) garnered more support for redistributive policies than a disadvantage frame; however, this effect emerged only among conservatives<sup>24</sup>. While these results are intriguing, the small sample size ( $N=79$ ) suggests a cautious interpretation.

It thus remains unanswered which economic inequality frame facilitates greater support for reparative action and whether one’s own social class affects this process. The current research seeks to address these gaps in the literature in a comprehensive investigation. In five studies, we examine the effects of framing redistributive policy (Study 1) and economic inequality (Studies 2–5) on support for collective action, using nationally representative samples, samples with targeted recruitment of upper-class and lower-class people, diverse methodologies (for example, social media engagement), and control conditions to provide baseline comparisons. Furthermore, we investigate how belonging to the advantaged or disadvantaged social class groups and perceptions of injustice (reliable predictors of collective action<sup>21,27</sup>) may influence these reactions.

## Results

**Study 1.** In Study 1, we analysed publicly available data from a nationally representative survey about economic inequality that fortuitously included an experimental manipulation of redistributive policy framing ( $N=1,504$ )<sup>28</sup>. The respondents were randomly assigned to answer two questions about economic inequality policy framed in one of two ways (advantage-reducing policy or disadvantage-reducing policy). The respondents reported their degree of support for governmental intervention to reduce economic inequality. Specifically, the respondents were asked how much (1 = nothing at all, 4 = a lot) the government should do to either (a) reduce the gap between the rich and everyone else (advantage frame) or (b) reduce poverty (disadvantage frame). Afterwards, the respondents were asked about their views on government efficacy to enact policies to reduce inequality—that is, how much the government can either (a) reduce the gap between the rich and everyone else or (b) reduce poverty—with the same response options.

Table 1 presents descriptive statistics for all studies. In addition, we use two-tailed statistical tests (that is, multivariate regression analysis) and report the unstandardized regression coefficients ( $B$ ) in all analyses except for Study 4, where we do not have access to the raw data and thus do not use inferential statistics. We conducted weighted linear regression analyses to examine the effects of policy framing (0 = disadvantage frame, 1 = advantage frame) on the respondents’ preferences for reducing inequality, controlling for respondent demographics (that is, age, gender, ethnicity, political ideology and social class categorization). See the Supplementary Information for comprehensive regression and correlation tables.

**Table 1 | Means (and standard errors in parentheses) for advantage and disadvantage conditions across studies**

	Advantage condition	Disadvantage condition
<b>Study 1</b>	$N=706$	$N=678$
Preference for government action	3.001 (0.045)	3.310 (0.038)
Efficacy judgement of government	2.966 (0.041)	3.151 (0.034)
<b>Study 2a</b>	$N=133$	$N=139$
Support for collective action	3.365 (0.145)	3.773 (0.142)
<b>Study 2b</b>	$N=36$	$N=39$
Support for collective action	3.274 (0.266)	4.260 (0.255)
<b>Study 3</b>	$N=888$	$N=892$
Support for collective action	2.748 (0.089)	3.046 (0.084)
Injustice perceptions	5.027 (0.081)	5.345 (0.059)
<b>Study 5</b>	$N=524$	$N=523$
Support for collective action	3.363 (0.072)	3.611 (0.072)
Injustice perceptions	5.620 (0.053)	5.784 (0.053)

Descriptive statistics (survey weights adjusted in Study 1 and Study 3) for the dependent variables by experimental condition and study, controlling for covariates. The value of  $N$  for each framing condition for each study is presented above the means and standard errors.

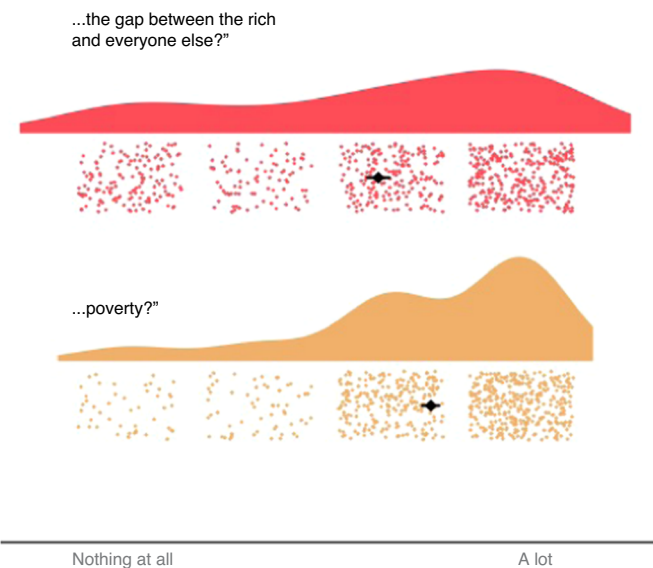
The respondents were more likely to indicate that the government should reduce poverty (that is, the disadvantage frame) than reduce the gap between the rich and everyone else (that is, the advantage frame) ( $B=-0.309$ ;  $t=-5.279$ ;  $P<0.001$ ; 95% confidence interval (CI),  $(-0.424, -0.194)$ ; Cohen’s  $f^2=0.023$ ; Fig. 1). We also tested whether the respondents’ social class (using two dummy variables indicating advantaged upper classes (upper-middle class or upper class) or disadvantaged lower classes (lower-middle or lower class), with the middle class as the reference group) or political ideology moderated the observed effect. Neither advantaged class membership ( $P=0.502$ ) nor disadvantaged class membership ( $P=0.076$ ) nor ideology ( $P=0.148$ ) significantly moderated the effect.

We then examined how policy framing influenced the respondents’ views of government efficacy to reduce inequality, controlling again for demographics. In a similar pattern to that of preferences for government action, the respondents expressed that government policies and programmes can do more to reduce poverty than to reduce the gap between the rich and everyone else ( $B=-0.185$ ;  $t=-3.490$ ;  $P<0.001$ ; 95% CI,  $(-0.290, -0.081)$ ;  $f^2=0.009$ ; Fig. 2).

Again, we tested whether social class (with dummy variables indicating belonging to the advantaged or disadvantaged economic groups) or political ideology moderated the observed effects. While ideology and disadvantaged class membership did not moderate the effect ( $P=0.289$  and  $P=0.375$ , respectively), advantaged class membership was a significant moderator. The effect of framing was exacerbated among upper-class individuals, who reported less optimism for the notion that the government can reduce the gap between the rich and everyone else, compared with their middle-class counterparts ( $B=-0.408$ ;  $t=-2.721$ ;  $P=0.007$ ; 95% CI,  $(-0.702, -0.114)$ ) or their lower-class counterparts ( $B=-0.305$ ;  $t=-1.979$ ;  $P=0.048$ ; 95% CI,  $(-0.607, -0.003)$ ).

Taken together, these data suggest that individuals view government action to reduce economic inequality more favourably if the action is framed as reducing disadvantages (that is, poverty), compared with reducing advantages (that is, the gap between the rich and everyone else). This preference holds for individuals regardless of their ideology and their own social class standing. The framing

"How much, if anything, should the government do to reduce..."

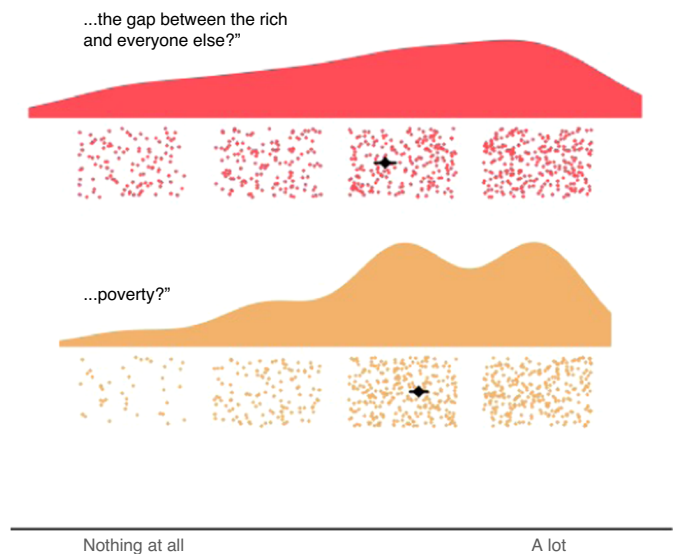


**Fig. 1 | Raincloud plots with jittered data for respondents' preferences for the government to reduce poverty or to reduce the gap between the rich and everyone else.** The respondents were randomly assigned to answer one of the two questions, which provided the manipulation of policy framing. Respondents who were asked about how much the government should do to reduce poverty (bottom) expressed more support than respondents asked about reducing the gap between the rich and everyone else (top) ( $N=1,384$ ;  $B=-0.31$ ;  $t=-5.28$ ;  $P<0.001$ ; 95% CI,  $(-0.42, -0.19)$ ). The dotted areas indicate the raw data, and the solid areas indicate the data distributions. The black diamonds signify the means for each question; the black lines signify the 95% CIs around the means.

effect in ratings of government efficacy to reduce inequality was exacerbated among upper-class individuals, who deemed the government less capable of reducing advantages, compared with middle-class or lower-class respondents. The relative pessimism expressed by upper-class individuals about the government's efficacy to reduce advantages could stem from multiple factors. Upper-class individuals may be motivated to downplay politicians' capabilities to reduce rich advantages because it would affect them directly. Alternatively, they might base these judgements on real experiences, such as decades of stable effective tax rates for the rich and greater experience with how wealth impacts access to politicians<sup>29</sup>.

**Study 2.** While the national survey data from Study 1 provide confidence in generalizability and suggest broad relevance of the documented policy-framing effect, a limitation is that researchers conducting secondary analyses (as we did) did not create the survey questions. In this case, the questions probably were developed for purposes other than providing a clean experimental test of the framing of economic inequality policy, and as such, the two conditions differed in several aspects other than their focus on advantages or disadvantages. For example, the advantage frame explicitly compared the rich with everyone else, whereas the disadvantage frame only referenced poverty. In addition to methodological concerns, past research has shown that individuals' support for policies aimed at reducing advantages versus reducing disadvantages is influenced by the framing of economic inequality itself. Thus, for the remainder of this manuscript, we focus our investigation on this more

"How much do you think government policies and programs can do to reduce..."

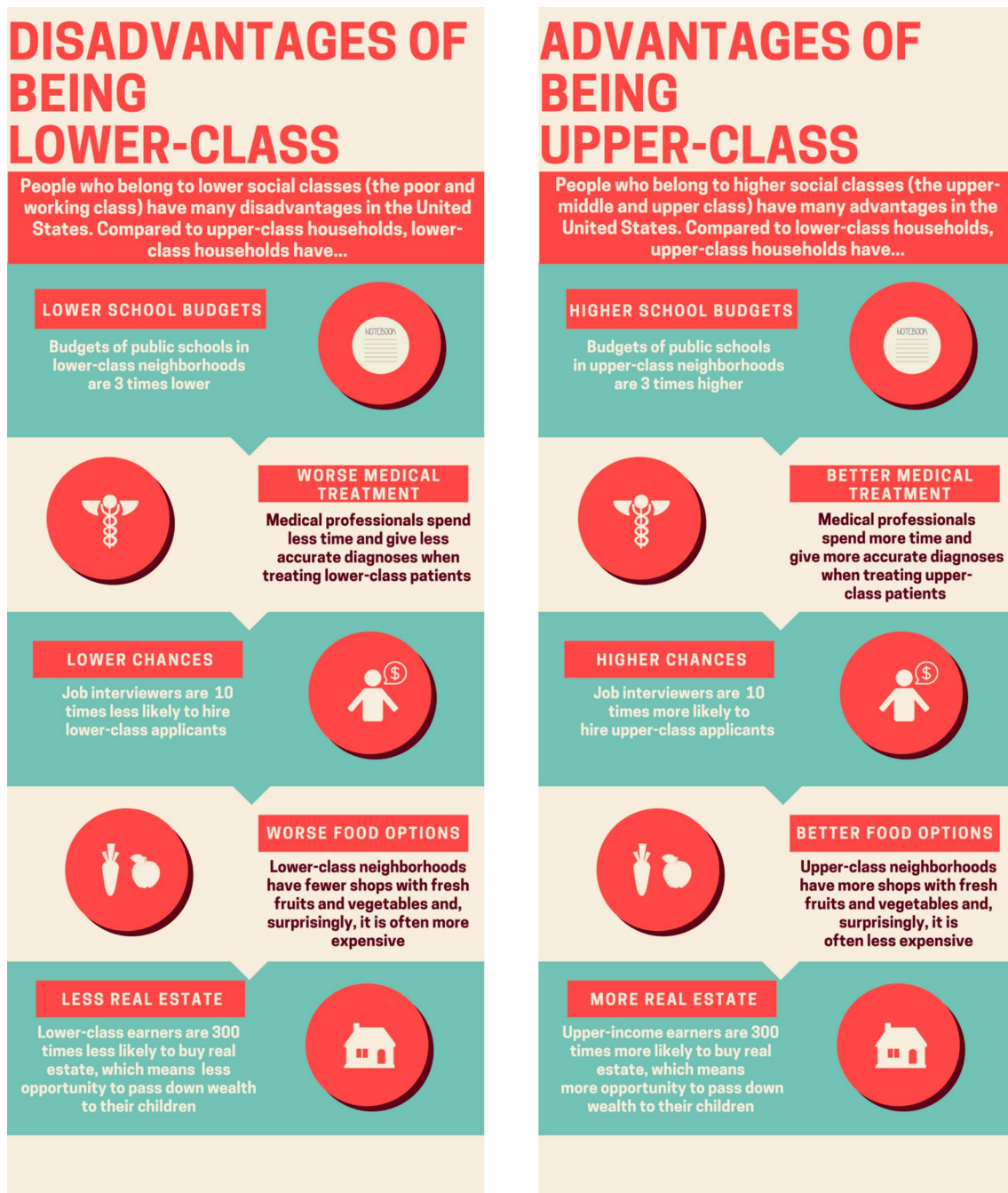


**Fig. 2 | Raincloud plots with jittered data for respondents' views on government efficacy to reduce poverty (that is, reduce disadvantages) or to reduce the gap between the rich and everyone else (that is, reduce advantages).** The respondents were randomly assigned to answer one of the two questions, which provided the manipulation of policy framing. Respondents who were asked about how much government policies and programmes can do to reduce poverty (bottom) expressed more support than respondents asked about reducing the gap between the rich and everyone else (top) ( $N=1384$ ;  $B=-0.19$ ;  $t=-3.49$ ;  $P<0.001$ ; 95% CI,  $(-0.29, -0.08)$ ). The dotted areas indicate the raw data, and the solid areas indicate the data distributions. The black diamonds signify the means for each question; the black lines signify the 95% CIs around the means.

antecedent process and examine how the framing of economic inequality may influence support for action to reduce inequality.

To provide a tightly controlled test of how economic inequality framing influences support for action, in Study 2 we randomly distributed infographics with information about economic inequality (Fig. 3) framed as either lower-class disadvantages or upper-class advantages and measured individuals' reported willingness to take collective action. Across conditions, the two infographics provided identical information about US economic inequality, except that one infographic framed inequality as upper-class advantages (the advantage frame) and one as lower-class disadvantages (the disadvantage frame). The participants then filled out a questionnaire and reported their willingness to take collective action. Given the class-based variability in judgements of government efficacy in Study 1 and Americans' complex views on government involvement (for example, redistribution policies) to address economic inequality<sup>30</sup>, we chose two actions that do not rely on government involvement but instead relate to increasing awareness and activism in one's community. The participants reported their likelihood (1 = extremely unlikely, 7 = extremely likely) of (a) sharing the infographic on social media and (b) attending a protest about reducing income inequality in the United States. Consistent with the results of Study 1, we hypothesized that the disadvantage frame would garner more support for collective action to reduce economic inequality than the advantage frame.

We conducted this study in two samples. Study 2a ( $N=315$ ) was conducted online on Amazon's Mechanical Turk (MTurk) crowdsourcing platform to access a more diverse sample than most college student pools<sup>31</sup>. However, upper-middle-class and



**Fig. 3 | Infographic about economic inequality with either a disadvantage frame or an advantage frame.** MTurk workers (Study 2a,  $N=272$ ), park-goers in New York City (Study 2b,  $N=75$ ) and a nationally representative sample of Americans (Study 3,  $N=1,780$ ) were randomly assigned to read an infographic about economic inequality with either a disadvantage frame (left) or an advantage frame (right). The infographic referred to low-income and high-income instead of lower-class and upper-class in Study 2a. Note that the information describing different forms of economic inequality displayed in the infographic was chosen for simplicity and ease of communication (from news articles and other online sources) but the information has not been fact-checked.

upper-class individuals are underrepresented on MTurk, compared with the general population. To provide a sample of relatively higher-socio-economic-status individuals, Study 2b ( $N=100$ ) sought to replicate the results by sampling from visitors to Washington Square Park, a wealthy area in New York City (median ZIP-code income, US\$104,561; ref. <sup>32</sup>); indeed, this successfully boosted the proportion of self-reported upper-middle-class and upper-class individuals to 38.96% in Study 2b (from 10.66% in Study 2a). The procedure and materials paralleled those of Study 2a except that Study 2b was conducted in-person instead of online.

We again conducted linear regression adjusting for the participants' demographics. As predicted, in both samples, individuals exposed to an infographic explaining economic inequality as lower-class disadvantages (as opposed to upper-class advantages) reported a greater likelihood of engaging in collective action against economic inequality (Study 2a:  $B=-0.408$ ;  $t=-2.004$ ;  $P=0.046$ ; 95% CI,  $(-0.809, -0.007)$ ;  $f^2=0.013$ ; Study 2b:  $B=-0.986$ ;  $t=-2.608$ ;  $P=0.011$ ; 95% CI,  $(-1.742, -0.231)$ ;  $f^2=0.080$ ). We tested whether ideology moderated the framing effect of Study 2a (the participants' ideology was not measured in Study 2b), but no

significant interaction emerged ( $P=0.480$ ). No significant social class interactions emerged in either study; however, these results should be treated tentatively given the small social class subsamples (see the Supplementary Information for the details).

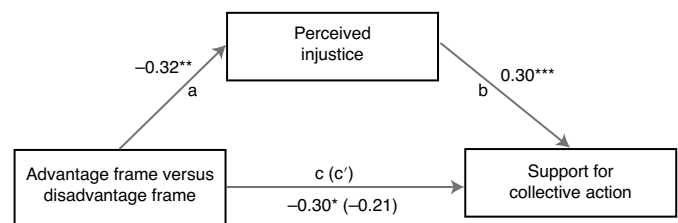
**Study 3.** Studies 2a and 2b provide consistent evidence that framing information about economic inequality as lower-class disadvantages motivates individuals to support collective action more than framing economic inequality as wealthy people's advantages, an effect that appears in a predominantly lower-class sample as well as in a wealthier sample. But why may this be the case? Decades of research in collective action reveals that one of the most potent precursors to support for collective action is perceptions that the situation is unjust<sup>27,33</sup>. Thus, in Study 3 (and Study 5) we investigate the potential mediating role of injustice appraisals. On the basis of this prior work, we test whether economic inequality framed as lower-class disadvantages is perceived as more unjust than an upper-class advantage frame, and whether this potentially explains why the disadvantage frame motivates greater support for action to reduce inequality.

While an individual's own social class did not impact the observed effects of Studies 1–2 (except government efficacy judgements in Study 1), a substantial body of intergroup relations research underscores the importance of one's group membership in reactions to group-based advantages/disadvantages<sup>19</sup>. As such, Study 3 aimed to provide a stringent test of whether social class moderates the effect of inequality framing on support for collective action by recruiting equal numbers of lower-class and upper-class participants within the same nationally representative online sample ( $N=1,861$ ; NORC's AmeriSpeak Panel). The methods were similar to those of Study 2: the participants were randomly assigned to read one of the two infographics varying in the framing of economic inequality (Fig. 3) and then reported their perceptions that social class inequality in the United States is unjust and, as in Study 2, their support for collective action to reduce economic inequality.

First, we used weighted linear regression to test for a framing effect on support for collective action to reduce economic inequality, adjusting for the participants' demographics. Consistent with the results of Study 2, the results revealed that individuals exposed to the disadvantage frame expressed more support for collective action than individuals exposed to the advantage frame ( $B=-0.298$ ;  $t=-2.459$ ;  $P=0.014$ ; 95% CI,  $(-0.537, -0.060)$ ;  $f^2=0.007$ ). We tested whether social class or political ideology moderated the observed effects, but we again found no significant moderation by either variable ( $P=0.699$  and  $P=0.107$ , respectively).

Next, we tested the hypothesis that individuals support more collective action in response to the lower-class disadvantage frame because this framing leads economic inequality to be perceived as more unjust. We conducted a weighted mediational analysis with structural equation modelling<sup>34,35</sup>. The results of this analysis are presented in Fig. 4. Individuals indeed perceived social class inequality as more unjust if the infographic framed inequality as lower-class disadvantages, compared with upper-class advantages ( $B=-0.318$ ;  $t=-3.204$ ;  $P=0.001$ ; 95% CI,  $(-0.513, -0.123)$ ;  $f^2=0.011$ ). We also found a significant positive association between perceptions of injustice and support for collective action ( $B=0.301$ ;  $t=7.581$ ;  $P<0.001$ ; 95% CI,  $(0.223, 0.379)$ ,  $f^2=0.057$ ). As shown in Fig. 3, the direct effect of inequality framing on collective action is no longer significant if the influence of injustice perceptions is accounted for in the model ( $B=-0.209$ ;  $t=-1.774$ ;  $P=0.076$ ; 95% CI,  $(-0.441, 0.022)$ ). Indeed, perceptions of injustice served as a statistical mediator of the effect of inequality framing on collective action support (indirect effect:  $B=-0.094$ ;  $t=-2.919$ ;  $P=0.004$ ; 95% CI,  $(-0.156, -0.031)$ ).

Overall, these results demonstrate that across a nationally representative sample of lower-class and upper-class Americans,



**Fig. 4 | Relationship between economic inequality framing and support for collective action, mediated by perceived injustice.**

The relationship between economic inequality framing and support for collective action, mediated by perceived injustice in Study 3 ( $N=1,780$ ; a path, which represents the association between injustice perceptions as the criterion variable and framing condition as a predictor:  $B=-0.32$ ;  $t=-3.20$ ;  $P=0.001$ ; 95% CI,  $(-0.51, -0.12)$ ; b path, which represents the association between support for collective action as the criterion variable and condition and injustices perceptions as predictors:  $B=0.30$ ;  $t=7.58$ ;  $P<0.001$ ; 95% CI,  $(0.22, 0.38)$ ; c path, which represents the association between support for collective action as the criterion variable and framing condition as a predictor:  $B=-0.30$ ;  $t=-2.46$ ;  $P=0.014$ ; 95% CI,  $(-0.54, -0.06)$ ; c' path, which represents the effect of framing condition on support for collective action controlling for injustice perceptions:  $B=-0.21$ ;  $t=-1.77$ ;  $P=0.076$ ; 95% CI,  $(-0.44, 0.02)$ ). The point estimates are calculated adjusting for covariates (that is, social class, age, gender, ethnicity and ideology), and the analyses were weighted according to the guidelines provided by the study administrator (NORC's AmeriSpeak). The value in parentheses (in the figure) represents the direct effect after the inclusion of the mediator. \* $P<0.05$ , \*\* $P<0.01$ , \*\*\* $P<0.001$ .

inequality framed as lower-class disadvantages is more likely to marshal support for collective action than inequality framed as upper-class advantages. This effect occurs independently of the participants' social class or political ideology. In addition, mediation analyses reveal that the effect of economic inequality framing on support for collective action is partly driven by heightened perceptions of injustice in response to the lower-class disadvantage frame.

**Study 4.** Across a variety of study populations, from nationally representative samples to pedestrians in a city park, Studies 1–3 reveal that individuals express more support for disadvantage-reducing (versus advantage-reducing) policy and for reducing economic inequality framed as lower-class disadvantages (versus upper-class advantages). However, it is not yet clear whether the disadvantage frame increased support relative to the baseline or whether the advantage frame decreased support relative to the baseline (or whether both effects occurred). Study 4 thus includes a control frame to ascertain baseline levels of engagement with inequality information.

Study 4 moves beyond 'the lab' to investigate whether a newspaper headline framing inequality as lower-class disadvantages (versus upper-class advantages or a neutral control frame) gets distributed more widely online on the most popular social networking website, Facebook<sup>36</sup>. We created different versions of a sponsored post presenting a headline about economic inequality and tested them against each other to assess which version reached the most users. There are some limitations to this approach: Facebook evaluates the statistical significance of the event (that is, Facebook's proprietary algorithm determines which headline 'wins') but does not allow us to directly evaluate the statistical significance of the difference between each pair of ads. However, this approach is ecologically valid, as the results are equivalent to what other ad buyers (for example, organizers, leaders and politicians) would use to optimize online communications on this topic.

## Advantage ad



Rich Americans live up to 15 years longer than poor peers. According to scientists this is due to increasing income inequality and the health insurance system.



NYU.QUALTRICS.COM

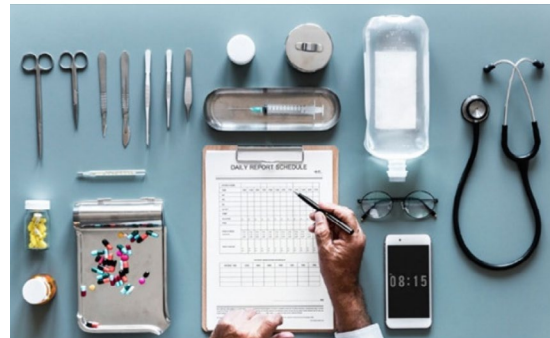
**Rich Americans live up to 15 years longer than poor peers, studies find**

Like Comment Share

## Disadvantage ad



Poor Americans live up to 15 years shorter than rich peers. According to scientists this is due to increasing income inequality and the health insurance system.



NYU.QUALTRICS.COM

**Poor Americans live up to 15 years shorter than rich peers, studies find**

Like Comment Share

## Control ad



Studies find a 15-year difference in life expectancy between Americans based on income. According to scientists this is due to increasing income inequality and the health insurance system.



NYU.QUALTRICS.COM

**Studies find a 15-year difference in life expectancy between Americans based on income**

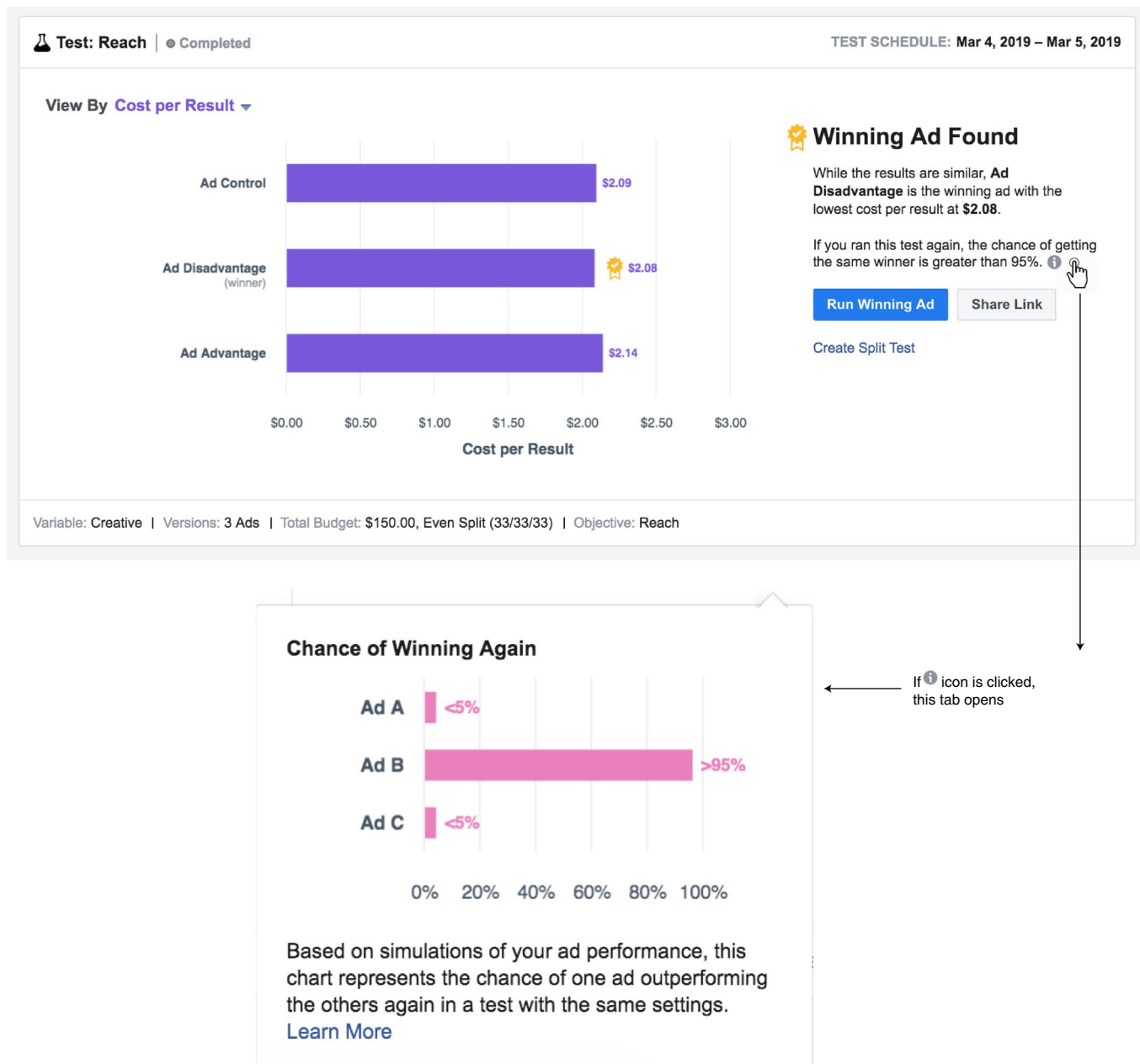
Like Comment Share

**Fig. 5 | The Facebook ads used in Study 4a ( $N = 72,324$ ) and Study 4b ( $N = 67,491$ ).** The advantage (top left) and disadvantage (top right) ads used in Study 4a and Study 4b. The control ad used in Study 4b is shown below. In Study 4a, the control ad headline read: “Studies find a 15-year difference in life expectancy between poor and rich Americans”. Facebook users were randomly assigned to view one of the three ads (advantage ad, disadvantage ad, or control ad) embedded in their newsfeed marked as sponsored content. Photo by rawpixel/Unsplash.

We created advertisements with different inequality frames (advantage, disadvantage, and control) that were randomly assigned to appear in users’ newsfeeds (Fig. 5). The headline in the advantage frame was taken directly from a major newspaper article: “Rich Americans live up to 15 years longer than poor peers, studies find”<sup>37</sup>. We then created additional headlines: “Poor Americans live up to 15 years shorter than rich peers, studies find” (disadvantage frame), “Studies find a 15-year difference in life expectancy between poor and rich Americans” (control frame, Study 4a) and “Studies find a 15-year difference in life expectancy based on income” (control frame, Study 4b). Study 4b was a preregistered replication of Study 4a with a slight modification of the control frame wording to ensure

that the word order (that is, mentioning “poor” before “rich”) did not inadvertently resemble a disadvantage frame.

We tested the effectiveness of each ad by creating a ‘split test’ (that is, a randomized experiment) on Facebook. A split test shows the different ads to randomly assigned, demographically equivalent audiences to determine a ‘winning ad’. The exact algorithm that Facebook uses to determine the winning ad is proprietary and unavailable to the public. In simplified terms, the reach increases (and the cost of running the ad decreases) if users, particularly users with large friend networks, engage with an ad (for example, spend time viewing, reacting to, liking, commenting on, sharing or clicking on the ad). On the basis of this feedback, Facebook’s algorithm gives higher priority to ads with



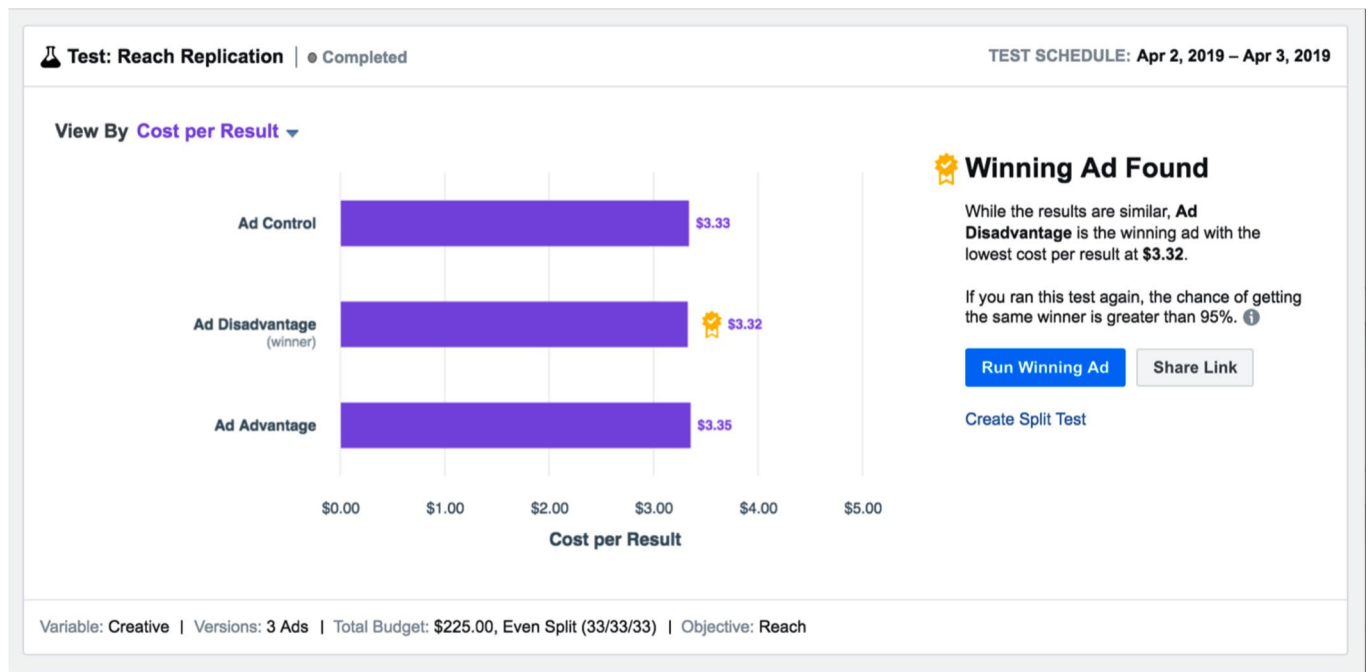
**Fig. 6 | Results from Study 4a (N = 72,324).** Facebook determined the ad framing economic inequality in terms of disadvantages (the disadvantage ad) to be the winner with the lowest cost per 1,000 people reached (top). Further information provided by Facebook about the chance of replication if you click on the information icon (bottom).

more engagement and distributes them more widely (for example, to users’ friend networks), which in turn increases unique views (that is, the reach) and decreases the cost.

*Study 4a.* We ran the split test for 24 hours and Facebook determined the disadvantage ad to be the winner—it had the lowest cost per 1,000 people reached (that is, it distributed the information most cost-effectively). In addition, Facebook determined that the disadvantage ad has a 95% chance of outperforming the other ads in a replication of the test (Fig. 6). In a single day, the disadvantage ad reached 623 (2.66%) more people than the advantage ad (which was the least effective ad). The disadvantage ad also outperformed the control ad, albeit by a much smaller margin (it reached 134 or 0.56% more people). Thus, the ad that framed economic inequality as disadvantages faced by lower-class Americans reached the broadest

audience in the most cost-effective manner (see Supplementary Figs. 1–3 for more details on the reach metric).

*Study 4b.* For the preregistered replication study, we again ran a split test on Facebook for 24 hours. Replicating the previous result and consistent with the preregistered hypothesis, Facebook determined the disadvantage ad the winner—it had the lowest cost per 1,000 people reached (Fig. 7). Again, Facebook calculated that the disadvantage ad had a greater than 95% chance of outperforming the other ads if the test was conducted again. In terms of absolute numbers, the disadvantage ad reached 180 (0.08%) more people than the advantage ad, which again reached the fewest people. The control ad reached 81 (0.03%) fewer people than the disadvantage ad and 99 (0.04%) more people than the advantage ad, again performing second best in terms of reach (see Supplementary Figs 1–3 for more details).



**Fig. 7 | Results from Study 4b ( $N = 67,491$ ).** Facebook determined the ad framing economic inequality in terms of disadvantages (the disadvantage ad) to be the winner with the lowest cost per results.

In sum, Study 4b provides a preregistered replication of the framing effect observed in Study 4a: a news headline framing economic inequality as disadvantages faced by lower-class Americans increases the potential virality of the message (it reached the most people) compared with a rich advantage frame or control frame. On the basis of these results, an individual or an organization (for example, a newspaper, non-profit, or think tank) publishing this content would be advised to frame economic inequality as lower-class disadvantages if they sought to reach the maximum number of people with their message. This finding dovetails with the results of Studies 1–3, while also extending the findings from self-report measures to behavioural engagement in a real-world setting.

**Study 5.** Across Studies 2–4, we provide evidence that economic inequality framed as lower-class disadvantages increases Americans' engagement with and concern for the issue. However, thus far, our experimental materials (that is, infographics and Facebook ads) have described at least one outcome of economic inequality that was related to health. Human life and related factors such as health and medical care are considered by many to be 'sacred values'—values that are absolute and not subject to trade-offs<sup>38</sup>. If health-related inequalities are seen as compromising these sacred values, a violation of this kind could elicit severe moral outrage (that is, affective injustice), which could explain the motivation to act to help the disadvantaged<sup>39,40</sup>. Thus, in Study 5 we sought to disambiguate whether the documented effect only occurs due to the perceived injustice of health-based inequalities or whether the results replicate without the salience of health-related disparities. We hypothesized that the effect is not driven by health-related inequality framing in particular but by economic inequality framing more generally.

Study 5 ( $N = 1,112$ ) was a preregistered experiment conducted online on the Prolific Academic crowdsourcing platform<sup>41</sup>. The methods were almost identical to those used in Study 3; however, the individuals were exposed to a shortened version of the lower-class disadvantage (versus upper-class advantage) infographic that did not include the health-related piece of information, and individuals from all social classes were included in the sample.

Consistent with previous results and our preregistered hypothesis, individuals exposed to the lower-class disadvantage infographic (compared with the upper-class advantage infographic) expressed more support for collective action ( $B = -0.248$ ;  $t = -2.424$ ;  $P = 0.016$ ; 95% CI,  $(-0.449, -0.047)$ ;  $f^2 = 0.005$ ), controlling for the participants' demographic characteristics. Again, neither advantaged class membership ( $P = 0.349$ ) nor disadvantaged class membership ( $P = 0.830$ ) nor ideology ( $P = 0.331$ ) significantly moderated the effect of inequality framing. We then tested for the same mediation process model as in Study 3. Replicating the effects of Study 3, the participants reported that inequality was more unjust if they were exposed to lower-class disadvantages (versus upper-class advantages) ( $B = -0.164$ ;  $t = -2.171$ ;  $P = 0.030$ ; 95% CI,  $(-0.313, -0.016)$ ;  $f^2 = 0.003$ ). We also replicated the significant positive association between perceptions of injustice and support for collective action ( $B = 0.519$ ;  $t = 13.385$ ;  $P < 0.001$ ; 95% CI,  $(0.443, 0.596)$ ;  $f^2 = 0.139$ ). Finally, we replicated the finding that the direct effect of inequality framing on collective action is not significant if the influence of perceived injustice is accounted for in the model ( $B = -0.163$ ;  $t = -1.716$ ;  $P = 0.086$ ; 95% CI,  $(-0.348, 0.023)$ ). In sum, perceptions of injustice again served as a mediator of the effect of inequality framing on collective action support (indirect effect:  $B = -0.085$ ;  $t = -2.157$ ;  $P = 0.031$ ; 95% CI,  $(-0.163, -0.008)$ ).

## Discussion

Using diverse methodologies, representative national samples and preregistered hypotheses, the present research finds that Americans are more supportive of policy framed as reducing disadvantages faced by lower-class Americans, more supportive of action to reduce economic inequality framed as lower-class disadvantages and more engaged online with a lower-class disadvantage frame, compared with an upper-class advantage frame or a neutral control frame. In addition, a representative sample of lower-class and upper-class Americans and a large preregistered replication experiment reveal that the lower-class disadvantage (versus upper-class advantage) frame is perceived as more unjust and that this difference in perceived injustice partially explains why the



disadvantage frame enhanced collective action support. While social class and ideology are important individual-difference factors that reliably predict reactions to economic inequality (see the Supplementary Information for the full regression tables), we do not find consistent moderation by social class or political ideology. We intentionally focused the outcome measures of Studies 2–5 on actions that are independent of government involvement and instead are collectively enacted within one's local community. The results of this work are thus applicable to organizers, leaders and politicians who may be motivated to mobilize average Americans, independent of their attitudes toward the government, political ideology and social class standing.

The present research is limited in important ways that should be addressed in future research. We provide an examination of the effects of both framing government policy (Study 1) and framing inequality itself (Studies 2–5), but more work is needed to clarify how these effects may interrelate with one another. For example, similar to research conducted in the domain of race<sup>21,23</sup>, economic inequality framed as upper-class advantages could elicit stronger support for policies perceived to reduce advantages (for example, support for government action to reduce the gap between the rich and everyone else) than a lower-class disadvantage frame or no frame. The sole other study<sup>24</sup> that also investigated the effect of economic inequality frames on support for government action provides support for this possibility. The authors found that framing economic inequality as rich people's advantages (versus poor people's disadvantages) led to more support for redistributive policies among conservatives, and importantly, the redistributive policies in question were advantage-reducing: new tax brackets for people who earn above US\$1 million and US\$5 million. While these results are interesting, more research is needed to understand why this would be the case (and why only for conservatives) and to understand the relationship between government-based policy frames and economic inequality frames more generally.

The results of the present research are consistent across contexts, samples and outcome measures; however, the sizes of the effects of inequality framing on support for collective action and engagement are relatively modest (the semipartial correlations between information framing and collective action support ranged from 0.07 to 0.27, which are considered small- to medium-sized effects in psychology<sup>42</sup>; in comparison, the semipartial correlations between collective action and ideology, our consistently strongest individual-difference predictor, ranged from 0.22 to 0.35). This is perhaps unsurprising, given the subtlety of the experimental manipulation—the information conveyed through the infographic and Facebook ads was the same, with only a few words differing across conditions—and given the relatively short study durations (and exposure time to information). However, even small to medium effect sizes are potentially impactful in the long run<sup>42</sup>. For example, in Study 4a, after 24 hours of data collection, the disadvantage ad had reached 623 more people than the advantage ad. This number could increase exponentially with each day as the audience reach of the ad continued to grow over time. Future research should test this possibility empirically, but the potential cumulative impact of information framing over time may be anything but trivial.

The present work identified one underlying factor that helps explain why a disadvantage frame garners more support for taking action: the disadvantage frame highlights the inequity of economic inequality. That is, we found that individuals across social classes responded to economic inequality framed as disadvantages faced by people living in poverty with greater reports that the inequality is inequitable or unjust. While past research has typically focused on the framing of inequality (that is, disparities between groups) or inequity (that is, disparities that are described as unjust) separately, the present work suggests that inequality framing can impact inequity judgements. The literature would benefit by delving further

into how perceptions of inequality and inequity may be interrelated and impact one another.

Overall, this work represents a large-scale investigation of economic inequality framing and the dissemination of information on the topic with emphasis on precision, generalizability and ecological validity. While messages about economic inequality often highlight the exuberant advantages and wealth of the 1%, the present research reveals that emphasizing the struggles of the economically disadvantaged may be more effective in mobilizing support for collective action to reduce inequality and provides insight into individuals' engagement with one of the most challenging issues of our time.

## Methods

The Institutional Review Board at New York University approved all study protocols. The participants in this research gave informed consent in accordance with the guidelines set forth by the Institutional Review Board at New York University. All data collected by the authors and all data analyses were performed blind to the conditions of the experiments.

**Study 1. Participants.** The data in Study 1 are based on telephone interviews conducted between 15 and 19 January 2014 among a national sample of adults living in all 50 US states and the District of Columbia ( $N = 1,504$ )<sup>28</sup>. We excluded 138 participants from the analysis due to missing data on one or more variables of interest. Thus, the final sample consisted of 1,384 participants (642 male, 742 female; aged 18–97, mean = 50.46, s.d. = 17.91). In the final sample, 77.19% of the participants identified as white/Caucasian, 10.11% as Black/African American, 4.19% as Hispanic/Latino, 2.46% as Asian/Asian American, 1.26% as Native American/American Indian, 2.73% identified multiple ethnicities and 2.06% specified another ethnicity, didn't know or refused to answer; 1.37% of the participants identified as lower class, 17.49% as lower-middle class, 48.27% as middle class, 23.63% as upper-middle class and 9.25% as upper class.

**Materials and procedure.** All interviews were conducted in English and Spanish (depending on the respondent's language preference). We conducted weighted analyses in Stata (version 15.1)<sup>43</sup> to correct for selection probability and non-response rates, which facilitates generalizable inferences. For detailed information on study weights and the full questionnaire, see the Pew Research website<sup>44</sup>. The respondents were randomly assigned to one of two forms. In form 1 (the advantage frame), the respondents answered the following two questions: "How much, if anything, should the government do to reduce the gap between the rich and everyone else?" and "How much do you think government policies and programs can do to reduce the gap between the rich and everyone else in this country?" (1 = nothing at all, 2 = not much, 3 = some, 4 = a lot). The respondents randomly assigned to form 2 (the disadvantage frame) answered the following two questions: "How much, if anything, should the government do to reduce poverty?" and "How much do you think government policies and programs can do to reduce poverty in this country?" The participants also answered questions about their demographics including age, gender, ethnicity, conservatism and social class categorization.

For consistency, we used the same demographic covariates (except ideology in Study 2b, which we did not collect) and a similar coding scheme for all demographic covariates across studies. Age and political conservatism were included as continuous variables. We dummy-coded gender (0 = male, 1 = female), as well as ethnicity (using white people as the reference group). Two dummy-coded variables reflected the respondents' identification as part of the advantaged (upper-middle class and upper class) or disadvantaged (lower-middle class and lower class) social classes, using the middle class as the reference group.

**Study 2a. Participants.** The participants in Study 2a were 315 workers on the MTurk crowdsourcing platform<sup>31</sup>. We calculated power to detect a traditionally small-to-medium effect size ( $d = 0.35$ ). The power analysis revealed that a sample size of 260 participants was required to achieve 80% power. Anticipating potential exclusions, we decided to collect a final sample of 300 participants. The data were collected between 12 and 13 June 2017. We restricted our sample to participants from the United States and excluded 11 participants who were not in the United States at the time of the study and 32 participants who were not raised in the United States. After these exclusions, the final sample consisted of 272 participants (167 female, 104 male, 1 other), aged between 18 and 70 (mean = 36.73, s.d. = 11.23). In the final sample, 73.90% of the participants identified as white/Caucasian American, 9.56% as Black/African American, 4.41% as Latino/a/Hispanic, 5.88% as Asian American, 1.47% as Native American, 4.41% specified multiple ethnicities and 0.37% specified another ethnicity; 6.62% of the participants identified as poor, 37.13% as working class, 45.59% as middle class, 10.29% as upper-middle class and 0.37% as upper class.

**Materials and procedure.** The participants were randomly assigned to read an infographic (500 × 1,250 pixels) presenting information about economic inequality framed as either low-income disadvantages or high-income advantages.

For example, in the advantage frame, the participants read that budgets of public schools in high-income neighbourhoods are three times higher than in low-income neighbourhoods. In the disadvantage frame, the participants read that budgets of public schools in low-income neighbourhoods are three times lower than in high-income neighbourhoods. In total, the infographic described five pieces of information about economic inequality that were framed as high-income advantages or low-income disadvantages. After reading the infographic, the participants reported how likely they would be to share the infographic on social media and the likelihood that they would participate in a protest or demonstration about reducing social class inequality in the United States (1 = extremely unlikely, 7 = extremely likely). Both items were averaged into a collective action composite ( $r = 0.49, P < 0.001$ ). We also assessed the individuals' ideology and social class. The social class category probe read as follows: "People talk about social classes such as the poor, the working class, the middle class, the upper-middle class, and the upper class. Which of these classes would you say you belong to?" This measure has been shown to intuitively and meaningfully capture group-based class distinctions in the United States<sup>45–47</sup>. We include this social class category measure in all remaining studies. The participants also reported their age, gender and ethnicity. Conservatism was assessed with one item: "I endorse many aspects of conservative political ideology" (1 = strongly disagree, 7 = strongly agree). Additional measures were included for exploratory purposes. We used the same demographic covariates as in Study 1, and the covariates were coded similarly to the coding scheme used in Study 1. As such, age and political conservatism were included as continuous variables. We dummy-coded gender (0 = male, 1 = female), as well as ethnicity (using white people as the reference group). Since we used a different social class category measure than in Study 1, we created two comparable social class dummy variables (disadvantaged class = working class and poor; advantaged class = upper-middle class and upper class), again using the middle class as a reference group.

**Study 2b. Participants.** One hundred participants were recruited in a public park to participate in Study 2b. We decided a priori to collect 100 participants, considering the challenges of in-person field data collection and given that prior work used similar sample sizes<sup>23</sup>. The data were collected between 30 August and 13 September 2017. Seven participants were excluded from the data analysis because they conversed with another person while completing the survey, 15 participants were excluded because they were not US citizens or residents (for example, foreign tourists) and 3 participants were excluded because they had missing data on one of the variables of interest. The final sample consisted of 75 participants (45 female, 30 male), aged between 18 and 78 (mean = 23.20, s.d. = 9.12). In the final sample, 38.66% of the participants identified as white/Caucasian American, 10.67% as Black/African American, 13.33% as Latino/a/Hispanic, 24.00% as Asian American, 2.67% as Native American, 4.00% specified multiple ethnicities and 6.67% specified another ethnicity; 2.67% of the participants identified as poor, 14.67% as working class, 44.00% as middle class, 32.00% as upper-middle class and 6.67% as upper class.

**Materials and procedure.** The materials and procedure were similar to those of Study 2a. The research assistants approached individuals who were sitting or walking in Washington Square Park in New York City and asked them to participate in a short study in exchange for a snack of their choice (candy, water or a can of soda). The participants were randomly assigned to view a laminated infographic (10 × 15 inches) presenting information about economic inequality framed in terms of either lower-class disadvantages or upper-class advantages (Fig. 1). The infographics were identical to those used in Study 2a, except that we switched the words 'high-income' and 'low-income' for the words 'upper social class' and 'lower social class' to test for the generalizability of language around economic inequality. After the participants finished reading the infographic, they were asked to fill out a paper questionnaire that included our dependent variables of interest, among other exploratory questions. We assessed the participants' support for collective action against economic inequality with the same two items as in Study 2a (that is, the likelihood of sharing the infographic on social media and the likelihood of attending a protest against economic inequality). Both items were averaged into a collective action composite ( $r = 0.44, P < 0.001$ ). Demographic variables (age, gender and ethnicity) were assessed as in Study 2a, although we did not assess ideology. As in Study 2a, we used the social class category measure<sup>45</sup> to assess social class. We used the same demographic covariates as in Study 2a (except ideology, which we did not collect), and all covariates were coded as in Study 2a.

**Study 3. Participants.** The data for Study 3 were collected as part of the Time-sharing Experiments for the Social Sciences programme (TESS; NSF grant no. 0818839, J. Freese and J. N. Druckman, principal investigators), which allowed us to conduct a study using NORC's AmeriSpeak Panel to recruit a national sample of upper-class and lower-class participants. Prior studies testing similar effects of racial inequality framing and/or moderation of membership in the advantaged/disadvantaged groups reveal small to medium effect sizes (that is,  $\eta_p^2$  ranging from 0.02 to 0.09 and Cohen's  $d$  from 0.29 to 0.49). A power analysis revealed that a sample size of 1,302 participants was required for 95% power to detect a small effect. To account for potential exclusions, we requested a national sample of 1,500

participants comprising equal numbers of people who identify as lower social class (poor and working class) and higher social class (upper-middle and upper class). The TESS programme administrators allowed us to recruit a total of 1,800 participants. The study was fielded between 8 February and 12 March 2018 with a final sample of 1,816 adults, living in all 50 US states. Thirty-six participants were excluded from the analysis due to missing data on one of the variables of interest. Thus, the final sample consisted of 1,780 participants (880 female, 900 male; aged 18–90, mean = 47.49, s.d. = 16.23). In the final sample, 68.60% of participants identified as white/Caucasian American, 10.34% as Black/African American, 13.76% as Latino/a/Hispanic, 2.70% as Asian American, 3.15% specified multiple ethnicities and 1.46% specified another ethnicity. Because we were interested in responses from individuals identifying as lower class and upper class, this study specifically recruited participants who identified as poor and working class as well as those identifying as upper-middle and upper class (that is, the sample did not include those who identified as middle class). In the final sample, 12.02% of participants identified as poor, 44.66% as working class, 40.22% as upper-middle class and 3.09% as upper class.

**Materials and procedure.** The experimental design went through rigorous prefielding peer review as part of the funding process (for the full dataset and proposal, see <https://osf.io/nj5dx/>). We conducted weighted analyses in Stata (version 15.1) to correct for selection probability and non-response rates. The materials and procedure were similar to those of Study 2. The participants were randomly assigned to read an infographic (500 × 1,250 pixels) highlighting economic inequality in terms of either lower-class disadvantages or upper-class advantages. The infographics were identical to those used in Study 2b (Fig. 3). After the participants read the infographic, we assessed their support for collective action against economic inequality with the same two items as in Study 2 (that is, the likelihood of sharing the infographic on social media and the likelihood of attending a protest against economic inequality). Both items were averaged into a collective action composite (weighted  $r = 0.62, P < 0.001$ ). Injustice appraisals were assessed with one item: "The level of social class inequality in the United States is unjust" (1 = strongly disagree, 7 = strongly agree). Additional measures were included for exploratory purposes (see the full dataset and proposal). As in Study 2, we assessed social class with the social class category measure. Again, the participants reported their gender, age, ethnicity and political ideology (1 = extremely liberal, 7 = extremely conservative). Since middle-class individuals were not included in Study 3, we created a comparable binary social class dummy variable (0 = working class and poor, 1 = upper-middle class and upper class). We used the same demographic covariates as in Study 2, and all covariates were coded as in Study 2 (except the binary social class covariate).

**Study 4a. Participants.** Our audience for Study 4a (that is, individuals who would be randomly assigned to the ad manipulation) was composed of adult Facebook users (aged 18+), located in the United States, who accessed the newsfeed feature on desktops to ensure that the ads appeared correctly. An individual user could see only one of the ad versions and, to count as a unique view, each user could see it only once. A total of 72,324 users were presented with the ads between 4 and 5 March 2019. We set our ad budget to US\$150, which allowed for estimated 95% power to detect a frame effect (that is, the likelihood of detecting a difference in the ad versions, if there is one to detect, as calculated by Facebook).

**Materials and procedure.** We used Facebook's ad manager to create the three different advertisements to run a split test. In a split test, ads are tested against each other to determine which ad performs best in terms of the marketing objective. We selected reach as our marketing objective because we considered this to be the best proxy for measuring the potential for collective engagement. This objective tests which ad reaches the maximum number of unique users. The reach increases if users (particularly those who have large friend networks) engage with the ad. The potential audience is divided into random, non-overlapping samples for accurate split test results. At the end of the testing period, Facebook determines the winning ad by calculating the cost for each ad to reach 1,000 people (Facebook can also declare no winner, if the ads perform equally well). In addition, Facebook reports the absolute number of people reached by each ad. Precisely how Facebook's algorithm weights different engagement variables (for example, viewing, sharing and liking) to determine the winning ad is unknown to the public. For a recent example of the complexity involved in split test optimization and attribution algorithms, see ref.<sup>48</sup>

As an ad format, we used a single-image advertisement, which included a headline, descriptive text, an image and a website URL (Supplementary Fig. 4). Each ad was labelled as sponsored content. We used the same free stock image and NYU Qualtrics URL for each ad. If users clicked on the ad, they were forwarded to a form, which included the contact information of the researchers.

**Study 4b. Participants.** Our audience for Study 4b was adult Facebook users (aged 18+) located in the United States. As in Study 4a, each user saw one version of the ad, once. On the basis of the results of Study 4a, we set the budget to US\$225 to aim to reach a sample of 100,000 people within a 24-hour period; at the end of the 24 hours (from 2 to 3 April 2019), a total sample of 67,491 users had been presented with the ads.

**Materials and procedure.** The materials were identical to those in Study 4a, except that in the control frame, we removed any reference to poor or rich people (that is, “between poor and rich Americans” was replaced with “between Americans based on income”; Fig. 5). Before the data collection began, we preregistered our procedure and our hypothesis that Facebook would determine the disadvantage as the winner on Open Science Framework (OSF; <https://osf.io/ewt8r>).

**Study 5. Participants.** In anticipation that the revised infographic used in Study 5 might represent a somewhat weaker manipulation than the prior studies’ infographic (it is shorter and includes fewer pieces of information about inequality), we chose to calculate power on the basis of a traditionally small effect size (Cohen’s  $f = 0.010$ ). A power analysis revealed that a sample size of 1,054 participants was required for 90% power to detect a small effect of inequality framing on support for collective action. Consistent with our previous studies, we planned to exclude participants who were not raised in the United States; we therefore oversampled and opened the survey to 1,100 participants. The initial sample included 1,112 workers on the Prolific Academic crowdsourcing platform, who participated in the study on 19 February 2020. We excluded 65 participants who were not raised in the United States. After these exclusions, the final sample consisted of 1,047 participants (558 female, 485 male, 4 other), aged between 18 and 82 (mean = 36.16, s.d. = 13.06). In the final sample, 73.93% of the participants identified as white/Caucasian American, 7.45% as African American, 5.16% as Latino/a/Hispanic, 5.92% as Asian American, 0.67% as Native American, 6.11% specified multiple ethnicities and 0.76% specified another ethnicity; 8.89% of participants identified as poor, 37.00% as working class, 40.44% as middle class, 13.00% as upper-middle class and 0.67% as upper class.

**Materials and procedure.** The materials were identical to those in Study 3, except that we removed one piece of information from the infographics—the item that described differences in health outcomes (“Medical professionals spend more [less] time and give more [less] accurate diagnoses when treating upper-class [lower-class] patients”). Thus, the revised infographic presented four (not five, as was the case in Studies 2 and 3) pieces of information, framed as either upper-class advantages or lower-class disadvantages (Supplementary Fig. 5). Before we began the data collection, we preregistered our procedure and our hypothesis that the lower-class disadvantage infographic (compared with the upper-class advantage infographic) would increase support for collective action on OSF on 18 February 2020 (<https://osf.io/btz96>).

**Reporting Summary.** Further information on research design is available in the Nature Research Reporting Summary linked to this article.

## Data availability

All data and materials have been made publicly available via the Open Science Framework and can be accessed at <https://osf.io/f9sr7/>.

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## References

- Piketty, T. in *Inequality in the 21st Century* (eds Grusky, D. & Hill, J.) 43–48 (Avalon, 2017).
- Wilkinson, R. G. & Pickett, K. *The Spirit Level: Why Equality Is Better for Everyone* (Penguin, 2010).
- Sanders, B. Issues: income and wealth inequality. *Bernie Sanders* <https://berniesanders.com/issues/income-and-wealth-inequality/> (2017).
- Alvaredo, F., Chancel, L., Piketty, T., Saez, E. & Zucman, G. *World Inequality Report: Executive Summary* (World Inequality Database, 2018); <https://wir2018.wid.world/files/download/wir2018-summary-english.pdf>
- Lawson, M., et al. *Public Good or Private Wealth*. (Oxfam GB, 2019).
- Telford, T. Income inequality in America is the highest it’s been since Census Bureau started tracking it, data shows. *The Washington Post* <https://www.washingtonpost.com/business/2019/09/26/income-inequality-america-highest-its-been-since-census-started-tracking-it-data-show/> (26 September 2019).
- Hastings, O. P. Who feels it? Income inequality, relative deprivation, and financial satisfaction in U.S. states, 1973–2012. *Res. Soc. Stratif. Mobil.* **60**, 1–15 (2019).
- Buttrick, N. R. & Oishi, S. The psychological consequences of income inequality. *Soc. Pers. Psychol. Compass* **11**, e12304 (2017).
- Oishi, S., Kesebir, S. & Diener, E. Income inequality and happiness. *Psychol. Sci.* **22**, 1095–1100 (2011).
- Jost, J. T., Banaji, M. R. & Nosek, B. A. A decade of system justification theory: accumulated evidence of conscious and unconscious bolstering of the status quo. *Polit. Psychol.* **25**, 881–919 (2004).
- Bartels, L. M. *Unequal Democracy: The Political Economy of the New Gilded Age* (Princeton Univ. Press, 2010).
- Savani, K. & Rattan, A. A choice mind-set increases the acceptance and maintenance of wealth inequality. *Psychol. Sci.* **23**, 796–804 (2012).
- McCall, L., Burk, D., Laperrrière, M. & Richeson, J. A. Exposure to rising inequality shapes Americans’ opportunity beliefs and policy support. *Proc. Natl. Acad. Sci. USA* **114**, 9593–9598 (2017).
- Levitin, M. The triumph of Occupy Wall Street. *The Atlantic* <https://www.theatlantic.com/politics/archive/2015/06/the-triumph-of-occupy-wall-street/395408/> (2015).
- Tversky, A. & Kahneman, D. The framing of decisions and the psychology of choice. *Science* **211**, 453–458 (1981).
- Tversky, A. & Kahneman, D. in *Choices, Values, and Frames* (eds Kahneman, D. & Tversky, A.) 209–223 (Cambridge Univ. Press, 2000).
- Chong, D. & Druckman, J. N. Framing theory. *Annu. Rev. Polit. Sci.* **10**, 103–126 (2007).
- Swim, J. K. & Miller, D. L. White guilt: its antecedents and consequences for attitudes toward affirmative action. *Pers. Soc. Psychol. Bull.* **25**, 500–514 (1999).
- Iyer, A., Leach, C. W. & Crosby, F. J. White guilt and racial compensation: the benefits and limits of self-focus. *Pers. Soc. Psychol. Bull.* **29**, 117–129 (2003).
- Powell, A. A., Branscombe, N. R. & Schmitt, M. T. Inequality as ingroup privilege or outgroup disadvantage: the impact of group focus on collective guilt and interracial attitudes. *Pers. Soc. Psychol. Bull.* **31**, 508–521 (2005).
- Lowery, B. S., Chow, R. M., Knowles, E. D. & Unzueta, M. M. Paying for positive group esteem: how inequity frames affect whites’ responses to redistributive policies. *J. Pers. Soc. Psychol.* **102**, 323–336 (2012).
- Phillips, L. T. & Lowery, B. S. The hard-knock life? Whites claim hardships in response to racial inequity. *J. Exp. Soc. Psychol.* **61**, 12–18 (2015).
- Lowery, B. S., Chow, R. M. & Crosby, J. R. Taking from those that have more and giving to those that have less: how inequity frames affect corrections for inequity. *J. Exp. Soc. Psychol.* **45**, 375–378 (2009).
- Chow, R. M. & Galak, J. The effect of inequality frames on support for redistributive tax policies. *Psychol. Sci.* **23**, 1467–1469 (2012).
- Phillips, L. T. I ain’t no fortunate one: on the motivated denial of class and race privilege. *Acad. Manage. Proc.* **2015**, 19158 (2015).
- Brown, R. M. & Craig, M. A. Intergroup inequality heightens reports of discrimination along alternative identity dimensions. *Pers. Soc. Psychol. Bull.* **46**, 869–884 (2020).
- van Zomeren, M., Postmes, T. & Spears, R. Toward an integrative social identity model of collective action: a quantitative research synthesis of three socio-psychological perspectives. *Psychol. Bull.* **134**, 504–535 (2008).
- January 2014 Political Survey* (Pew Research Center, 2014).
- Gilens, M. *Affluence and Influence: Economic Inequality and Political Power in America* (Princeton Univ. Press, 2012).
- McCall, L. & Kenworthy, L. Americans’ social policy preferences in the era of rising inequality. *Perspect. Polit.* **7**, 459–484 (2009).
- Buhrmester, M., Kwang, T. & Gosling, S. D. Amazon’s Mechanical Turk: a new source of inexpensive, yet high-quality, data? *Perspect. Psychol. Sci.* **6**, 3–5 (2011).
- 2013–2017 American Community Survey 5-Year Estimates* (U.S. Census Bureau, 2017); [https://factfinder.census.gov/faces/nav/jsf/pages/community\\_facts.xhtml?src=bkml](https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml?src=bkml)
- Tausch, N. et al. Explaining radical group behavior: developing emotion and efficacy routes to normative and nonnormative collective action. *J. Pers. Soc. Psychol.* **101**, 129–148 (2011).
- Brown, R. L. Assessing specific mediational effects in complex theoretical models. *Struct. Equ. Modeling* **4**, 142–156 (1997).
- Gunzler, D., Chen, T., Wu, P. & Zhang, H. Introduction to mediation analysis with structural equation modeling. *Shanghai Arch. Psychiatry* **25**, 390–394 (2013).
- Perrin, A. & Anderson, M. *Share of U.S. Adults Using Social Media, Including Facebook, Is Mostly Unchanged Since 2018* (Pew Research Center, 2019); <https://www.pewresearch.org/fact-tank/2019/04/10/share-of-u-s-adults-using-social-media-including-facebook-is-mostly-unchanged-since-2018/>
- Glenza, J. Rich Americans live up to 15 years longer than poor peers, studies find. *The Guardian* <https://www.theguardian.com/us-news/2017/apr/06/us-healthcare-wealth-income-inequality-lifespan> (6 April 2017).
- Tetlock, P. E. Thinking the unthinkable: sacred values and taboo cognitions. *Trends Cogn. Sci.* **7**, 320–324 (2003).
- Montada, L. & Schneider, A. Justice and emotional reactions to the disadvantaged. *Soc. Justice Res.* **3**, 313–344 (1989).
- van Zomeren, M., Postmes, T. & Spears, R. On conviction’s collective consequences: integrating moral conviction with the social identity model of collective action. *Br. J. Soc. Psychol.* **51**, 52–71 (2012).
- Peer, E., Brandimarte, L., Samat, S. & Acquisti, A. Beyond the Turk: alternative platforms for crowdsourcing behavioral research. *J. Exp. Soc. Psychol.* **70**, 153–163 (2017).
- Funder, D. C. & Ozer, D. J. Evaluating effect size in psychological research: sense and nonsense. *Adv. Methods Pract. Psychol. Sci.* **2**, 156–168 (2019).
- Graubard, B. I. & Korn, E. L. Modelling the sampling design in the analysis of health surveys. *Stat. Methods Med. Res.* **5**, 263–281 (1996).

44. *Most See Inequality Growing, but Partisans Differ over Solutions: About the Survey* (Pew Research Center, 2014); <https://www.people-press.org/2014/01/23/about-the-survey-147/>
45. Dietze, P. & Knowles, E. D. Social class and the motivational relevance of other human beings: evidence from visual attention. *Psychol. Sci.* **27**, 1517–1527 (2016).
46. Jackman, M. R. & Jackman, R. W. *Class Awareness in the United States* (Univ. of California Press, 1983).
47. Dietze, P. & Knowles, E. D. Social class predicts emotion perception and perspective-taking performance in adults. *Pers. Soc. Psychol. Bull.* <https://doi.org/10.1177/0146167220914116> (2020).
48. Lakhota, K. & Kempe, D. Approximation Algorithms for Coordinating Ad Campaigns on Social Networks. *Proceedings of the 28th ACM International Conference on Information and Knowledge Management* (eds Zhu, W. et al.) 339–348 (Association for Computing Machinery, 2019).

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## Author contributions

P.D. and M.A.C. designed the experiments, collected and analysed the data, and wrote the manuscript.

## Competing interests

The authors declare no competing interests.

## Additional information

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**Correspondence and requests for materials** should be addressed to P.D.

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Sampling strategy	See main text for details on sampling strategy. Study 1 and Study 3: Representative samples collected through Pew Research and NORC's AmeriSpeak Panel Study 2: Convenience sample Study 4: Convenience sample Study 5: Convenience sample
Data collection	See main text for details on data collection. Experimenters were blind to hypotheses and conditions. Computers were used to gather data for all studies except Study 2b, in which we used pen and paper to collect data. In Study 2b, some of the participants were around other people during data collection because we collected data in a public park (participants who conversed with another person during the study were excluded from data analysis, see main text).
Timing	Study 1: Data collected between January 15-19, 2014 Study 2a: Data collected between June 12-13, 2017 Study 2b: Data collected between August 30 - September 15, 2017 Study 3: Data collected between February 8 - March 12, 2018 Study 4a: Data collected between March 4-5, 2019 Study 4b: Data collected between April 2-3, 2019 Study Study 1: Data collected between January 15-19, 2014 Study 2a: Data collected between June 12-13, 2017 Study 2b: Data collected between August 30 - September 15, 2017 Study 3: Data collected between February 8 - March 12, 2018 Study 4a: Data collected between March 4-5, 2019 Study 4b: Data collected between April 2-3, 2019 Study 5: Data collected on February 19, 2020
Data exclusions	All data exclusions are described in detail in the main text .
Non-participation	Study 1: Response rates for Pew Research polls typically range from 5% to 15%; the response rate is the percentage of known or assumed residential households for which a completed interview was obtained Study 2a and Study 2b: We do not have information on response rates Study 3: Weighted Recruitment rate: 33.7 %; Weighted Household retention rate: 88.1%; Survey completion rate: 64.9%; Weighted cumulative response rate: 6.6% Study 4a and Study 4b: We do not have information on response rates Study 5: We do not have information on response rates
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Study 1: Recruitment was managed by Pew Research.  
 Study 2a: We recruited participants on Amazon's Mechanical Turk (MTurk) crowdsourcing platform  
 Study 2b: The sample was recruited in a public park in New York City  
 Study 3: Recruitment managed by NORC's AmeriSpeak Panel  
 Study 4: The online sample was recruited on Facebook via Facebook's Ads platform  
 Study 5: We recruited participants on Prolific Academic crowdsourcing platform  
 Advantages and disadvantages of the different recruitment strategies are discussed in the main text

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