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# Factual belief polarization between Democrats and Republicans: source or epiphenomenon of ideological and affective polarization?

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Democrats and Republicans have polarized in their attitudes (i.e., ideological polarization) and their feelings toward each other (i.e., affective polarization). Simultaneously, both groups also seem to diverge in their factual beliefs about reality. This preregistered survey experiment among 2,253 American citizens examined how this *factual belief polarization* may or may not fuel ideological and affective polarization around four key issues: income differences, immigration, climate change, and defense spending. On all issues except immigration, Democrats and Republicans were equally or more divided in their factual beliefs about the present than in their ideals for the future. Corrective information decreased partisan polarization over some ideals, but not directional policy attitudes. Priming respondents' factual beliefs conversely increased polarization around defense spending, but not other issues. Much remains unclear about the complex relation between factual beliefs and polarization, but measuring ideals and priming beliefs could be promising avenues for future research.

KEYWORDS

factual beliefs, misperceptions, ideological polarization, affective polarization, survey experiment

## 1 Introduction

American politics has seen a process of polarization between both major parties. Since the 1970s, a large number of moderate Democrats and Republicans in Congress have been replaced by outspoken liberals or conservatives (Hare and Poole, 2014). This elite polarization has also manifested itself among the mass public. Even though the overall variation in Americans' attitudes has remained rather constant over time (Fiorina and Abrams, 2008; Lelkes, 2016; Jocker et al., 2024), citizens who identify as a Democrat have become more liberal while Republicans have become more conservative (Abramowitz and Saunders, 2008). Perhaps more problematic, both groups have also developed increasingly hostile feelings toward each other (Iyengar et al., 2019). About eight-in-ten American partisans rate adherents of the other party coldly (Pew Research Center, 2019) and nearly half even view them as "immoral people" (Pew Research Center, 2016). During this period of increasing polarization, America has also seen a politicization of factual matters regarding issues such as climate change and COVID-19 (e.g., Dunlap et al., 2016). Such controversies demonstrate that Democrats and Republicans are not only divided in their attitudes (i.e., ideological polarization) and their feelings toward each other (i.e., affective polarization), but also in their factual beliefs about reality. Indeed, about three-quarters of

Americans believe that Republican and Democratic voters not only disagree over plans and policies, but also on "basic facts" (Pew Research Center, 2019). Lee et al. (2021) and Rekker (2021, 2022) conceptualized the term "factual belief polarization" for instances in which an objective fact is known according to evidence and expert opinion, but citizens' factual beliefs are nonetheless correlated with their party preference or issue attitudes.

Although the rise of factual belief polarization may have coincided with increasing levels of ideological and affective polarization, the causal relation between both developments is highly ambiguous. Intuitively, it seems plausible that factual belief polarization could be an important *source* of ideological and affective polarization. For example, it appears self-evident that people's factual beliefs can shape their attitudes because facts (e.g., the causes of global warming) have direct implications for policies (e.g., reducing $CO_2$ emissions). Democrats and Republicans could therefore grow apart ideologically as a result of diverging factual beliefs. A shared sense of reality may also constitute a barrier against affective polarization by ensuring at least a basic level of understanding for the other's position. If factual beliefs grow apart, Democrats and Republicans may however start to see the other as detached from reality, which is easier to condemn than mere disagreement. Nonetheless, the empirical evidence for a causal effect of factual belief polarization on ideological and affective polarization is surprisingly sparse and inconclusive. Some experimental studies revealed that people indeed change their attitudes when their factual beliefs are corrected (e.g., Howell and West, 2009), but other studies found no such effect (e.g., Kuklinski et al., 2000). Moreover, no experimental evidence is available on the effect of factual beliefs about political issues on affective polarization. Instead, experimental studies have so far focused on how affective polarization can be fueled by misperceptions about political opponents rather than about issues (e.g., Ahler and Sood, 2018; Lees and Cikara, 2020).

In the light of these mixed findings, the empirical literature cannot rule out the possibility that factual belief polarization should be seen merely as an *epiphenomenon* of ideological and affective polarization (i.e., a byproduct without any causal impact). Indeed, the empirical case for a causal effect of ideology and partisan affect on factual beliefs is much stronger than the evidence for the reverse relation. Decades of research on motivated reasoning have shown unambiguously that people tend to select and interpret factual information in a way that reinforces their identity and attitudes rather than challenging them (e.g., Taber and Lodge, 2006). Moreover, uninformed citizens may use their political attitudes as a heuristic to fill the gaps in their knowledge (Herda, 2013). Democrats and Republicans may therefore have diverged in their factual beliefs simply as a result of growing apart ideologically. Likewise, factual belief polarization may also be fueled by increasing levels of affective polarization (Broockman et al., 2023; Jenke, 2023). When citizens become more emotionally invested in their political identity and more hostile toward opponents, they may also become increasingly prone to exclusively trust identity-consistent information from in-group members such as partisan media.

This preregistered survey experiment among 2,253 American voters, therefore, examines whether factual belief polarization should be seen as a source of ideological and affective polarization. It expands upon the existing literature in four ways. First, this

study follows in the footsteps of previous research by examining if people's issue attitudes can be changed by informing them about four key issues in American politics: the income distribution, the immigrant population, the climate consensus, and the defense expenditure. If factual belief polarization is a source of ideological polarization, this intervention should decrease attitude differences between Democrats and Republicans. Second, this study introduces a novel experimental manipulation that relies on priming factual beliefs, rather than correcting them. If the polarization of factual beliefs is a source of ideological polarization, priming such beliefs may increase attitude differences between Democrats and Republicans. It is crucial to explore such alternative ways to examine the attitudinal effects of factual beliefs because the observation that corrective information often fails to change people's views cannot be taken as evidence that factual beliefs themselves have no effect. Attempts to correct factual beliefs may invoke a defensive reaction from participants so that they either reject the corrections directly or refuse to adjust their attitudes. Third, this study describes not just citizens' factual beliefs (e.g., "what is currently the income distribution?") and policy attitudes (e.g., "should the government redistribute incomes?"), but also their ideals (e.g., "what would be the fairest distribution of incomes?"). This makes it possible to compare on a common metric if Democrats and Republicans are more divided in their beliefs about the present or in their ideals for the future. Ideals may also shed light on the reasons why directional policy attitudes may or may not be rooted in factual beliefs. Fourth and finally, this study examines if correcting and priming factual beliefs can alter not just ideological but also affective polarization.

# 2 Theory and hypotheses

## 2.1 Political polarization over factual beliefs

Political polarization is an umbrella term for various forms of political dividedness. Although the literature on polarization has commonly distinguished between ideological and affective polarization, the politicization of scientific knowledge about issues such as climate change and COVID-19 has made clear that political opponents are often divided not only in their attitudes and their feelings toward each other, but also in their factual beliefs about reality. In one of the few articles that have systematically conceptualized this phenomenon, Lee et al. (2021) introduced the term "factual belief polarization" to refer to this type of dividedness. Whereas ideological polarization refers to people's attitudes about *what ought to be*, factual belief polarization refers to differential beliefs about *what is*. Factual belief polarization occurs when an objective fact is known according to evidence and expert opinion, but citizens' factual beliefs are nonetheless correlated with their party preference or issue attitudes (Rekker, 2022).

Factual belief polarization is closely related to the concept of "misperceptions," which were defined by Nyhan and Reifler (2010, p. 305) as "cases in which people's beliefs about factual matters are not supported by clear evidence and expert opinion." Most (though not all) studies have defined misperceptions as incorrect beliefs that people hold with confidence (e.g., Kuklinski et al., 2000; Flynn et al.,

2017). This criterion distinguishes misperceptions from ignorance, which is defined as lacking a correct belief on an issue.

Despite the clear similarities, there are also two conceptual differences between misperceptions and factual belief polarization (Rekker, 2022). First, misperceptions must in some way be connected to citizens' party preference or issue attitudes in order to qualify as *political* polarization. Second, factual belief polarization does not require that citizens hold their factual perceptions with a strong degree of confidence. Instead, it starts from the idea that citizens' attitudes on key issues are inevitably intertwined with a large multitude of factual beliefs ranging from strong convictions to implicit assumptions. For example, very few people may know the exact share of immigrants in their country's population, but nearly everyone must know from personal experience that this number is larger than zero percent and smaller than one-hundred percent. This implies that almost everyone has at least a rough and implicit assumption about the size of the immigrant population. As it turns out, such assumptions can differ widely between proponents and opponents of immigration (Nadeau et al., 1993; Herda, 2013). This type of polarization over factual beliefs may be consequential regardless of the degree of confidence with which people hold their perceptions. Because of this conceptual distinction between misperceptions and factual belief polarization, both phenomena require a somewhat different research agenda. Research on misperceptions has focused mostly on instances in which citizens confidently hold blatantly inaccurate beliefs such as that Osama bin Laden is still alive or that vaccines cause autism. Such incorrect beliefs are usually the result of explicit misinformation (Nyhan, 2020). The challenge for research on factual belief polarization, however, lies more in identifying the (often implicit) factual assumptions that are intertwined with citizens' attitudes on the most central political issues.

For all four issues in this study, previous research has already established the existence of factual belief polarization. Regarding climate change, 83% of Democrats believe that global warming is caused by human activity, but only 43% of Republicans share this position (Dunlap et al., 2016). Likewise, Republicans assume a more egalitarian income distribution than Democrats (Boudreau and MacKenzie, 2018) and a lower level of defense spending (Lee et al., 2021). On the issue of immigration, opponents perceive a larger share of foreign-born citizens in the population than proponents (Nadeau et al., 1993; Herda, 2013). It is, however, unclear if Democrats and Republicans are more divided in their beliefs about what is or in their ideals about what ought to be. This question could be important because if adherents of both parties are (much) less divided in their factual beliefs than in their normative ideals, factual belief polarization may be a relatively minor factor in the broader issue of political polarization. If Democrats and Republicans are, however, equally or more divided in their beliefs about the present than in their ideals for the future, factual belief polarization could be a potentially important driver of ideological and affective polarization. In one of the few studies that compared beliefs and ideals on a common metric, a survey among Californians found that Democrats and Republicans differ more in their factual beliefs about income differences than in their ideals about what a fair income distribution would look like (Boudreau and MacKenzie, 2018). Using the same measure, another study found that both groups are about equally divided in their beliefs

and ideals about income inequality (Norton and Ariely, 2011). This study expands upon these studies by measuring beliefs and ideals on a common metric about four key issues to address the following question:

- **RQ1:** *How does the magnitude of factual belief polarization between Democrats and Republicans compare to the ideological polarization over ideals between both groups?*

## 2.2 Correcting factual beliefs

Factual belief polarization may fuel ideological polarization when people's factual beliefs inform their attitudes. To what extent this is the case has been addressed by an extensive experimental literature on the correction of misperceptions. These studies examined if participants' policy attitudes can be changed by presenting them with factual information. Such interventions might be effective when two conditions are satisfied: (1) that participants indeed correct their misperceptions and (2) that they see a need to update their policy attitudes in the light of their newly acquired factual knowledge. Regarding the first condition, meta-analytic studies show that corrections are generally effective in reducing misperceptions (Chan et al., 2017; Walter and Murphy, 2018). Although there have been some instances in which the corrections "backfired" and increased misperceptions (Nyhan and Reifler, 2010; Ma et al., 2019), most studies established that informed participants indeed report more accurate beliefs. It is, however, much less clear if people update not only their factual beliefs but also their opinions. Some studies revealed that corrective information can induce attitude change (e.g., Howell and West, 2009), but many other studies found no such effect (e.g., Kuklinski et al., 2000). To the extent that corrective information induces attitudes change, it however stands to reason that it may reduce ideological polarization. When Democrats and Republicans are informed about relevant facts, there policy attitudes may conceivably converge because both groups update their opinions based on the same information. Similarly, corrective information may reduce affective polarization by creating some understanding for the other party's position among both Democrats and Republicans. Democrats may, for instance, gain some sympathy for Republicans and proponents of defense spending when they are informed that the current defense expenditure is smaller than they thought.

Regarding income differences, there is some evidence that informing citizens about the income distribution can change their policy attitudes toward redistribution. In a survey experiment among Californians, Republicans increased their support for a progressive income tax after learning about the income inequality in their state (Boudreau and MacKenzie, 2018). This intervention also decreased attitude differences between Democrats and Republicans. In another experiment, participants were more likely to express that it is the government's responsibility to reduce inequality when they had been informed about the income distribution and the rising levels of inequality in the US (McCall et al., 2017). Likewise, another experimental study demonstrated that Americans raised their support for

redistribution after learning the magnitude of income differences based on gender, race, and family background (Becker, 2020). Revealing a somewhat different pattern, another survey experiment showed that informed participants updated their ideals about what a fair income distribution would look like, but not their policy attitudes toward redistribution (Trump, 2018). Furthermore, a systematic literature review documented both instances in which information treatments increased and decreased polarization over redistribution attitudes (Marino et al., 2024).

In a similar vein, another strand of literature has examined the effect of corrective information on policy attitudes toward immigration. Survey experiments revealed that informing participants about the racial composition or the share of foreign-born citizens in the US did little to change their attitudes toward immigration, even though the information improved the accuracy of their factual beliefs (Lawrence and Sides, 2014; Hopkins et al., 2019). A study that compared different information treatments found that Republicans raised their support for legal immigration only when they were informed about characteristics of the immigrant population and not only about its size (Grigorieff et al., 2020). A survey experiment among Danes, however, revealed that participants did not change their attitudes either when they were informed about the size of the immigrant population or about other characteristics (Jørgensen and Osmundsen, 2022).

Research on corrective information and climate change attitudes has been inspired largely by the "gateway belief model" (Van der Linden et al., 2015). This model posits that people can, regardless of their beliefs or ideology, be persuaded that scientist agree on anthropogenic global warming. The awareness that there is a scientific consensus may, in turn, function as a "gateway cognition" that also shifts people's own beliefs about climate change and eventually their policy attitudes. Corroborating this model, experimental studies have consistently shown that consensus messages can effectively correct people's perceptions of what scientists believe about climate change (Van der Linden et al., 2015; Deryugina and Shurchkov, 2016; Bolsen and Druckman, 2018). It is, however, much less clear if such consensus beliefs are indeed a gateway to broader attitude change. Several studies found that consensus messages did not change people's own beliefs about climate change or their attitudes toward climate action (Deryugina and Shurchkov, 2016; Dixon et al., 2017; Bolsen and Druckman, 2018). Moreover, some studies suggest that consensus messages can even backfire among conservatives and Republicans, leading them to report lower levels of belief in global warming and less support for climate policies (Cook and Lewandowsky, 2016; Bolsen and Druckman, 2018; Ma et al., 2019). These findings indicate that informing people about climate change may conceivably exacerbate ideological polarization between Democrats and Republicans instead of alleviating it. In sharp contrast, another study, however, found that consensus messages effectively increased people's belief in global warming, as well as their support for climate action (Van der Linden et al., 2019). Moreover, the consensus messages in this study decreased ideological polarization by being more effective among conservatives than among liberals.

Regarding the issue of defense spending, observational research reveals an association over time between defense spending and public opinion whereby support for additional spending increased during periods when the actual expenditure decreased and vice versa (Wlezien, 1995; Wlezien and Soroka, 2023). This relationship suggests that citizens' attitudes toward defense spending are responsive to factual information about the current expenditure, but experimental evidence on the effect of corrective information is currently lacking. There is, however, some evidence that people's policy attitudes can be changed by informing them about the share of spending on other issues. For example, two studies revealed that Americans increased their support for foreign aid spending when they were informed about the share of the federal budget spent on foreign aid (Gilens, 2001; Scotto et al., 2017). Similarly, another study found that people became more supportive of additional science spending after being informed about the share of the federal budget allocated to scientific research (Goldfarb and Kriner, 2017). The ideological distance between Democrats and Republicans was, however, not reduced by this information. Nonetheless, effects of corrective information about federal spending are not consistently found in all studies. For example, another experiment found that informing Americans about the share of the federal budget spent on welfare did not change their attitudes toward welfare spending (Kuklinski et al., 2000).

In sum, the present study informs participants about the magnitude of income differences, the share of immigrants in the population, the climate consensus, and the share of defense spending. Despite mixed findings, the existing literature provides at least some indication that such corrective information can induce attitude change in a way that decreases ideological polarization between Democrats and Republicans. There are no clear reasons to expect that this effect differs between the four examined issues because previous research provides some, but not conclusive, evidence for the hypothesized effect of corrective information for each of the four policy domains. Whereas most previous studies focused on a single issue, the current examination however includes four different issues to provide a more thorough and comprehensive test of the more general hypothesis that factual belief polarization could be a source of ideological and affective polarization across different policy domains.

In addition, this study introduces two additional outcome variables besides policy attitudes. First, this study will ask respondents what situation they would view as ideal (e.g., what share of the federal budget should be spend on defense). A previous study on income differences demonstrated that such ideals might be more responsive to corrective information than directional policy attitudes (Trump, 2018). How informed participants may or may not update their ideals may also shed light on why corrective information often fails to change people's opinions. Second, this study examines the effect of corrective information not just on ideological but also on affective polarization. It stands to reason that a shared sense of reality can buffer against political hostility by ensuring at least a basic level of understanding for the other's position. If this is the case, informing people about facts may conceivably bring down the level of affective polarization between political opponents. When informed about the true magnitude of income inequality, a Republican who previously underestimated income differences may, for example, become more understanding of Democrats who support government redistribution. In line with this reasoning, observational research points out that factual

belief polarization and affective polarization often go together (Rekker and Harteveld, 2022; Jenke, 2023). Moreover, experimental research revealed that corrective information about the views and characteristics of political opponents (as opposed to political issues) can decrease affective polarization (e.g., Ahler and Sood, 2018; Lees and Cikara, 2020). In sum, the second research question is postulated as follows:

- **RQ2:** *Does informing people with corrective information decrease ideological (RQ2a) and affective polarization (RQ2b) between Democrats and Republicans?*

## 2.3 Priming factual beliefs

Although experimental studies on corrective information have yielded valuable insights on the role of factual beliefs in attitude formation, this research design is not without its limitations. Most crucially, the observation that corrections of misperceptions often fail to change attitudes cannot be taken as evidence that factual beliefs *themselves* have no effect. As Flynn et al. (2017) put it: "misperceptions can have important consequences for policy debate and public attitudes even if correcting them does not change people's opinions." Specifically, corrective information may often fail to change people's views because it invokes a defensive psychological reaction that is known as "reactance." Reactance occurs when people experience a threat to their agency or freedom and respond to a message with hostility and counterarguing (Rains and Turner, 2007). Such a response can be triggered when corrective information is overtly persuasive or when people perceive a threat to their attitudes and identity (Dillard and Shen, 2005). For example, Republicans and climate skeptics often report feeling "pressured," "manipulated," and "forced into beliefs about climate change" when they are informed about the climate consensus (Ma et al., 2019; Chinn and Hart, 2021).

In the light of these limitations of corrective information, there is a need for alternative ways to examine the attitudinal effects of factual belief polarization. As a potential solution, the present study examines the causal effect of factual beliefs on attitudes not only by correcting such beliefs, but also by merely "priming" them. Priming occurs when a stimulus unconsciously influences how people respond to a subsequent stimulus by activating a mental construct (Higgins et al., 1977; Bargh and Chartrand, 2000; Weingarten et al., 2016). Factual beliefs can be primed by asking participants first about their beliefs and then about their policy preferences. As a result of this question order, the cognitive accessibility of factual beliefs is temporarily increased and participants may unintentionally express their policy attitudes with their factual beliefs in mind (Kuklinski et al., 2000; Tourangeau et al., 2000). If factual belief polarization is a source of ideological and affective polarization, this priming method may increase attitudinal differences and hostility between Democrats and Republicans. When primed with their high perception of income inequality, Democrats may, for example, report greater support for redistributive policies and more hostility toward opponents of redistribution. Conversely, primed Republicans may decrease their support for redistribution because they typically assume a more egalitarian income distribution. In other words, the third research question is as follows:

- **RQ3:** *Does priming people with their factual beliefs increase ideological (RQ3a) and affective polarization (RQ3b) between Democrats and Republicans?*

# 3 Method

## 3.1 Sample

The participants of this study are 2,253 eligible American voters who were recruited through Prolific and completed the survey on 22 January 2022. Quota sampling was used to obtain a representative sample with regard to vote choice in the 2020 presidential elections: 743 non-voters, 789 Biden-voters, and 721 Trump-voters. Although this method cannot guarantee representativeness with regard to other characteristics than vote choice, the analysis in Supplementary Appendix S1 indicates that the recruited sample is very similar to the representative probability sample of the 2020 American National Election Studies (ANES) with regard to gender, educational level, party identification, and political interest. The only clear difference between both samples lies in the age distribution: whereas older voters are overrepresented in the ANES, younger voters are overrepresented in the present sample. Prior to the data collection, this study (including a pre-analysis plan) was preregistered on OSF and approved by the ethics committee of the University of Amsterdam.

## 3.2 Measures

Respondents' *party identification* was measured with three items that were adopted from the ANES. The first question asks respondents if they think of themselves as a Democrat, a Republican, an independent, or an adherent of another party. Participants who identify with either of the two parties are then asked if their identification is "strong" or "very strong." The remaining respondents are instead asked if they think of themselves as "closer" to either of the two parties. Following the ANES, the answers on these three questions were recoded into a sevn-point party identification scale ranging from strong Democrat (1) to strong Republican (7).

For the issue of *income differences*, respondents' factual beliefs were measured with the item: "When you think about the amount of money that a family can spend after taxes, how many times more do you think the 10% households with the highest incomes earn compared to the 10% households with the lowest incomes?" Respondents' ideals were measured with the same question, except that it asked them not about the current distribution of incomes, but rather how many times more the households with the highest incomes "should earn." To avoid steering answers with response scales, participants were asked to indicate their beliefs and ideals about all issues by typing a number in an open field. Respondents' policy attitudes about income differences were measured with an item that was adopted from the General Social Survey: "What score between 1 (government ought to reduce the income differences between rich and poor) and 7 (government should not concern

itself with reducing income differences) comes closest to the way you feel?" For all policy attitudes, respondents provided their answer on a seven-point scale. For all four issues, ideals and directional policy attitudes are treated as distinct manifestations of ideological polarization, since ideology inherently encompasses both a vision of an ideal society and the policies to achieve it.

Respondents' beliefs about *immigration* were measured with the question: "What do you think is currently the share of immigrants in the United States? By immigrants, we mean people who were born in another country as well as their children, but not their grandchildren." Participants' ideals about immigration were inquired with a similar item that asked what "would be an ideal share of immigrants." The question about policy attitudes toward immigration asked respondents if the US "should admit fewer or more immigrants."

For the issue of *climate change*, participants were asked "How convinced are you that climate change is mainly caused by human activity? Please place yourself on a scale from 0 to 100% where 0% means that you think it is extremely unlikely that climate change is caused mainly by human activity, 100% means that you are sure that climate change is caused mainly by human activity, and 50% means that you are unsure." Ideals about climate change were examined by asking respondents: "In order to justify extensive government spending and regulations to stop global climate change, how certain do you think we have to be that climate change is indeed caused mainly by human activity?" Policy attitudes about climate change were inquired with the question: "Do you think the United States should do less or more in terms of spending and regulations to stop global climate change?"

Factual beliefs about *defense spending* were measured by asking respondents: "When you think about the entire annual budget of the federal government, what percentage do you think is currently spent on defense?" Participants' ideals were inquired with the question what percentage of the federal budget "should be spent on defense." The question about policy attitudes toward defense spending was phrased: "Do you think the United States should decrease or increase defense spending?"

This study furthermore examined *affective polarization* by presenting respondents with the "feeling thermometer" that was popularized by the ANES. On a feeling thermometer, respondents can indicate how they feel about different groups of people with a temperature ranging from 0 (very cold or unfavorable) to 100 degrees (very warm and favorable). Using a slider, respondents rated their feelings toward Democrats and Republicans, as well as toward proponents and opponents of each of the four issues (e.g., "How would you rate people who think the United States should increase defense spending?"). The absolute difference between respondents' rating of both groups was taken as a measure of affective polarization. A full overview of the questionnaire can be found in the preregistered proposal of this study (OSF: https://osf.io/3yeg7).

## 3.3 Procedure

The procedure of this study is depicted in Figure 1. Because the experimental treatments require a basic understanding of math from participants, the first part of the questionnaire was a

screening that consisted of three basic math questions about ratios and percentages. Participants then answered some demographic questions and the items about party identification. For respondents who failed to answer at least two of the three screening questions correctly ($N = 199$; 8.8%), the survey ended here. The remaining participants ($N = 2,054$; 91.2%) were randomly assigned to one of three experimental conditions: a control condition, a priming condition, and a correction condition. Randomization checks confirmed that the assigned condition was unassociated with gender ($p = 0.90$), race ($p = 0.84$), educational level ($p = 0.94$), liberal-conservative ideology ($p = 0.58$), and political interest ($p = 0.25$).

For each of the four issues, participants in the *control condition* were first asked about their policy attitude, second about their feelings toward people on both sides of the debate, third about their ideal, and fourth about their factual belief. In the *priming condition*, this question order was reversed: first the belief, second the ideal, third the policy attitude, and fourth the feeling thermometer. The idea behind this question order is that participants are primed with their factual beliefs in the first question, while the second question then makes them aware of the distance between their belief and their ideal. As a result, it is likely that participants will use this primed discrepancy to answer the question on their policy attitude. For example, a respondent who indicated in the first question that (s)he believes the share of immigrants in the United States is currently 40% and in the second question that (s)he thinks this should be 20%, may answer in the third question that the US should admit fewer immigrants as a logical consequence of this discrepancy.

The question order in the *correction condition* resembled the priming condition, except that the question about beliefs was replaced by factual information. For income differences, the presented information was: "When it comes to the distribution of incomes in the United States, official statistics by the OECD show that the amount of money that a family can spend after taxes is *18 times* higher for the 10% households with the highest incomes compared to the 10% households with the lowest incomes." Regarding immigration, participants were informed that: "According to population surveys, immigrants make up *26% of the population in the United States.*" Likewise, participants were informed about the scientific consensus on climate change: "The consensus among climate scientists is that it is *more than 99% sure* that climate change is caused mainly by human activity." On the issue of defense spending, the presented information was: "According to the Congressional Budget Office, the federal government spends *11%* of its entire annual budget on defense." The factual information in these messages was based respectively on reports from the OECD (2016), Pew Research Center (2020), the IPCC (2021), and the CBO (2021). As the final question in each condition, respondents rated their feelings toward Democrats and Republicans on a feeling thermometer.

# 4 Analyses and results

## 4.1 Political polarization over factual beliefs

Table 1 displays a series of ordinary least squares regression analyses with heteroscedasticity robust standard errors. The
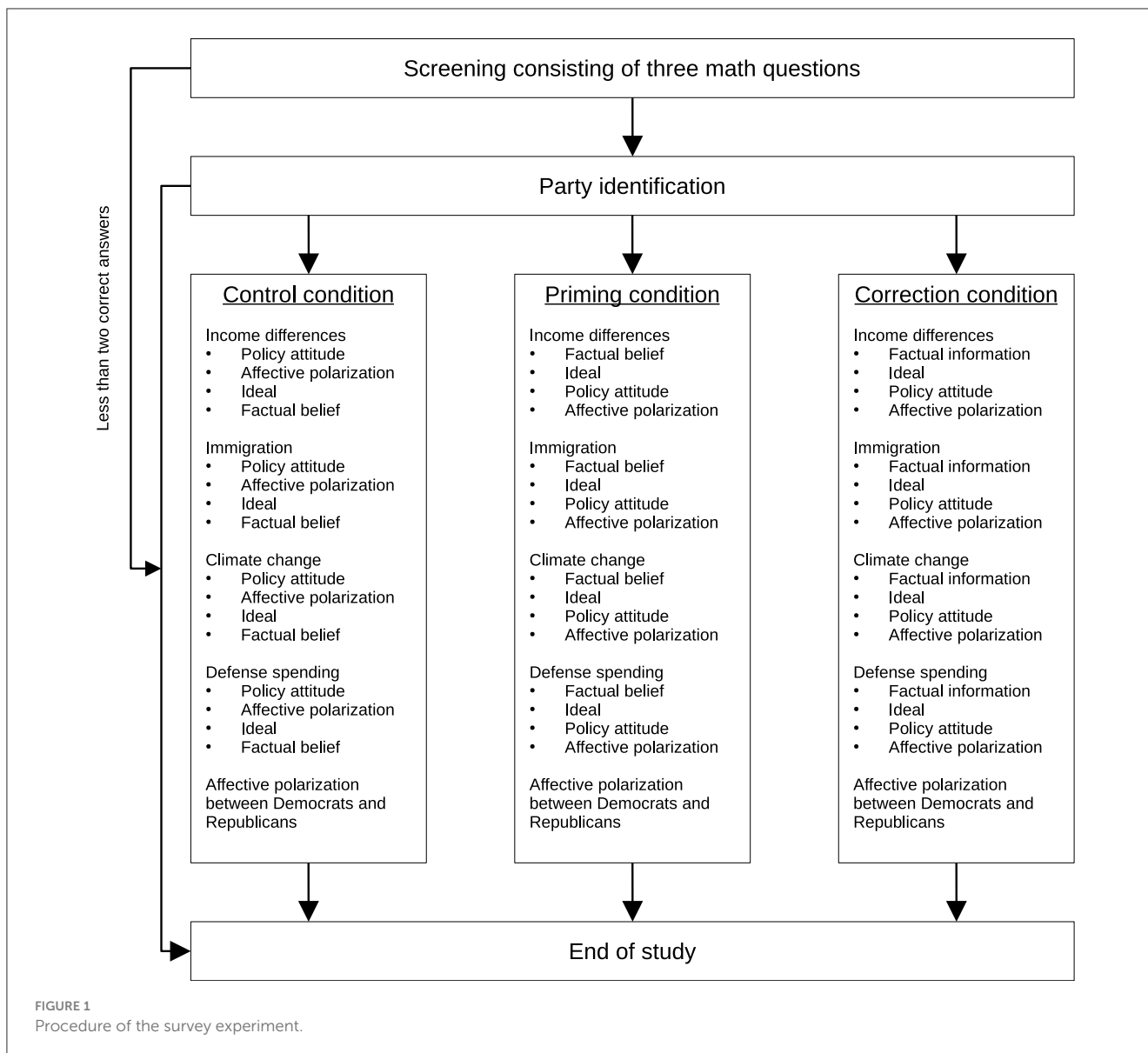
FIGURE 1
Procedure of the survey experiment.

research question how the magnitude of factual belief polarization compares to ideological polarization over ideals (RQ1) was examined using models in which the dependent variable was a merged variable that indicates the ideals of respondents in the control condition and the beliefs of respondents in the priming condition. This approach ensured that none of the hypothesized question order effects could influence the results for this descriptive research question. The direction of the scores on beliefs and ideals was synchronized so that higher scores reflect the Republican viewpoint. The predictors were a dummy indicating which question respondents answered (beliefs or ideals), party identification, and an interaction between both variables. For three out of the four issues, the estimated interaction effect reveals that Democrats and Republicans were equally or more divided in their beliefs than in their ideals. On the issue of climate change, both groups were significantly further apart in their beliefs than in their ideals and a non-significant effect in the same direction was found for income differences and defense
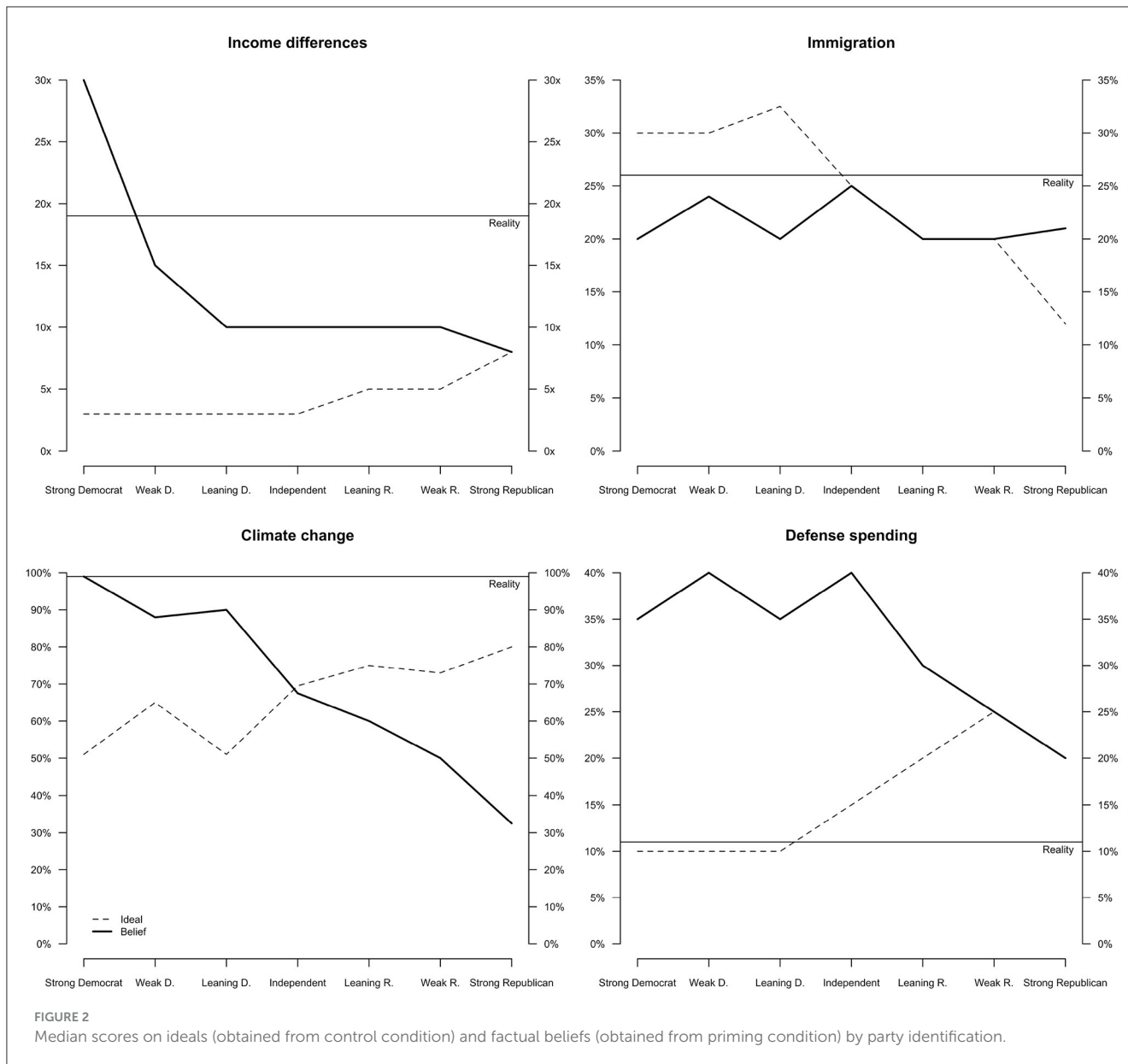
spending. Immigration was the only issue on which Democrats and Republicans were, conversely, more divided in their ideals than in their beliefs.

To better understand these findings, Figure 2 compares the median ideals and beliefs of Democrats and Republicans (i.e., weak and strong identifiers). Interestingly, this graph tells a different story for each issue. About the income distribution, Democrats and Republicans differ widely in their factual beliefs and the median voter substantially underestimates income inequality. However, Democrats and Republicans do agree on the fundamental issue that income differences are currently larger than they ideally should be. For immigration, Figure 2 depicts the normatively ideal situation that Democrats and Republicans differ only in their ideals, but not in their factual beliefs because both groups have a rather accurate perception. Regarding climate change, Democrats and Republicans are to some extent divided over the question how much certainty would be needed to justify spending and regulations, but they are clearly much more divided over the factual question whether or

TABLE 1 Regression models for the main analyses.

| | Income differences | Immigrant population | Climate change | Defense spending | |
|---|---|---|---|---|---|
| Dependent variable: beliefs (priming condition) or ideals (control condition) in synchronized direction | | | | | |
| Party identification (centered) | 2.70(0.49)*** | 2.83(0.31)*** | 2.40(0.57)*** | 2.09(0.24)*** | |
| Belief (ref = ideal) | 53.23(1.76)*** | −47.20(0.98)*** | −26.93(1.61)*** | 45.66(0.94)*** | |
| Belief*party identification | 0.82(0.84) | −2.97(0.43)*** | 6.44(0.74)*** | 0.41(0.42) | |
| Model | | | | | |
| Respondents | 1,337 | 1,337 | 1,337 | 1,337 | |
| $R^2$ | 43.4% | 63.2% | 32.5% | 64.9% | |
| Dependent variable: ideals | | | | | |
| Party identification (centered) | 2.70(0.49)*** | −2.83(0.31)*** | 2.40(0.57)*** | 2.09(0.24)*** | |
| Condition (ref = control) | | | | | |
| Primed with belief | −2.67(1.28)* | −1.15(1.01) | 2.04(1.68) | 4.14(0.85)*** | |
| Informed about facts | −7.14(1.11)*** | 0.66(0.88) | 9.11(1.65)*** | −8.46(0.60)*** | |
| Condition*party identification | | | | | |
| Primed with belief*party identification | −1.12(0.60)[+] | −0.25(0.44) | −0.47(0.80) | −0.13(0.38) | |
| Informed about facts*party identification | −1.67(0.51)** | −0.48(0.38) | 0.34(0.77) | −0.57(0.27)* | |
| Model | | | | | |
| Respondents | 2,054 | 2,054 | 2,054 | 2,054 | |
| $R^2$ | 7.0% | 12.7% | 4.3% | 21.2% | |
| Dependent variable: policy attitudes | | | | | |
| Party identification (centered) | 0.62(0.03)*** | −0.53(0.03)*** | −0.62(0.03)*** | 0.42(0.03)*** | |
| Condition (ref = control) | | | | | |
| Primed with belief | 0.17(0.09)* | 0.15(0.08)[+] | 0.02(0.09) | −0.44(0.08)*** | |
| Informed about facts | 0.24(0.09)** | 0.02(0.08) | 0.15(0.09) | −0.15(0.09)[+] | |
| Condition*party identification | | | | | |
| Primed with belief*party identification | 0.01(0.04) | 0.04(0.04) | 0.02(0.04) | 0.05(0.04) | |
| Informed about facts*party identification | −0.02(0.04) | 0.02(0.04) | 0.05(0.04) | 0.05(0.04) | |
| Model | | | | | |
| Respondents | 2,054 | 2,054 | 2,054 | 2,054 | |
| $R^2$ | 41.2% | 33.5% | 39.7% | 28.6% | |
| Dependent variable: affective polarization | | | | | |
| Condition (ref = control) | | | | | |
| Primed with belief | −0.73(1.77) | −0.68(1.82) | −4.56(1.91)* | 3.89(1.86)* | −1.28(1.67) |
| Informed about facts | 0.03(1.77) | −2.21(1.79) | −2.27(1.87) | 5.11(1.85)** | −1.56(1.65) |
| Model | | | | | |
| Respondents | 2,054 | 2,054 | 2,054 | 2,054 | 2,054 |
| $R^2$ | 0.0% | 0.1% | 0.28% | 0.4% | 0.1% |

Estimates with standard errors in parentheses. Higher scores on policy attitudes indicate less support for redistribution and more support for immigration, climate action, and defense spending.
[+]$p < 0.10$.
*$p < 0.05$.
**$p < 0.01$.
***$p < 0.001$.

FIGURE 2
Median scores on ideals (obtained from control condition) and factual beliefs (obtained from priming condition) by party identification.

not global warming is manmade. Finally, adherents of both parties overestimate the amount of defense spending, but Democrats overestimate the actual number much more than Republicans. Participants clearly provided higher numbers as factual beliefs than as ideals on this issue. Republicans would ideally spend more money on defense than Democrats, but even the ideals of strong Republicans do not exceed their factual beliefs about the current expenditure.

## 4.2 Correcting factual beliefs

To answer the research question whether corrective information can decrease ideological and affective polarization between Democrats and Republicans (RQ2), this study included a set of regression models in which the subsequent dependent variables were participants' ideals, policy attitudes, and affective polarization around issues and partisanship. The independent variables in the models on ideological polarization were experimental condition, party identification, and an interaction between both variables (see Table 1). The models on affective polarization featured only condition as predictor. The results for ideals revealed that corrective information significantly reduced the ideological distance between Democrats and Republicans on the issues of income differences and defense spending, but not immigration and climate change. In sharp contrast, the results however revealed no significant interaction between the correction condition and party identification for any of the four policy attitudes. These null results also extend to affective polarization around three of the four issues and partisanship. On the issue of defense spending, the corrective information unexpectedly increased affective polarization.

TABLE 2  Differences between experimental conditions by party identification.

| | Income differences | Immigrant population | Climate change | Defense spending | |
|---|---|---|---|---|---|
| **Dependent variable: ideals** | | | | | |
| **Democrats** | | | | | |
| Condition (ref = control) | | | | | |
| Primed with belief | −0.00(1.16) | 0.15(1.66) | 1.01(2.69) | 4.24(1.11)*** | |
| Informed about facts | −3.40(1.00)*** | 2.68(1.40)+ | 7.42(2.73)** | −6.75(0.75)*** | |
| Model | | | | | |
| Respondents | 788 | 788 | 788 | 788 | |
| $R^2$ | 2.2% | 0.5% | 1.2% | 15.5% | |
| **Republicans** | | | | | |
| Condition (ref = control) | | | | | |
| Primed with belief | −5.50(3.08)+ | −1.31(1.61) | −1.31(3.11) | 2.50(1.66) | |
| Informed about facts | −11.86(2.63)*** | 0.32(1.38) | 9.49(2.93)** | −9.95(1.19)*** | |
| Model | | | | | |
| Respondents | 564 | 564 | 564 | 564 | |
| $R^2$ | 3.8% | 2.6% | 2.8% | 13.5% | |
| **Dependent variable: policy attitudes** | | | | | |
| **Democrats** | | | | | |
| Condition (ref = control) | | | | | |
| Primed with belief | 0.13(0.11) | 0.01(0.13) | −0.01(0.08) | −0.58(0.13)*** | |
| Informed about facts | 0.16(0.12) | −0.09(0.13) | 0.09(0.08) | −0.30(0.13)* | |
| Model | | | | | |
| Respondents | 788 | 788 | 788 | 788 | |
| $R^2$ | 0.3% | 0.1% | 0.2% | 2.6% | |
| **Republicans** | | | | | |
| Condition (ref = control) | | | | | |
| Primed with belief | 0.26(0.17) | 0.21(0.16) | 0.06(0.20) | −0.25(0.16) | |
| Informed about facts | 0.03(0.17) | 0.02(0.16) | 0.36(0.20)+ | −0.05(0.16) | |
| Model | | | | | |
| Respondents | 564 | 564 | 564 | 564 | |
| $R^2$ | 0.5% | 0.4% | 0.7% | 0.5% | |
| **Dependent variable: affective polarization** | | | | | |
| | Income differences | Immigrant population | Climate change | Defense spending | Partisan polarization |
| **Democrats** | | | | | |
| Condition (ref = control) | | | | | |
| Primed with belief | −0.88(2.60) | 1.83(2.68) | −2.46(2.41) | 10.10(2.98)*** | 0.23(2.44) |
| Informed about facts | −1.57(2.59) | −1.08(2.72) | −2.36(2.39) | 6.04(2.97)* | 0.47(2.40) |
| Model | | | | | |
| Respondents | 788 | 788 | 788 | 788 | 788 |
| $R^2$ | 0.1% | 0.2% | 0.2% | 1.5% | 0.0% |

*(Continued)*

TABLE 2 (Continued)

| | Income differences | Immigrant population | Climate change | Defense spending | Partisan polarization |
|---|---|---|---|---|---|
| Republicans | | | | | |
| Condition (ref = control) | | | | | |
| Primed with belief | 2.83(3.25) | −0.00(3.69) | −4.28(3.51) | 0.34(3.31) | −0.34(3.28) |
| Informed about facts | 3.39(3.32) | −2.91(3.59) | −1.15(3.47) | 4.28(3.33) | −1.27(3.22) |
| Model | | | | | |
| Respondents | 564 | 564 | 564 | 564 | 564 |
| $R^2$ | 0.2% | 0.2% | 0.3% | 0.4% | 0.0% |

Estimates with standard errors in parentheses. Higher scores on policy attitudes indicate less support for redistribution and more support for immigration, climate action, and defense spending.

[+]$p < 0.10$.
[*]$p < 0.05$.
[**]$p < 0.01$.
[***]$p < 0.001$.

To interpret these findings, Table 2 and Figure 3 provide a separate comparison between the conditions for Democrats and Republicans. The results show that neither Democrats nor Republicans changed their policy attitudes when they were informed about income inequality. However, the explanation for this null effect may differ between both groups. Figure 2 suggests that corrective information may have been unconvincing for Republicans because they do not believe a discrepancy between the current and ideal level of inequality justifies government intervention. Meanwhile, many Democrats may have had little reason to update their attitudes because their factual perception was already close to the actual number. Likewise, corrective information may have failed to change immigration attitudes because both Democrats and Republicans already had a fairly accurate perception of the immigrant population. Regarding climate change, Figure 2 shows that the median Republican believes that about 75% certainty would be needed to justify climate action. Nonetheless, Republicans did not update their opinions when they were informed that the actual certainty is "at least 99%." In fact, the results even reveal a marginally significant "backfire effect" in which informed Republicans strengthened their opposition to climate policies. Many informed Republicans also increased their required level of certainty for climate action, perhaps as a way to rationalize not changing their policy attitudes. On the issue of defense spending, Democrats and Republicans responded to corrective information by bringing their ideal level of spending closer to the actual number. Informed Democrats typically indicated an ideal that is slightly lower than the current defense expenditure, while most Republicans provided a somewhat higher number. This pattern suggests that both Democrats and Republicans updated their ideals to make them consistent with their policy attitudes.

## 4.3 Priming factual beliefs

The aforementioned regression analyses were also used to answer the question whether priming beliefs can increase ideological and affective polarization between Democrats and Republicans (RQ3). Contrary to expectations, the models in Table 1 reveal no significant interaction between the priming condition and party identification for either ideals or policy attitudes on any of the four issues. Participants in the priming condition did, however, differ from the control condition in their levels of affective polarization around two of the four issues. As expected, participants who were primed with their factual beliefs about defense spending expressed more affective polarization around this issue. The analyses in Table 2 indicate that this effect was mostly driven by Democrats, who on average raised their affective polarization with a considerable effect size of 10 degrees. This effect was also visible in the policy attitudes of Democrats, who increased their opposition to defense spending. Based on Figure 2, this effect may be explained by the pattern that the median Democrat greatly overestimates the actual defense expenditure. When primed with this belief, many Democrats seem to double down on their opposition to defense spending. On the issue of climate change, participants in the priming condition unexpectedly indicated lower levels of affective polarization compared to the control condition. This effect was not significant for either Democrats or Republicans separately, but Table 2 hints that especially Republicans became less affectively polarized by reflecting on their own climate change beliefs.

## 4.4 Manipulation checks

The various null results for priming may either indicate that factual beliefs have no effect in these instances or that that the manipulation was ineffective. Because priming involves an unconscious cognitive process, it is unfortunately not possible to distinguish between both possibilities with a manipulation check. For the information treatment, a *direct* manipulation check would have asked respondents about their own perception after they had just been informed about the actual number. Such a question could appear strange to participants or force them to communicate in a rather artificial way if they accepted or rejected the information. Instead, this study therefore relied on an *indirect* manipulation check by examining the main effect of the information treatment on respondents' ideals. Previous research has demonstrated that participants use factual beliefs as an anchor for their ideals (Pedersen and Mutz, 2019). The strong main effects of the information treatment on ideals, therefore, demonstrate that

the manipulation was successful and that participants processed the information. In this light, the null results for corrective information indicate that informed participants changed their factual beliefs but not their opinions.

## 4.5 Robustness checks

The presented analyses deviate in three ways from the preregistration. First, the pre-analysis plan proposed an analysis across all issues simultaneously, in addition to models for each separate issue. This pooled analysis was dropped because it would be uninformative in light of the results, which differed more between issues than expected in both size and direction. Second, the preregistration proposed to recode extreme scores, but this step could be omitted because outliers did not meaningfully alter the results. The third deviation from the pre-analysis plan is the inclusion of ideals as an additional outcome variable for the effect of corrective information and priming. The pre-registered analyses, which are displayed in Supplementary Appendix S2, yield similar results and conclusions as the presented main analyses. Finally, the regression models in Supplementary Appendix S3 provide little indication that the effect of the experimental manipulation depends systematically on respondents' educational level or political interest.

# 5 Discussion

American politics has for some time been characterized by growing animosity and attitudinal differences between Democrats and Republicans. At the same time, both groups also seem to diverge in their factual beliefs about reality. This survey experiment examined whether this factual belief polarization could fuel ideological and affective polarization, or if it is best thought of as an epiphenomenon of these processes. First of all, the descriptive analyses demonstrated that, on all issues except immigration, Democrats and Republicans are equally or more divided in their beliefs about the present compared to their ideals for the future. This finding resembles results from previous research that compared beliefs and ideals about the income distribution (Norton and Ariely, 2011; Boudreau and MacKenzie, 2018). Although it does not in itself say anything about the direction of causality, the considerable magnitude of factual belief polarization suggests that it at least has a potential to fuel ideological and affective polarization.

Nonetheless, this study found no evidence that informing Democrats and Republicans with factual information can bring them closer together in either their policy attitudes or their feelings toward each other. Corrective information did, however, reduce the distance between Democrats' and Republicans' ideals about income inequality and defense spending. Overall, this study's findings are, therefore, consistent with a previous study which revealed that corrective information on income inequality can change people's ideals, but not directional policy attitudes (Trump, 2018). This emphasizes that, in addition to policy attitudes, ideals are a useful outcome variable for examining the effect of corrective information. Moreover, the inclusion of

ideals exposed two potential mechanisms through which corrective information can fail to shift policy attitudes. First, people can view their own ideals as irrelevant to policies. In such instances, people have no reason to update their policy attitudes when corrective information alters the distance between their beliefs and ideals. For example, most Republicans expressed relatively egalitarian ideals about the income distribution compared to both their factual beliefs and the actual level of inequality. However, Republicans generally seem to view these ideals as irrelevant for their policy attitudes and fundamentally reject the idea of government redistribution. Second, corrective information can fail to change policy attitudes when people update their ideals to maintain and rationalize their policy attitudes. When Democrats were informed about the current defense expenditure, they simply decreased their ideal level of spending to maintain their position that defense spending should be decreased. Similarly, Republicans who were informed about the climate consensus raised their ideals about how much certainty would be needed to justify climate action.

Crucially, the observation that corrections of misperceptions often fail to change attitudes cannot be taken as evidence that factual beliefs *themselves* have no effect. As an alternative way to examine the attitudinal effects of factual belief polarization, this study proposed and tested an experimental manipulation of priming participants' factual beliefs. As expected, primed participants expressed higher levels of affective polarization around the defense expenditure. The magnitude of this effect was considerable among Democrats, who also doubled down on their negative policy attitudes toward defense spending. This finding suggests that factual belief polarization could be a source of ideological and affective polarization around this issue, even though corrective information failed to bring Democrats and Republicans closer together. It should, however, also be emphasized that the effects of priming were far from consistent across all issues and outcome measures. For immigration, the lack of a priming effect may be explained by the fact that Democrats and Republicans had similar beliefs about the immigrant population to begin with. However, both groups clearly differed in their factual beliefs about income differences and climate change, but priming these beliefs did not increase ideological or affective polarization.

This study started from the question if factual belief polarization is a source of ideological and affective polarization between Democrats and Republicans, or merely an epiphenomenon. Previous research on this question has yielded mixed findings and the present study was no different. Both the literature review and the results demonstrated that much remains unknown about if, when, how, and to what extent factual belief polarization can fuel ideological and affective polarization. The current examination perhaps raised more questions than it answered about this complex relationship. The many null results of the information treatment reaffirm the limitations of this method for examining the attitudinal effects of factual beliefs. This study, however, also demonstrated that priming factual beliefs could be a promising method to gain a better understanding of the attitudinal effects of factual belief polarization. Although this method yielded significant results for only one of the four examined issues, this

**FIGURE 3**
Scores by experimental condition and partisanship with a 95% confidence interval.
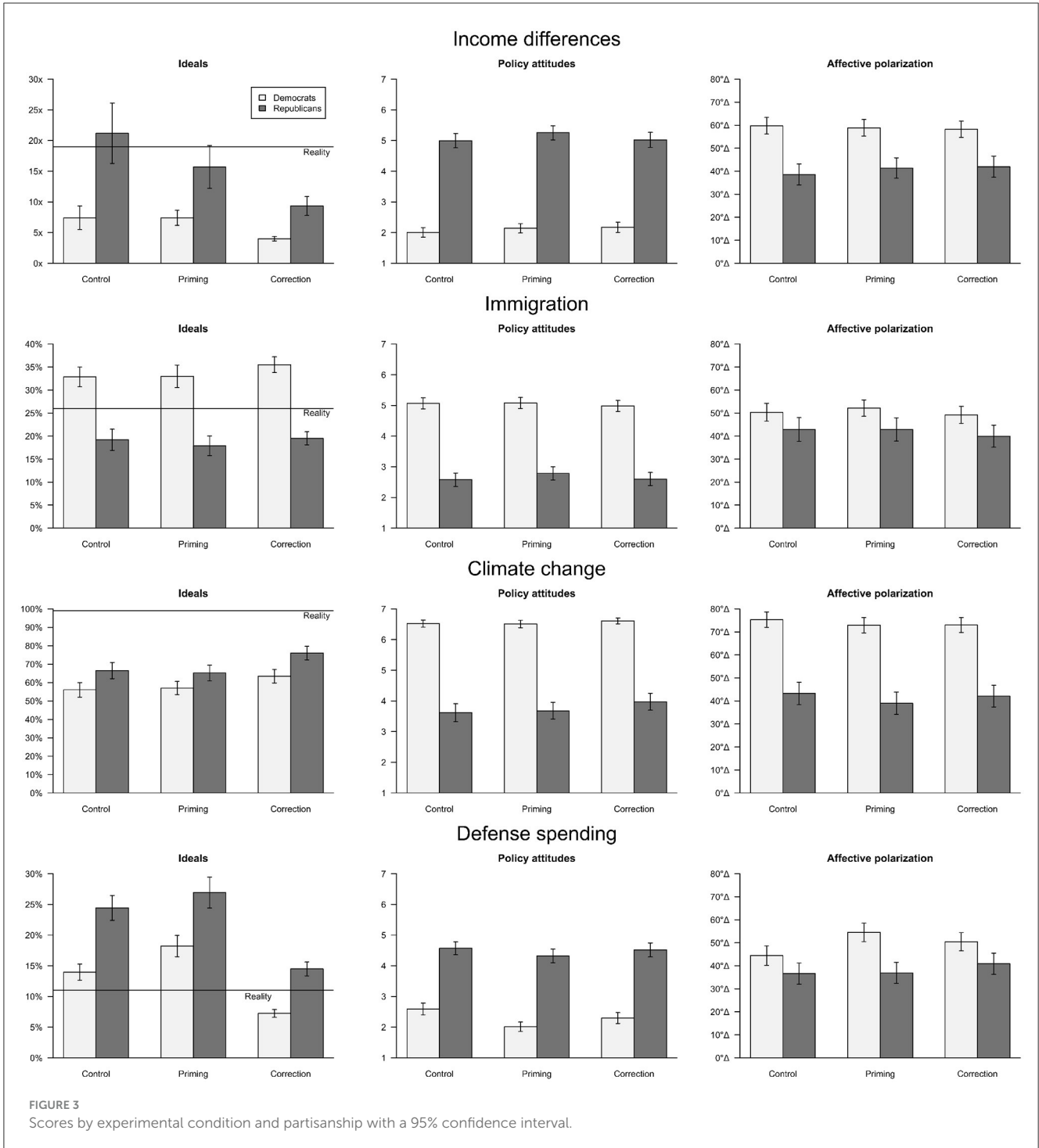
finding nonetheless suggests that there are instances in which the addition of a priming condition can identify effects that would have remained undetected with only an information treatment. By measuring ideals, this study furthermore identified two potential mechanisms through which corrective information can fail to shift policy attitudes. It is clear that much more research is needed before the complex relation between factual beliefs and polarization can be fully understood. In this ongoing debate, measuring ideals and priming beliefs could prove to be valuable additions to the methodological toolkit.

## Data availability statement

The data, syntax, and preregistered proposal are available here: https://osf.io/5hkst.

## Ethics statement

The studies involving humans were approved by University of Amsterdam: Faculty of Social and Behavioural Sciences. The

studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

## Author contributions

RR: Conceptualization, Data curation, Formal analysis, Writing – original draft.

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## Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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## Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpos.2024.1254826/full#supplementary-material

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