

What shapes public support for climate change mitigation policies? The role of descriptive social norms and elite cues

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Abstract: What are the roles of bottom-up and top-down signals in the formation of climate change policy preferences? Using a large sample of American residents ($n = 1520$) and combining an experimental manipulation of descriptive social norms with two choice experiments, we investigate the effects of descriptive norms and policy endorsements by key political actors on climate policy support. We study these questions in two areas considered to be central in a number of decarbonization pathways: the phase-out of fossil fuel-powered cars and the deployment of carbon capture and storage. Our study provides two important results. First, social norm interventions may be no silver bullet for increasing citizens' support for ambitious climate policies. In fact, we not only find that climate policy support is unaffected by norm messages communicating an increased diffusion of pro-environmental behaviors, but also that norm messages communicating the prevalence of non-sustainable behaviors decrease policy support. Second, in the presence of policy endorsements by political parties, citizens' trust in these parties influences their support for climate policies. This study contributes to research in behavioral climate policy by examining the impact of descriptive norms and elite cues on climate policy support.

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Introduction

Two of the most recent Special Reports of the Intergovernmental Panel on Climate Change (IPCC, 2018, 2019) emphasize the importance of drastic reductions of greenhouse gas emissions. As such reductions will require public buy-in to a broad range of climate change mitigation policies, two questions are of central importance: What shapes public attitudes toward climate policies? And how can public support for rapid decarbonization be strengthened? Taking up two current strands in the behavioral and political science literatures, we theorize that information on *social norms* and about key political and social actors' positions on public policies (i.e., *elite cues*) are important factors in moving citizens' climate policy preferences.

Building on results in the behavioral science literature, we study the effects of *descriptive* social norms, defined as predominant attitudes and patterns of behavior in a social group. By providing people with information about such norms (e.g., informing them that their fellow citizens are increasingly using low-carbon means of transportation), people might adapt their own attitudes and behaviors. To assess the role of elite cues, we investigate whether public endorsements of policy proposals by politically relevant and visible actors (e.g., political parties and key policy stakeholders) affect citizens' support for these proposals. For example, if people learn that the car manufacturers' association supports a specific climate policy proposal, does this have an effect on a citizen's own policy appraisal, and if so, is this effect contingent on his or her trust in this actor?

We investigate the role of descriptive norms and elite cues in shaping climate policy preferences in an experiment involving 1520 American residents. Our study aims to make three contributions. First, building on recent research that highlights the potentially productive role of social norms in getting a grip on climate change action (e.g., Hoffman, 2015; Nyborg *et al.*, 2016), we experimentally explore the role that descriptive norm interventions can play in increasing citizens' appetite for ambitious climate change mitigation measures. Extending prior work in this domain, we not only test the impact of 'positive' norms (i.e., descriptive norms favorable to climate change mitigation), but also investigate how 'negative' norms (i.e., descriptive norms *not* favorable to climate change mitigation) influence preferences. Second, by studying the impact of elite cues on climate policy preferences, our study contributes to understanding the polarization of climate attitudes among the American population (Weber & Stern, 2011; Fisher *et al.*, 2013). Third, we explore potential differences in the effects of descriptive norms and elite cues across different mitigation options. As the climate policy literature (e.g., Green & Denniss, 2018) indicates, a mix of supply-side policies (targeting the suppliers of fossil fuels; e.g., mining and utility companies) and demand-side measures (targeting the consumer demand

for emissions-intensive goods) is needed to address climate change, but little systematic research has been conducted to address whether and how preference formation among citizens differs across these different mitigation contexts. Our study contributes to filling this gap.

Descriptive social norms

Social norms, as predominant behavioral patterns within social groups, shape individuals' attitudes and behaviors. This is because individuals face incentives to conform with others' (individuals' or groups') expectations and act accordingly (Asch, 1952; Deutsch & Gerard, 1955). A conceptual distinction is often made between descriptive social norms, which refer to attitudes and behaviors that are prevalent in a social group, and injunctive social norms, which refer to attitudes and behaviors considered appropriate in a group (Cialdini *et al.*, 1990). As one important difference, descriptive norms generally do not involve any social sanction for nonconformity to the norm, whereas injunctive norms do (Cialdini *et al.*, 1990; Christensen *et al.*, 2004).

As Cialdini and Goldstein (2004) pointed out, norms operate through a variety of motivational and cognitive mechanisms. Decision-makers may employ descriptive norms as a source of information to identify the most convenient course of action or they may conform to them simply to reduce cognitive processing effort (see also Mead *et al.*, 2014; Farrow *et al.*, 2017). Hence, it is argued in the literature that descriptive social norms lead (probabilistically) to conformity. A consistent body of research has shown that altering people's perceptions of descriptive social norms (i.e., their perceptions of what others typically think or do) can lead to substantial changes in pro-environmental behavior (Cialdini *et al.*, 1991; Schultz *et al.*, 2007; Allcott, 2011; Farrow *et al.*, 2017). Based on this literature, it has recently been hypothesized that social norm dynamics can trigger virtuous behavioral cycles that could contribute to solving highly complex global problems like climate change (Nyborg *et al.*, 2016; Huber *et al.*, 2018). Moreover, recent research in political economy shows that internalized social norms tend to make people more supportive of international climate agreements (Bechtel *et al.*, 2019). On the basis of these works, we contend that information about descriptive social norms highlighting emerging sustainable behavioral patterns could lead people to become more supportive of ambitious domestic climate policies.

Decision-makers may also comply with injunctive norms, such as to avoid sanctions or to signal agreement with the group norms and confirm identity. However, injunctive social norms have also been shown to potentially result in reactance (e.g., for an experiment on college-age binge drinking, see Jung *et al.*, 2010), and they might be expected to do so in a politically polarized

domain like climate policy. Therefore, the social norms manipulation used in this study involved the provision of information on descriptive social norms. Other studies may investigate how climate policy attitudes are influenced by injunctive norms or by a combination of injunctive and descriptive norms.

As promising as descriptive norms might seem for furthering the diffusion of sustainable behaviors, the dynamics unleashed by the perception or communication of descriptive norms may well also point in the other direction. To paraphrase Cialdini *et al.* (1991), individuals who find themselves in an already littered environment will face incentives to become litterers, too. Consequently, messages that highlight the prevalence of environmentally non-sustainable behavioral patterns should also lead to conformity, running counter to pro-environmental behavior and restraining public support for climate policies. While non-sustainable social norm signals are ubiquitous in the real world, their influence on individuals' support for climate policy is rarely tested and contrasted with messages that signal environmentally sustainable norms. A partial exception for this is provided in the study by Bolsen and colleagues (2014), who showed that norm-based communications portraying others to be unsupportive of climate policies had a negative effect on individuals' willingness to support climate action. We take their work one step further and investigate the potentially differential impacts of positive and negative descriptive norm interventions in the context of public support for two specific and currently discussed measures for climate change mitigation.

Elite cues

Norms emerging from prevalent behaviors in a social group are an example of bottom-up signals for political preference formation. In a complementary fashion, political scientists and behavioral decision researchers have paid attention to top-down signals, such as endorsements of (political) agendas or messages by highly visible actors like political elites. Such endorsements provide cues to their recipients about how to appraise a message, based on its source.¹ Research on the role of the source in determining the persuasiveness of a message has origins in social and cognitive psychology. McGuire (1969, p. 198) contended that individuals use clearly valenced sources of information as cues for preference formation – a mode of making inferences without taking more detailed knowledge into account (see also Chaiken *et al.*, 1989). Political scientists have demonstrated that elite cues can influence political information processing. Accordingly, elite cues can be a powerful heuristic that enables

¹ Hence their description as 'source cues' in the political science literature.

voters to make decisions with minimal effort (Arceneaux & Kolodny, 2009; Nicholson, 2012). Voters have been shown to rely on different types of elite cues when forming political preferences, such as public statements by party leaders or stakeholders' endorsements of a position or policy (Lupia, 1994; Kuklinski & Quirk, 2000; Arceneaux, 2008). Policy preferences seem to be particularly responsive to elite cues in situations of high complexity (Druckman *et al.*, 2010; Nicholson, 2011). As the task of finding climate solutions is indeed a highly complex one (Levin *et al.*, 2012), elite cues may be very important in this area.

Trust in the source of the cue has repeatedly been shown to be an important factor in influencing a message's effectiveness (Eagly & Chaiken, 1993; Miller & Krosnick, 2000). While the concept of trust is not unambiguously defined in the literature (see Nooteboom, 2002), we follow the literature on political trust and define trust as a relational judgment that an individual (the truster) makes with regard to a political actor (the trustee, such as a political party or interest group) concerning some expected behavior (Bauer & Freitag, 2017). Trust in an actor implies the willingness to make oneself vulnerable to a trustee who has the power to do harm or betray the truster (Levi & Stoker, 2000). Political trust is typically conceptualized as graded; that is, a truster evaluates a trustee to be trustworthy to a certain degree (Levi & Stoker, 2000; Schafheitle *et al.*, 2019). In the political realm, the ideology of trusters and trustees is an important transmission belt in the evaluation that an actor will be trustworthy (Hartman & Weber, 2009). Along these lines, it has been shown that ideological congruence between the source of a message and its recipient facilitates framing effects (Bechtel *et al.*, 2015). To illustrate, in Hartman and Weber's (2009) experiment, respondents received information about a proposed rally by the Ku Klux Klan (KKK) embedded either in a frame emphasizing free speech or a public safety and order frame. Additionally, the source of the frame was orthogonally manipulated as originating from either a liberal or a conservative group. Respondents were then asked about their support for the KKK's request to hold the rally. The results demonstrate the power of source information, as respondents were just as likely to support the request as they were to oppose it provided it was framed by the source they identified with, while if the exact same message came from a source respondents did not identify with, their attitudes were not shifted in any direction (Hartman & Weber, 2009). Moreover, elite cues can backfire if the message produces an 'identity mismatch', coming from an actor that an individual does not trust (Aaroe, 2012). Building on this work, we test the impact of cues from political parties and key policy stakeholders, defined as endorsements of specific climate policy proposals, and we investigate how the impact of elite cues on policy preferences depends on respondents' trust in the source of the cue.

Carbon capture and storage and the phase-out of fossil fuel-powered cars: two approaches to mitigating climate change

Based on these priors, we study US residents' preferences with regard to two climate change mitigation policies that could significantly contribute to deep decarbonization: the phase-out of fossil fuel cars and the scale-up of carbon capture and storage (CCS) deployment. Policies to phase out fossil fuel cars are currently being discussed in many countries, several of which (e.g., Norway, France, India and China) plan to phase out cars with internal combustion engines between 2025 and 2040 (Meckling & Nahm, 2019). CCS processes are based on a set of technologies that prevent the release of carbon dioxide (CO₂) produced by industrial processes or electricity generation into the atmosphere or capture CO₂ already present in the atmosphere. The gas is usually captured and transported to a storage site, typically an underground geological formation, where it is deposited. CCS technologies can be combined with fossil fuel-based electricity generation, but also with ethanol production and industrial processes. While the technology plays an important role in several climate change mitigation scenarios (IEA, 2018; IPCC, 2018), CCS deployment has not met projections so far (IEA, 2009; Reiner, 2016), and some CCS projects have faced public opposition (Terwel *et al.*, 2012). CCS is, on average, less supported than other measures to decarbonize the energy system, such as electricity generation from renewable sources (Johnsson *et al.*, 2010).

We selected CCS deployment and the phase-out of fossil fuel cars because they represent fundamentally different mitigation options with different behavioral implications. CCS is a supply-side solution addressing the supply of fossil fuels via macro-level technology deployment. Previous studies found that Americans, like most citizens of advanced economies, have on average extremely low awareness, low knowledge and no strong attitudes with respect to this technology (Reiner *et al.*, 2006; Johnsson *et al.*, 2010; L'Orange Seigo *et al.*, 2014), which is relatively far away from everyday experience and concerns. The transition to low-carbon mobility, on the other hand, has direct demand-side ramifications, requires the formation of habits compatible with climate change mitigation (Creutzig *et al.*, 2018) and is related to policies and technologies most Americans are highly familiar with.

Hypotheses

We hypothesized that positive descriptive norm messages would increase citizens' support for mitigation policies and negative norm messages would decrease support compared to a situation of receiving no information about

descriptive norms. Moreover, we expected the effects of negative descriptive norms to be stronger than positive norms effects. This hypothesis is based on broad evidence in psychology documenting a negativity effect in impression formation (e.g., Skowronski & Carlston, 1989). Specifically, many studies have shown that negative information tends to have a stronger impact on attitudes and behaviors than positive information (Klein, 1996; Cacioppo *et al.*, 1997; Albarracín *et al.*, 2008). With regard to potential differences between the two climate change mitigation policies, we expected descriptive norm interventions to be more effective in shaping support for climate policies that have a direct impact on individual behaviors, as in the case of policies to phase out fossil fuel cars. For supply-side measures such as CCS, which have no bearing on the everyday lives and behaviors of most citizens, we expected smaller effects of descriptive norms on policy support.

We hypothesized that policy endorsement by trusted elites would increase respondents' policy support. However, we expected the effectiveness of elite cues to differ between CCS and fossil fuel-powered car phase-out policies. As the literatures in psychology (e.g., Petty & Cacioppo, 1986) and political science (e.g., Nicholson, 2011) show, people rely more on cues when they do not have enough knowledge to rely on the substance of a message. Due to the lower familiarity of CCS, we expected elite cues to be more effective in shaping support for CCS policies compared to policies relating to a phase-out of fossil fuel-powered cars.

Study design

We conducted a survey experiment on a representative (but nonprobability) sample of 1520 American residents, which matches well with the distribution of key sociodemographic variables in the US population (see Table S1 in the Supplementary Materials). Data were collected between October 1 and 18, 2018. The study was preregistered at the Open Science Framework² and got approval from Princeton University's institutional review board.

To investigate the roles that descriptive social norms and elite cues play in shaping policy preferences, we combined two choice experiments with an experimental manipulation of perceived descriptive norms. Choice experiments have recently been adopted by social scientists to gauge citizens' preferences for policy proposals. By observing respondents' preferences when exposed to a series of multidimensional policy scenarios, this method provides a powerful approach to simultaneously estimate the individual effects of

² See https://osf.io/6w4h3/?view_only=b59087110dad4733b1dbc218c22a9eeb.

several attributes of a policy proposal on policy preferences (Bechtel & Scheve, 2013; Gampfer *et al.*, 2014). In our case, this experimental design allowed us to investigate the impact of elite cues, one of the attributes of the presented proposals, on policy preferences across a wide range of policy proposals.

Study flow

Respondents first answered a range of questions that measured relevant covariates (see Table S3). Next, they were randomly assigned to either the choice experiment about fossil fuel-powered car phase-out policies or the experiment on CCS deployment policies, and they received basic information about the respective policy debate and policy design attributes (see below). Before turning to the choice experiments, respondents were randomly assigned to either a control or one of two social norm treatment conditions (see Figure 1 and Supplementary Materials for more details). Respondents in the treatment conditions received information about descriptive social norms, describing policy-relevant attitudes and behaviors of citizens living in their state. After reading information on the policy and – for treated respondents – on relevant descriptive norms, participants completed the first choice experiment. Next, respondents who had first been assigned to the phase-out experiment were assigned to the CCS experiment, and vice versa, so that in the end all participants completed both choice experiments. Again, the provision of policy information and the social norm manipulation preceded the choice experiment. After this second round, respondents answered some final questions and received a short debriefing.

Choice experiments

Participants were instructed that potential policy proposals to phase out fossil fuel-powered cars (scale up CCS) in their state vary on a number of attributes, and they received specific information about these attributes and their levels. The focal attribute of interest was elite cues, which we operationalized as endorsements of policy proposals by either one of the two main American political parties or one of two key policy stakeholders. Other attributes included policy design features such as policy type, timing of policy implementation, policy costs, pollution reduction (only for phase-out policies) and required distance from residential areas (only for CCS policies). Table S2 shows all attributes and their levels.

Respondents were shown eight pairs of hypothetical policy proposals (choice tasks) to phase out fossil fuel cars (scale up CCS) in their state, one pair at a time. The description of each proposal provided information on stakeholder endorsement and the four policy design attributes, with levels that varied

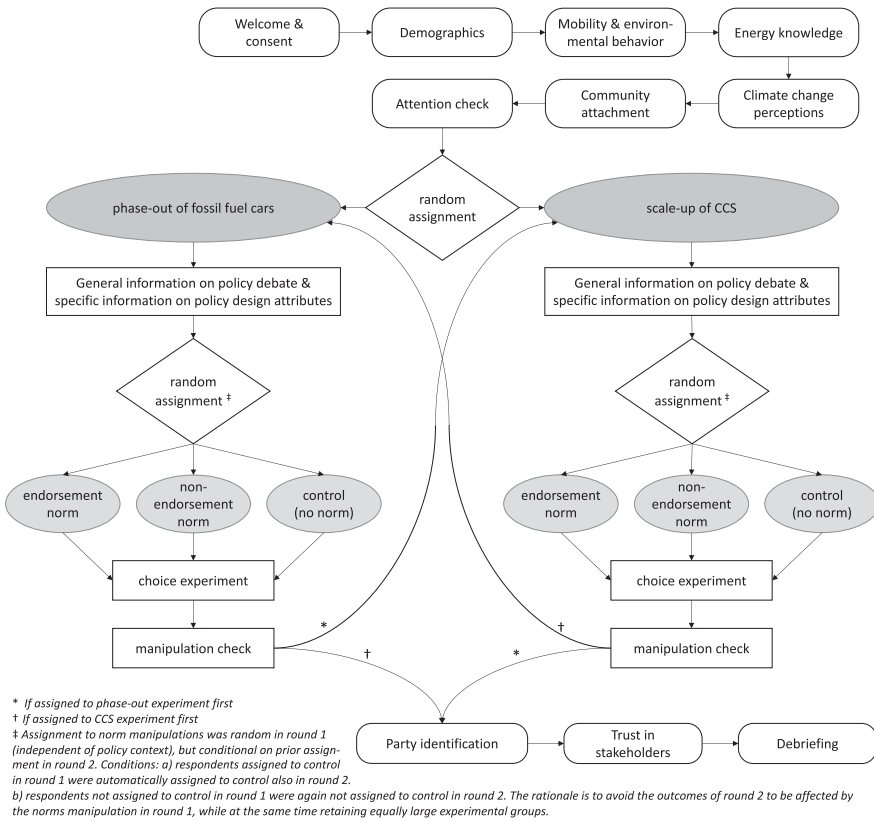


Figure 1. Summary of the study flow.

Note: 560 respondents who did not pass the attention check implemented before the choice experiment were excluded. These do not count into sample size of $n = 1520$. This exclusion criterion was included in the preregistration. CCS = carbon capture and storage.

randomly both within and across the binary comparisons (Hainmueller *et al.*, 2014). Figure S1 provides an example of a choice screen. For each pair of policy proposals, respondents’ policy preferences were assessed using two measures. First, respondents were forced to choose which of the two proposals they preferred (‘forced choice outcome’). Second, respondents were asked to imagine having the possibility to vote for either one of the proposals in a direct democratic vote and to indicate, on a scale from 0 to 10, how likely they would be to vote for each proposal (‘rating outcome’). Tables S4 and S5 summarize the main results of the choice experiments. Because this study focuses on the extent to which top-down and bottom-up signals shape climate policy

preferences, we focus on the elite cues attribute in the analysis below. The extent to which the policy design attributes influence citizens' preferences is analyzed in depth elsewhere (Rinscheid *et al.*, 2020).

Descriptive social norm treatments

The choice experiments were embedded in an orthogonal experimental manipulation of perceived social norms. Respondents were randomly assigned to an endorsement norm condition, a non-endorsement norm condition or a control condition (see Figure 1). In the experimental conditions, respondents read a short text highlighting prevalent policy-relevant attitudes and behaviors. Individuals in the control group received no text. As humans are motivated to pay particular attention to the norms of groups to which they belong (Tankard & Paluck, 2016, p. 184), all treatments mentioned residents of the state where each respondent lived as the reference group.

Social norm manipulations differed slightly for the two policies. For fossil fuel-powered car phase-out policies, respondents received information about the policy-relevant behaviors of their peers. In the endorsement condition, this included a statement about the increased diffusion of sustainable mobility behaviors, while in the non-endorsement condition, it included a statement about the limited diffusion of sustainable mobility behaviors. For CCS, a manipulation based on peer behavior would likely not have been credible, as the technology carries less behavioral relevance and is unknown to large parts of the population. Instead, respondents received information on the prevalent attitudes of people living in their state with respect to CCS policies. In the endorsement condition, this entailed a statement that policies to scale up CCS find broad public support in their state, while in the non-endorsement condition, this entailed a statement about low public support for CCS (see Supplementary Materials). Our manipulation check shows that the manipulations altered respondents' perceptions of descriptive social norms significantly (and symmetrically for positive and negative norms) relative to the control condition for both policy contexts (see Supplementary Materials).

Results

Pre-experimental support for decarbonization policies

After being provided with basic information about each of the two types of policies, respondents were asked about their general policy support. About 34% of respondents answered that they (strongly) support policies to phase out fossil fuel cars (corresponding to '5' or '6' on the 6-point scale), while 20% indicated that they (strongly) oppose such measures ('1' or '2' on the

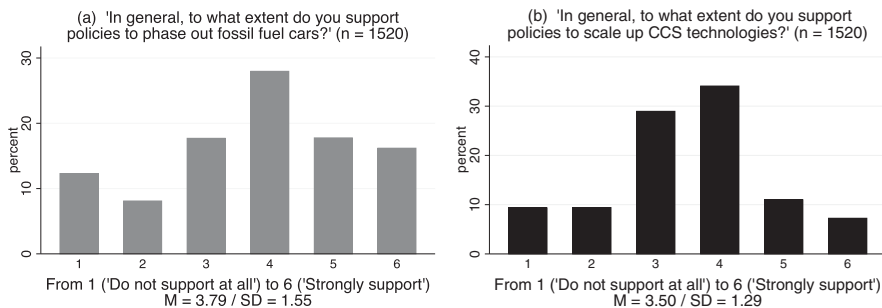


Figure 2. Initial support for policies to (a) phase out fossil fuel cars and (b) scale up carbon capture and storage (CCS).

Note: Pre-experimental support for the two policies was assessed using a scale from 1 to 6. Only the endpoints were labeled (1 = Do not support at all; 6 = Strongly support).

6-point scale; see [Figure 2\(a\)](#)). For the scale-up of CCS, preferences were less settled: only about 18% (strongly) opposed or (strongly) supported policies, respectively, and 63% took an intermediate position on CCS ('3' or '4' on the 6-point scale; see [Figure 2\(b\)](#)). This is due in part to the fact that only 19% of respondents were sure that they had heard about CCS before taking the survey, a number that might still be inflated.

Descriptive social norms and support for decarbonization policies

To assess the impact of descriptive social norms on citizens' policy preferences, we relied on the rating outcome of our choice experiments. The dependent variables of our main regression models correspond to respondents' mean policy ratings (out of 16 individual ratings per individual). In order to ease interpretation of the marginal effects shown below, we transformed the dependent variables to the probability scale and regressed the transformed mean policy ratings on the experimental manipulations. The dependent variables can be interpreted as measures of overall support for policies to phase out fossil fuel-powered cars and to scale up CCS, respectively. We also run extended models including a set of covariates to control for potential imbalances between the experimental groups, but also to identify factors beyond those manipulated in the experiment that may explain support for our policies of interest.

As outlined earlier, we expected negative norms to have a stronger impact on policy preferences than positive norms. As indicated in [Table 1](#), we do indeed find some evidence for this hypothesis, as the coefficients for non-endorsement norms are statistically significant and point in the expected direction in the case of phase-out policies, while the coefficients for the endorsement norm

Table 1. The influence of social norm treatments on climate policy support.

	Model 1: Support for phase-out of fossil fuel-powered cars	Model 2: Support for phase-out of fossil fuel-powered cars	Model 3: Support for scale-up of CCS	Model 4: Support for scale-up of CCS
Endorsement norms	0.0115	0.0103	0.0054	0.0062
Non-endorsement norms	-0.0314*	-0.0221*	-0.0140	-0.0162
Age		-0.0280***		-0.0338***
Gender (baseline female)		0.0105		0.0043
Income		-0.0043		-0.0105*
Rural (baseline urban)		-0.0148**		-0.0130***
Car ownership		-0.0067		
Democrat (baseline Independent)		0.0462***		0.0449***
Republican (baseline Independent)		0.0212		0.0197
Energy knowledge		-0.0003		
Knowledge about CCS				0.0043
Environmental behavior (low to high)		0.0115*		0.0106*
Community attachment (low to high)		0.0310***		0.0249***
Psychological distance of climate change (high to low)		0.0609***		0.0619***
Pre-experimental policy support		0.0867***		0.0925***
Constant	0.492***	0.451***	0.463***	0.434***
<i>n</i>	1520	1511	1520	1511
<i>R</i> ²	0.006	0.485	0.001	0.475

Note: Coefficients from ordinary least squares regressions. Standard errors are clustered at the level of the individual. For measurements of independent variables, see Table S3; for measurement of pre-experimental policy support, see Figure 2. Age was recoded to six groups (18–29, 30–39, 40–49, 50–59, 60–69 and 70+). Party identification is captured with two dummy variables for Democrats and Republicans, respectively. Continuous predictor variables were standardized before conducting the analysis (mean = 0; SD = 1).

p* < 0.05, *p* < 0.01, ****p* < 0.001.

CCS = carbon capture and storage.

condition fail to attain significance (see Models 1 and 2). Hence, ‘negative’ descriptive norms may have a more discernible impact on citizens’ policy preferences. When comparing the relevance of social norms across mitigation contexts, we had expected norms to be less effective in the context of CCS than in the context of fossil fuel-powered car phase-out policies. As can be seen in [Table 1](#) (Models 3 and 4), there is indeed no effect of descriptive norm information on CCS policy support. We also conducted linear contrasts directly comparing the positive and negative norm conditions for both policies. Accordingly, we identify a significant effect of descriptive social norms for the case of phase-out, but not CCS policies (see Supplementary Materials for further details).

While the fact that we only found effects of descriptive norms on phase-out policy support might be related to the different manipulations for the two policies, this finding lends suggestive evidence to our expectation of descriptive social norms being more important drivers of preferences with respect to policies that entail more direct implications for citizens’ everyday lives and behaviors. Other covariates included in Models 2 and 4, such as pre-experimental support for the respective policies, the perceived psychological distance of climate change (i.e., the extent to which respondents perceive climate change as distant or proximal)³ and people’s environmental behavior, age, party identification and community attachment, are significantly related to support for both phase-out and CCS deployment policies (see [Table 1](#)).

According to sensitivity analyses, we cannot exclude the possibility of type II error due to limitations of statistical power. Our sample size provides sufficient power to detect effects greater than 0.04. Hence, there is a high probability of small undetected effects of descriptive norms. As we further show in the Supplementary Materials, the detection of smaller effects would have necessitated a massive sample.

To shed more light on the differential effect of descriptive social norm information on policy support for phasing out fossil fuel-powered cars versus scaling up CCS deployment, we compute (absolute) support levels based on predicted values. [Figure 3](#) shows the simulation results for assessing levels of policy support for the three experimental groups, averaging over all policy attribute levels varied in the choice experiment. The results corroborate our intuition. Descriptive social norms might be more influential in the context of phase-out policies, which have more direct implications for individual behavior. In particular, the average support level for phase-out policies

³ We follow Liberman and Trope (2008) in conceptualizing perceived psychological distance as four-dimensional, including temporal, spatial, social distance and uncertainty (i.e., the perceived likelihood of an event). Our composite measure of perceived psychological distance of climate change reflects these dimensions (see [Table S3](#)).

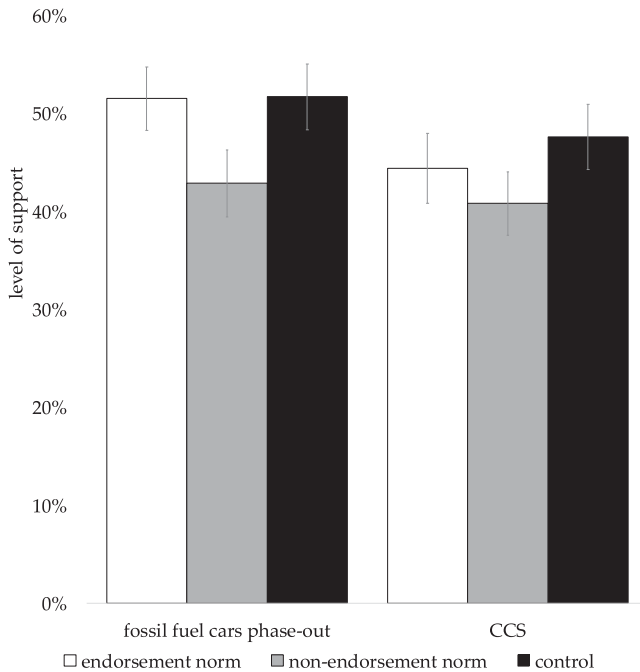


Figure 3. Predicted values of policy support, contingent on social norm treatment.

Note: Error bars represent associated 95% confidence intervals.
CCS = carbon capture and storage.

amounts to only 42.9% in the non-endorsement condition, while it reaches 51.5% in the endorsement norm and 51.7% in the control condition, and the differences between non-endorsement and endorsement/control are statistically significant. Average support levels for CCS range from 40.8% (non-endorsement) to 47.6% (control), but the differences are not significant.

Elite cues and support for decarbonization policies

We investigate the potential influence of elite cues on policy preferences based on the analysis of the respective attribute implemented in our choice experiments. To analyze the choice experiment data, we used linear regression models (Hainmueller *et al.*, 2014), including dummies to control for the social norm intervention. We did not expect endorsements to play a role in the aggregate, but that respondents' trust in the respective actors would moderate endorsement effects. Therefore, in addition to the main models documented in Tables S4 and S5, we ran a series of regression models interacting the

individual levels of the endorsement attribute with respondents' levels of trust in the actors included in the choice experiment (Democrats, Republicans, Greenpeace and the US Alliance of Automobile Manufacturers (USAAM) or Carbon Capture (CC) Coalition, respectively). We relied on the following item to measure trust in these political actors: "To what extent do you mistrust or trust the following actors and organizations?" using a labeled five-point scale from "strongly mistrust" to "strongly trust" (see Table S3).

Figures 4 and 5 show the average marginal component effects of stakeholder endorsements, conditional on the level of trust in political actors. Overall, trust in political parties is associated with strong cueing effects. As Figure 4(a) shows, trust in the Democratic Party leads to significantly lower support for phase-out proposals endorsed by almost any other actor, except for Greenpeace. For example, a proposal endorsed by the Republican Party leads to a 9 (12) percentage point decrease in the probability of being supported by respondents who (strongly) trust the Democratic Party. Mistrusting the Democratic Party, on the other hand, is associated with increasing policy support if endorsement comes from actors other than the Democratic Party. The results are similar when assessing trust in the Republican Party (see Figure 4(b)). A proposal endorsed by the Democratic Party leads to a 6 (14) percentage point decrease in the probability of being supported by respondents who (strongly) trust the Republican Party.

Trust in other stakeholders is associated with weaker cueing effects. As can be seen in Figure 4(c), neither trusting nor mistrusting USAAM leads to cueing effects (except that respondents who strongly mistrust USAAM prefer proposals endorsed by Greenpeace). Trusting Greenpeace, on the other hand, is associated with significantly lower support for policy proposals endorsed by the Republican Party or USAAM (Figure 4(d)). Mistrusting Greenpeace, in turn, leads to significantly higher support for policy proposals endorsed by USAAM or the Republican Party.

Overall, the influence of elite cues follows similar patterns in the case of CCS policies (see Figure 5). Recall that we expected stakeholder endorsements to play a more important role in the context of CCS. For the more familiar and less complex matter of fossil fuel-powered car phase-outs, stakeholders' recommendations were hypothesized to be less influential. As a yardstick that allows for direct comparison, we computed predicted values of policy support levels. If our expectations were true, we would expect to see a larger difference in absolute support levels for the case of CCS policies, contingent on the variation in the source of the cues. As the previous analysis demonstrates that partisan cues are more important than cues by other stakeholders, the predicted values shown in Figure 6 focus on how trust in parties moderates respondents' support for policies that are endorsed by either one of the two parties.

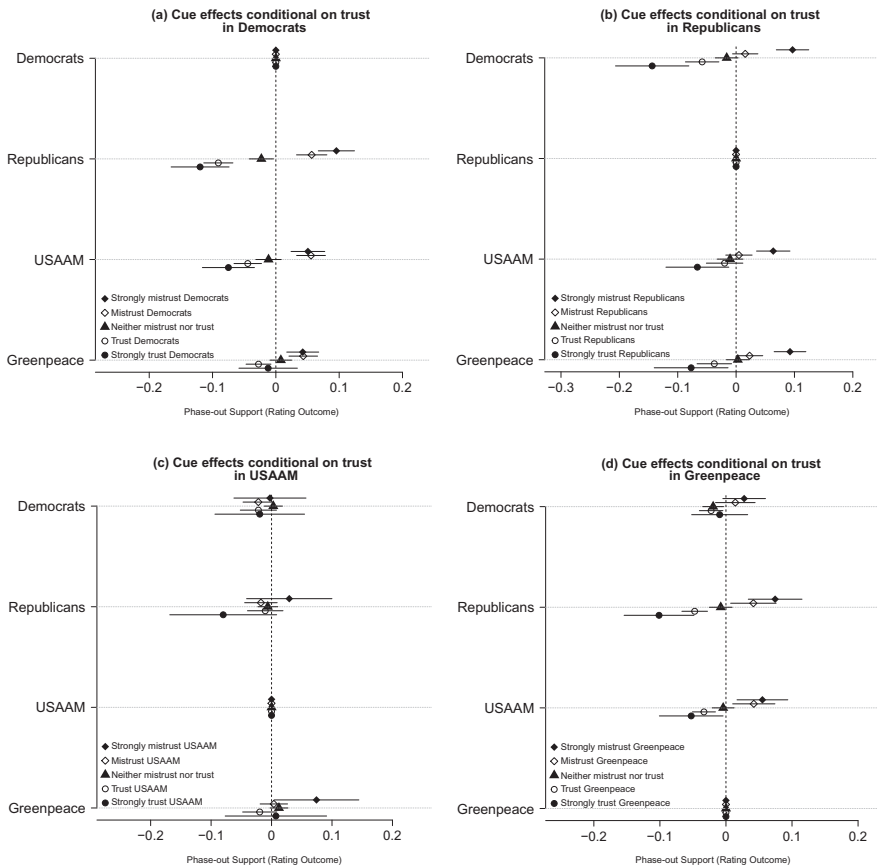


Figure 4. Effects of stakeholder endorsements on phase-out policy support, conditional on respondents' level of trust in these actors. (a) Cue effects conditional on trust in Democrats; (b) cue effects conditional on trust in Republicans; (c) cue effects conditional on trust in USAAM; and (d) cue effects conditional on trust in Greenpeace.

Note: Each dot represents an average marginal component effect of an individual attribute level (i.e., endorsement by stakeholders) on respondents' probability of choosing a policy proposal in relation to a proposal with the reference level. Horizontal bars represent associated 95% confidence intervals. The calculations are based on regression analyses with rating outcomes, the full set of attribute levels included and standard errors grouped at the level of the individual (clustered standard errors); $n = 1520$. USAAM = US Alliance of Automobile Manufacturers.

For this analysis, we classified respondents into five categories: (1) those that trust the Democratic Party but not Republican Party ($n = 518$); (2) those that trust the Republican Party but not Democratic Party ($n = 434$); (3) those

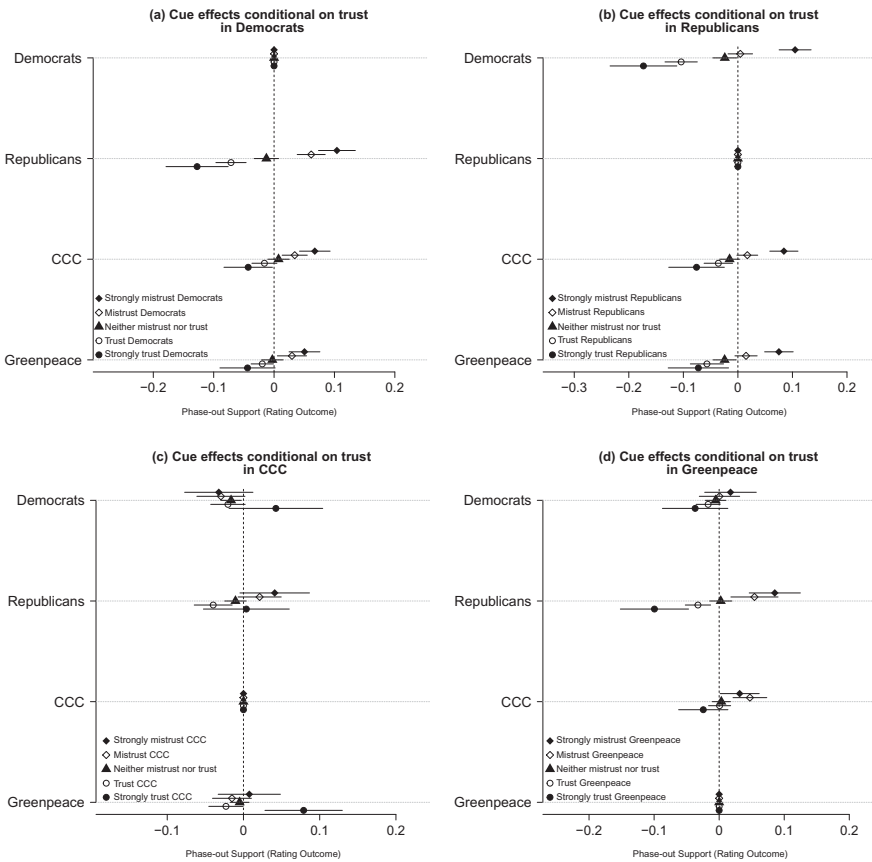


Figure 5. Effects of stakeholder endorsements on carbon capture and storage policy support, conditional on respondents' level of trust in these actors. (a) Cue effects conditional on trust in Democrats; (b) cue effects conditional on trust in Republicans; (c) cue effects conditional on trust in CCC; and (d) cue effects conditional on trust in Greenpeace.

Note: See Figure 4.

CCC = Carbon Capture Coalition.

that mistrust both parties ($n = 263$); (4) those that neither trust nor mistrust any party ($n = 238$); and (5) those that trust both parties ($n = 67$; for details, see Supplementary Materials). Figure 6 illustrates the results for respondent profiles (1) and (2), and Figure S2 entails the full results. For the first group (trust in the Democratic Party), the predicted level of support for phase-out policies is 63.0% if endorsement comes from the Democratic Party and 53.2% if endorsement comes from the Republican Party. For CCS policies, the predicted

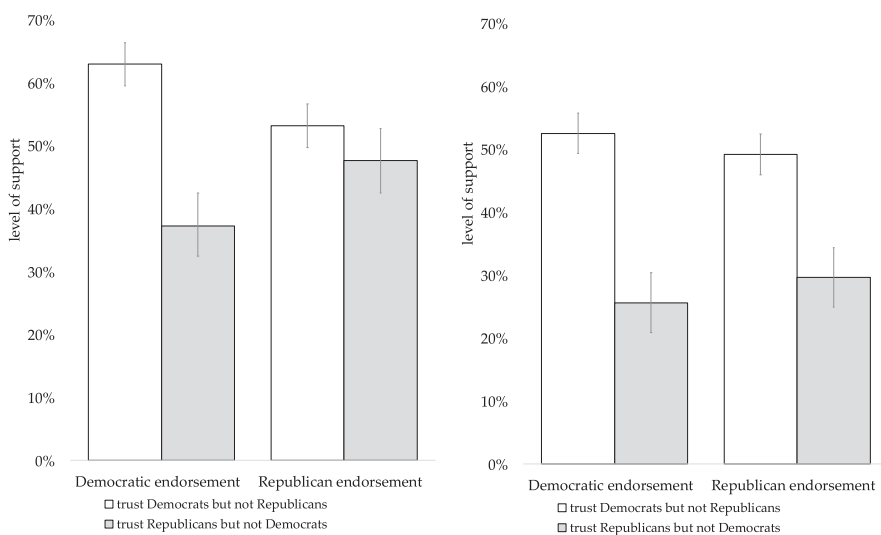


Figure 6. Predicted values of policy support contingent on partisan endorsement and trust in parties.

Note: Error bars represent associated 95% confidence intervals.

level of support within this group amounts to 52.6% with Democratic endorsement and 49.2% with Republican endorsement. Hence, contrary to our expectations, for this group, the difference between a Republican and a Democratic endorsement is even lower for CCS (3.4 percentage points) than for phase-out (9.8 percentage points) policies.

The same pattern emerges for the second group (trust in the Republican Party). In this group, predicted support for phase-out policies amounts to 47.6% for Republican endorsement and 37.3% for Democratic endorsement. For CCS policies, predicted policy support amounts to 29.7% with Republican endorsement and 25.6% with Democratic endorsement. Phase-out policy support hence changes by 10.3 percentage points if endorsement shifts from Democrats to Republicans, while CCS policy support changes by only 4.1 percentage points if the same shift occurs. Based on these results, we reject our hypothesis of elite cues being more relevant for the formation of climate policy preferences in the (arguably less familiar) domain of CCS. One explanation for this finding might be that knowledge about a specific subject matter should reach at least a certain base level for elite cues to substantially influence policy preferences. Clearly, more research should be conducted in order to understand how elite cues (and other factors) can influence public support for less known decarbonization options.

Discussion

Summary and policy relevance

To assess the political feasibility of different decarbonization strategies, it is important to better understand what drives their public perception. This is particularly true in times of deepening political polarization around the issue of climate change, driven in part by right-wing populist agendas and post-truth politics (Fraune & Knodt, 2018; Lockwood, 2018). In this paper, we explored how support for climate change mitigation policies is shaped by bottom-up and top-down signals, investigating the roles that descriptive social norms and elite cues play in the construction of policy preferences. By assessing their influence across two different climate change mitigation contexts (fossil fuel-powered car phase-outs and CCS deployment), our study allowed us to examine whether the effects of norms and cues vary across policies that differ in their impacts on citizens' routines and behaviors.

Moderating recent hopes that social norms might be a promising back-door approach to increasing support for climate change mitigation policies (Doherty & Webler, 2016; Nyborg *et al.*, 2016; Huber *et al.*, 2018), we found the impact of descriptive social norms on climate policy support to be less pronounced than expected. Importantly, our study tested the impact of both positive and negative descriptive social norm messages. While neither positive nor negative social norm information had a significant impact on CCS policy support when compared with the control condition of no normative information, only negative norm information had a significant impact on fossil fuel-powered car phase-out policy preferences, reducing policy support. These findings suggest that the impact of normative information varies across mitigation contexts, depending on the familiarity and behavioral relevance of policies. For decarbonization efforts that strongly affect user practices and everyday routines, like those in the transportation sector, the perceived prevalence of negative social norms may constitute an important barrier. In the case of policies to phase out fossil fuel-powered cars, our test of the difference between positive and negative norms conditions shows that providing information on the increased diffusion of sustainable mobility behaviors produced significantly higher levels of policy support with respect to providing information on the prevalence of non-sustainable mobility behaviors. This suggests that turning a negative norm into a positive one may be an effective tool to shift policy support. However, the results of our study also indicate that descriptive social norms have their limits in shaping individual climate policy preferences. On the one hand, this should come as no surprise, as preference formation depends on a variety of factors.

Nevertheless, we also caution that this finding should not be overinterpreted, for the reasons we address below.

In contrast to our results relating to social norms, the effects of elite cues on policy support are quite straightforward and substantial: cues that come from a trusted source clearly and significantly influence climate policy support. At the same time, endorsements of policies that emanate from an untrusted source lower citizens' policy support. The finding that political elites can influence mass attitudes and behaviors is not new, but our experimental application to the context of climate policies provides some important lessons. Our results suggest that parties (rather than other economic stakeholders) constitute the relevant in- and out-groups of American climate politics (cf., Nicholson, 2012). Interestingly, party cues are more influential in the context of fossil fuel-powered car phase-out policies, but they also affect policy support in the less familiar mitigation context of CCS. As party cues may be crucial levers to increase public support of rapid decarbonization policies, climate policy communicators might be well advised to take their potential impact on public support into account.

Limitations and implications for further research

The design of our study and hence the interpretation of the results are subject to a number of limitations that, however, also open up avenues for future research. First, the study relies on a rather complex design. A more straightforward design could have tested the impact of different elite cues on support for a single policy proposal, probably identifying even stronger source cue effects. We argue, however, that presenting policy endorsements as one among other varying elements characterizing potential policy packages and gauging respondents' preferences over several rounds more realistically simulates preference formation in light of messy real-world climate policy debates. While our design does not sacrifice internal validity, our results are characterized by high external validity (Hainmueller *et al.*, 2014).

A second limitation of our study is that the reference group (people living in the respondent's state) chosen for our social norm manipulations might not hold the highest normative importance for most respondents. Social identity theory (see Hornsey, 2008), for instance, predicts that norm interventions are more influential if the reference group is perceived as more central to one's identity. While we acknowledge that selecting reference groups closer to respondents (e.g., friends, coworkers or neighbors) might have led to stronger impacts on policy attitudes, selecting residents in respondents' states allowed us to avoid deception and to present identical and realistic manipulations to all respondents. Moreover, as the normative importance of groups is

context-dependent (Hogg & Reid, 2006), we assumed that the group of people living in a respondent's state carried a certain relevance in the context of a decision about a state policy. In order to spur theoretical growth on this topic, we would like to redouble Tankard and Paluck's (2016, p. 197) call for more research to identify the relevant reference groups and sources of normative information in different contexts and for different populations of interest.

Future studies on the effects of descriptive norms could employ improved experimental manipulations and better attend to the psychological processes that these may trigger. As evidenced by the analyses of our manipulation checks, while the treatments produced statistically significant differences in perceptions of descriptive norms across experimental groups, a comparison of mean scores (see Supplementary Materials) suggests that our descriptive norm manipulations were not particularly strong. This, again, might mirror real-world processes of information processing more closely than a setting in which a manipulation would have been highly effective, but it also helps to explain the limited effects of social norms detected in this study. In other words, one explanation for our results might be that respondents were not pushed over a meaningful norm perception threshold. As recent research by Sparkman and Walton (2017) has shown, presenting a norm as beginning to change (i.e., a dynamic norm information) seems to carry promise for leapfrogging such a threshold compared to conveying static information about existing norms.

While this study focused on the impact of descriptive social norms, we would welcome future studies that investigate the impact of injunctive social norms on climate policy attitudes. Moreover, it would be valuable to interrogate and test whether combinations of descriptive and injunctive norms maximize persuasive power in this context. Our findings on the impact of trusted elite cues on policy support should also be extended in future studies. While our results suggest that single-party policy endorsements increase polarization among partisan supporters, future studies could investigate the impact of bipartisan policy endorsements, which may prove successful in increasing support for climate policies across political camps.⁴ The role of elite cues in shaping policy support should also be studied in jurisdictions other than the USA to assess the extent to which our results might be confined to this specific political system. Finally, potential interactions between top-down and bottom-up signals in shaping climate policy support are ripe for investigation.

⁴ Our research design precluded the possibility of bipartisan endorsements, hence we cannot make conclusive claims in this regard.

Supplementary material

To view supplementary material for this article, please visit <https://doi.org/10.1017/bpp.2020.43>.

Acknowledgments

We thank the editors of this special issue, two anonymous reviewers as well as Valentina Bosetti, Beatrice Petrovich, Judi Greenwald and Gregg R. Sparkman for their valuable comments.

Financial support

This research was supported by a Swiss National Science Foundation Scholarship (Grant no. P1SGP1_174939) to AR; a SEAL (Sustainability, Environmental Achievement & Leadership) research award to AR; the Andlinger Center for Energy and the Environment at Princeton University; and a grant by the European Research Council under the European Community's Programme 'Ideas' – Call identifier: ERC-2013-StG/ERC grant agreement n° 336703 – project RISICO 'RISk and uncertainty in developing and Implementing Climate change pOlicies', which supported SP.

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