

illuminating the link between perceived threat and control over climate change: the role of attributions for causation and mitigation

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Abstract Perceiving greater threat from climate change has been shown to positively affect beliefs about humanity's ability to mitigate the threat. We examined two possible mediators of this paradoxical relationship utilizing data from a large socioeconomically diverse sample of the US adults ($n = 1040$) collected in 2015. Specifically, we predicted that attributing responsibility for either causing or mitigating climate change to government entities would bolster perceived collective control for addressing the problem. Results of structural equation modeling suggest that both types of attributions mediate the relationship between perceived threat and control over climate change, with the full model accounting for 57% of the variance in perceived collective control. Moreover, for the overall sample, attributions of responsibility for mitigating climate change emerged as a stronger mediator of perceived control than did causal attributions and as the only significant mediator among Republicans. We consider implications of these findings for understanding the role of attribution processes in public engagement on climate change and the effective communication of environmental risks.

Keywords Climate change · Attributions of responsibility · Mitigation beliefs · Threat perception · Collective control

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1 Introduction

People are motivated to feel a sense of control over their environments and their lives (Seligman 1975; Thompson and Schlehofer 2008). Intuitive models of risk appraisal suggest that perceptions of threat are often negatively correlated with perceived control: when people feel that the demands of acute stressors or everyday life events surpass their ability to manage them, threat perceptions increase (Bandura 1997; Fisher 1986; Jerusalem and Schwarzer 1992; Lazarus and Folkman 1984). In contrast to this standard view of the threat-control relationship, research on public opinion related to climate change has repeatedly documented a *positive* link between perceived threat and control, such that those reporting greater perceptions of threat tend to report greater feelings of both personal and collective control in confronting climate change (Heath and Gifford 2006; Kellstedt et al. 2008; Milfont 2012; Roser-Renouf et al. 2015).

One possible explanation for these findings is that both perceived threat and perceived control are correlated with belief in climate change and belief that humans are to blame for it, whereby skeptics who may perceive little or no threat may perceive little or no need to manage the threat. However, experimental findings from Hornsey et al. (2015) suggest a *causal* link between threat perception and perceived collective control even among non-skeptics. Excluding participants who did not believe in climate change or its human causes from the analysis, the researchers found that respondents who were exposed to a climate-related message that enhanced feelings of threat showed greater perceptions of collective control in addressing climate change, compared to those exposed to a low-threat message. Hornsey et al. (2015) suggested that this paradoxical link may reflect a motivational process, whereby perceived collective control has a compensatory function that arises from a desire to restore control in the face of collective threats (see Kay et al. 2009).

However, the mechanisms that might explain the paradoxical relationship between perceived threat and collective control have received limited empirical attention. Illuminating the cognitive processes underlying this link may have important theoretical and practical implications for understanding how climate threats are communicated in ways that optimally maintain or even enhance collective action (see Moser 2016). In this study, we examined the role of climate change attributions as an explanatory mechanism: specifically, whether attributions of responsibility for either (a) causing climate change or (b) mitigating its effects could help to explain the positive relationship between perceived threat and collective control beliefs. We reasoned that perceptions of threat from climate change would predict greater attributions of responsibility to government entities (e.g., the US congress or president)—the decision making bodies that are most influential in addressing climate change—which, in turn, would predict greater confidence in humanity's ability to effectively combat negative effects of climate change. Additionally, given the highly polarized nature of climate change risk perceptions (Hornsey et al. 2016), we explore the extent to which these attributions might differentially account for the threat-control relationship among political partisans in the USA.

1.1 Understanding the threat-control link: attribution in motivated cognition

According to Lazarus and Folkman's (1984) cognitive theory of stress, threat is a type of a stressor characterized by a sense of danger and anticipation of future harms and losses. The cognitive theory of stress posits that when people encounter a stressor of any kind, they engage in cognitive appraisal processes that involve a primary appraisal, which entails an evaluation of

the encounter (i.e., how relevant and harmful it is), and a secondary appraisal, which entails an assessment of available ways and means to deal with the stressor. Perceptions of control are part of the secondary appraisal and include beliefs about the effectiveness of existing strategies and one's own ability to execute the strategies (Folkman 1984; see also Bandura 1986).

Echoing a number of other theoretical perspectives (Bandura 1997; Fisher 1986; Jerusalem and Schwarzer 1992), the cognitive theory of stress posits that high levels of perceived control over a situation can reduce the level of perceived threat and vice versa (Folkman and Lazarus 1985). However, there is not always a negative association between threat and control—a positive association can also occur (Folkman 1984). More specifically, an individual may attempt to regulate threat and corresponding negative emotions by assessing threats in ways that boost the degree of perceived control (Folkman 1984).

One context in which the positive relationship between perceived threat and control has repeatedly emerged is climate change (e.g., Hornsey et al. 2015; Kellstedt et al. 2008; Milfont 2012). Of particular interest, in the work by Hornsey et al. (2015), threat perceptions were found to positively influence collective control beliefs (i.e., beliefs about the ability of the collective to mitigate the threat) but not personal control perceptions (i.e., beliefs about being able to influence the crisis through personal actions). Following from the Hornsey et al. (2015) findings, we hypothesized that perceptions of threat may prompt individuals to consider which entities contribute most to the threat (and, therefore, can potentially reduce their causal impact) and can most effectively address the problem of climate change—that is, to engage in attributional processes. Pinpointing an influential actor (e.g., the role of governments), in turn, may raise the level of perceived collective control. We test this reasoning in the present research.

Generally, the unique features of anthropogenic climate change—a complex, shared global threat, with uncertain causes and outcomes—point to a critical role for understanding how attributions shape the ways that people process climate risks and assess whether those risks can be managed. Attribution theory posits that people strive to understand the causes of events and their outcomes (e.g., Weiner 1990). Research on motivated reasoning (Kunda 1990) suggests that all judgments, including of the controllability of threats and about who is responsible for causing them, are powerfully motivated by desired end states (Kunda 1990; Langer 1975; Nickerson 1998) and that people employ a variety of cognitive strategies aimed at boosting a sense of control to achieve these preferred outcomes (Landau et al. 2015). Moreover, when people are able to isolate specific causes of events, they derive a sense of control over the situation, which can enhance the perceived tractability of a problem. For instance, research shows that assigning responsibility for an economic recession to specific groups (e.g., immigrants, bankers) has a stronger effect on enhancing feelings of control over one's economic situation than does blaming the economic system more generally (Bukowski et al. 2016).

According to psychological models of compensatory control, threats that reduce perceived control can motivate attributions to restore control (Kay et al. 2009). Compensatory control theory posits that the drive to maintain a sense of control is one manifestation of a more basic desire to believe that the world is nonrandom, manageable, and predictable (Kay et al. 2009, 2014; Landau et al. 2015). Moreover, uncertain, complex, and threatening events, such as climate change, are particularly likely to prompt spontaneous causal attributions to buttress a sense of control (Gray and Wegner 2010; also Waytz et al. 2010).

Hornsey et al. (2015) argued that perceived collective control in the context of climate change, in part, reflects motivated thinking designed to reduce helplessness in the face of

threat. Consistent with this perspective, they found that perceptions of threat, induced experimentally, enhanced perceptions of collective control and that this relationship could not be explained by latent third variables, such as respondents' environmental identity or political ideology, that cause both perceptions of high threat and high control. Nevertheless, these findings leave open questions about the mediating psychological processes that may help to explain the paradoxical link between risk perception and controllability and potential moderating role of political partisanship on these processes. In the present research, we explored attributions of responsibility for climate change as one such compensatory cognition that may enhance sense of collective control, and its potentially differing role among political partisans in the USA (Democrats, Republicans, and Independents). Consistent with prior research documenting causal effects of threat on felt collective, but not personal, control (see Hornsey et al. 2015, study 2), and given the relevance of perceived collective efficacy as an antecedent of collective action (see Moser 2016; Roser-Renouf et al. 2014), we focused specifically on perceptions of *collective* rather than personal control.

1.2 The present study

When it comes to climate change—a collective global issue that necessitates national and international cooperation across government entities (Moser 2016; Pearson et al. 2016)—we hypothesized that attributions of responsibility to government may explain the positive relationship between perceived climate threat and perceptions of collective control. Attributing the cause of the problem, at least in part, to state and government actors means recognizing their power to combat the problem. Additionally, to the extent that citizens believe that government priorities can be influenced, or that government officials can be replaced, they may feel a sense of enhanced collective control when considering government entities as causal agents. Indeed, public opinion surveys reveal that sizable portions of the US public believe that, via regulatory oversight, government plays a fundamental role in both causing and reducing threats from climate change (YouGov 2013), and a sizable majority of registered US voters view the federal government as responsible for preparing for various impacts of climate change (over 70%), including the president (62%) and US congress (63%) (Leiserowitz et al. 2016).

Although causal attributions and attributions of responsibility for addressing a problem (mitigation) may both make problems seem more tractable (Brickman et al. 1982; Hallman and Wandersman 1992), we hypothesized that attributions of responsibility for addressing climate change would more strongly predict enhanced perceived collective control than merely identifying its causal agents. In other words, perceiving government as merely a *cause* of climate change may orient people to perceive flaws in the current political system that could undermine feelings of control. In contrast, orienting attention to those who are responsible for *mitigating* a problem shifts the attentional focus from cause to remedies, which may heighten beliefs that a problem such as climate change is solvable.

Given the highly politicized context of climate change (Hornsey et al. 2016), we also examined the role of political party (identification as a Democrat, Republican, or Independent) in the attributional processes linking climate change threat perceptions and perceived collective control. Research suggests that both liberals and conservatives are prone to motivated reasoning when assessing risks posed by collective problems (Campbell and Kay 2014). Nevertheless, whereas substantial disagreement exists on both the causes of climate change and specific policy actions needed to mitigate it, there is less public disagreement in the belief that

governments have a role to play in addressing its effects, including within the USA (see Leiserowitz et al. 2016, 2017). Thus, we anticipated greater heterogeneity in the role of causal attributions, relative to attributions of mitigation responsibility, as explanatory mechanisms for the threat to control link across partisan groups.

Specifically, we hypothesized that attributing responsibility for mitigating the problem to state and federal government actors would predict perceptions of greater collective control over the problem among both Democrats and Republicans, as well as Independents. When it comes to the effects of causal attributions, however, we expected to see more heterogeneity in effects across political groups. For Democrats and Independents, we anticipated that perceiving government entities as key contributors to climate change would positively predict perceptions of collective control. In contrast, we anticipated a different pattern for Republicans for a few key reasons. First, strong partisan disagreements exist in the USA on the causal role of people, including governments, in contributing to climate change. Moreover, in public opinion polls, US Republicans show greater distrust of government, generally, and are less inclined to support a major role for government and elected officials in climate policy than other partisans (Funk and Kennedy 2016; Leiserowitz et al. 2017). We therefore reasoned that perceiving government actors as major contributors to the problem may also reinforce this distrust, which may undermine perceptions of collective control, generally. We therefore anticipated that perceiving state and federal government actors as contributing to the problem would be a weaker predictor of perceptions of control for Republicans, relative to Democrats and Independents. Thus, although attributing the cause of the problem to government entities may enhance perceived collective control for some individuals, it may also undermine it for others—namely Republicans—by drawing attention to the ways that governments are contributing to, rather than mitigating, the problem.

2 Method

2.1 Sample

We recruited a socioeconomically diverse sample of 1040 US adults in September of 2015 through Qualtrics Online Survey Panels (www.qualtrics.com), using quota sampling to approximate the American public on key sociodemographic variables (i.e., age, gender, race/ethnicity, and annual household income). Participants completed a web-based questionnaire. The sample included 522 males and 518 females, average age was 45 years ($SD = 15$), and 71% identified as Caucasian or White.

2.2 Measures

2.2.1 Perceived threat

We measured perceived threat by asking the respondents to indicate how much they “personally worry about climate change” on a 7-point scale (1 = Not at all to 7 = A great deal). We chose this measure because personal worry, as an emotional response, has been conceptualized to implicate personalized perceptions of threat (van der Linden 2017; see also Smith and Leiserowitz 2014).

2.2.2 Attributions of responsibility for causing climate change

Participants reported their perceptions of the extent to which local government officials, state government officials, the US congress, and the US president are responsible for causing climate change on a 5-point scale (1 = Not at all to 5 = Very much).

2.2.3 Attributions of responsibility for mitigating climate change

Beliefs regarding responsibility for climate change mitigation were adapted from Leiserowitz et al. (2015) and assessed whether respondents believed that local government officials, state government officials, the US congress, and the US president should be doing more or less to address climate change on a 5-point scale (1 = Much less to 5 = Much more).

2.2.4 Perceived collective control

We assessed perceived collective control with two items adapted from van Zomeren et al. (2010): “Generally speaking, to what extent do you think that it is possible for human beings to prevent the negative consequences of climate change?” and “To what extent do you think that groups of people, working together, can prevent the negative consequences of climate change?”. Responses were given on a 7-point scale (1 = Not at all to 7 = Very much) and were averaged to create a single measure of collective control (see Table 1 for inter-variable correlations).

2.2.5 Party identification

Participants were asked which political party they are most closely affiliated with. Answer choices included Democrat ($n = 372$), Republican ($n = 287$), Independent ($n = 268$), and other/none of the above ($n = 113$; these individuals were excluded from the multigroup analyses).

Table 1 Zero-order correlations between all variables

	1	2	3	4	5	6	7	8	<i>M</i> (<i>SD</i>)
1. Mitigation responsibility	1								3.82 (1.09) ^a
2. Causal responsibility	.64**	1							3.28 1.15) ^a
3. Perceived collective control	.62**	.53**	1						4.69 (1.66) ^b
4. Perceived threat	.57**	.47**	.69**	1					4.30 (1.81)
5. Gender	.12**	.07*	.13**	.12**	1				–
6. Age	-.16**	-.08*	-.19**	-.14**	-.33**	1			44.59 (14.67)
7. Education	-.03	-.01	-.00	.01	-.03	.04	1		–
8. Income	-.02	.02	.04	.03	-.20**	.09*	.37**	1	–

** $p < .001$; * $p < .05$; correlation matrix for the complete sample ($N = 1040$)

^a Means and standard deviations for the latent variables were calculated using mean composite scores of mitigation and causal responsibility items (i.e., attributions of responsibility to state government officials, local government officials, the US congress, and the US president); mitigation responsibility: $\alpha = .97$; causal responsibility: $\alpha = .94$

^b $r = .83$

2.3 Analytic procedure

Both sets of mediating pathways (via causal attributions and perceived mitigation responsibility) were modeled as latent constructs (with four corresponding indicators for each latent variable) using structural equation modeling with Mplus. Latent variables were allowed to correlate with each other, and age, gender, income, and education were included as statistical controls in all models. MLR estimation was used to account for the non-normal distribution of the data (Muthén and Muthén 1998–2015). Several statistics were used to evaluate the fit of the model following several guidelines (Hooper et al. 2008; Hu and Bentler 1998). Because the chi-square test is sensitive to large sample sizes and may result in the rejection of good-fitting models, we examined multiple standard fit indices, including root mean square error of approximation (RMSEA) values equal to or less than .05, comparative fit index (CFI) values greater than or equal to .95, and standardized root mean square residual (SRMR) below .08 as indicating good fit (Hooper et al. 2008; Hu and Bentler 1998).

First, we tested the model with the full sample and then examined whether the model differently fit the data for Democrats, Republicans, and Independents. For this multigroup analysis, our primary goal was to test whether party identification moderated the relationships between the variables of interest.¹ We examined CFI differences between models as an indicator of fit reduction, taking a CFI decrease of more than 0.01 as a sign of model deterioration and differential fit between groups (see Cheung and Rensvold 2002). We also ran Wald tests of parameter constraints to identify specific paths that differed between the groups.

Four participants who did not report their age (used as a control variable) were excluded from all the analyses. To avoid biasing estimates in political party differences, we included participants who did not believe in climate change in the present analyses. Estimated effects were similar and remained statistically significant when excluding climate change skeptics from analyses. The results of the analysis that excludes participants who do not believe in climate change are presented in the Supplementary Materials, Table S3.

3 Results

3.1 The overall model

The overall model showed good fit (Fig. 1). Although the chi-square test was significant, $\chi^2(55) = 205.69, p > .05$, other indices that are less sensitive to sample size suggested good model fit (RMSEA = .05, CFI = .98, and SRMR = .02).

All hypothesized paths were statistically significant. The relationship between perceived threat and collective control beliefs was partially mediated through two separate pathways: attributions of causal responsibility and attributions of responsibility for mitigating climate change. Specifically, as perceived threat from climate change increased, the perception that government is to blame for the crisis ($\beta = .47, p < .001$) and responsible for addressing it ($\beta = .56, p < .001$) also increased. Attributions of mitigation and causal responsibility, in turn,

¹ In accordance with guidelines for such analysis (Muthén and Muthén 1998–2015), measurement invariance, or the lack of differences in the latent constructs across groups, was first confirmed. See Supplementary Materials for details.

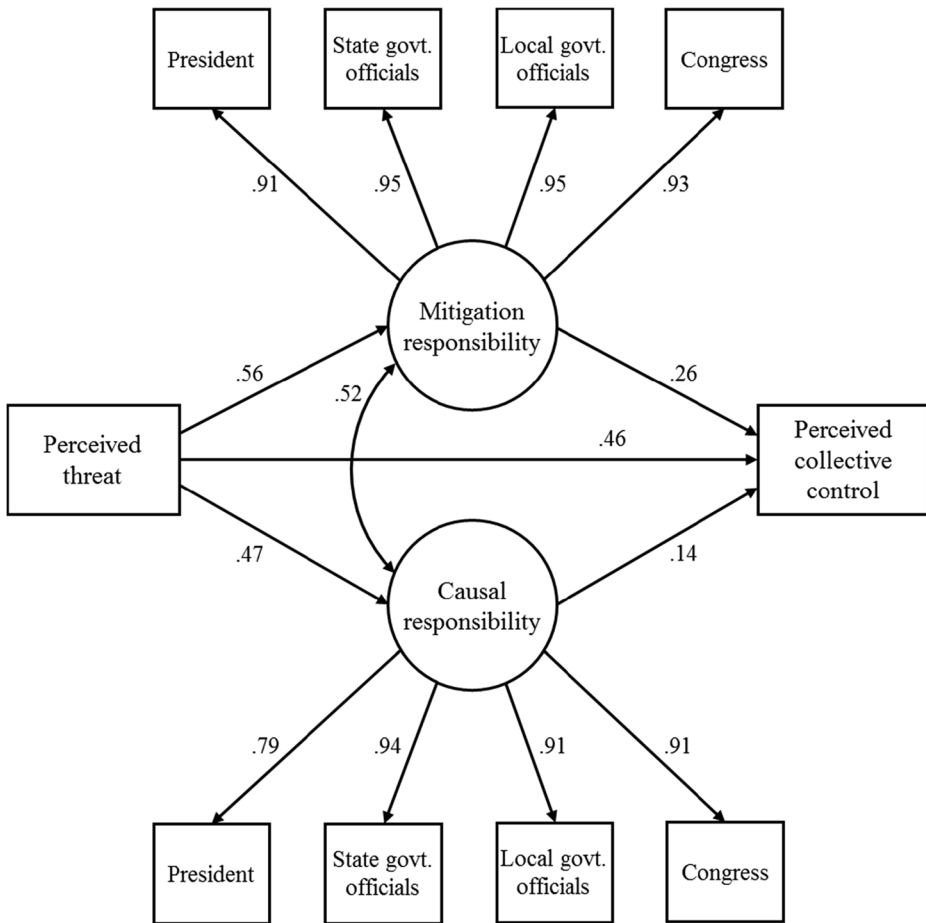


Fig. 1 Structural equation model (full sample). RMSEA = .05; CFI = .98; SRMR = .02. All coefficients are significant at $p < .001$. Loadings and paths values are standardized estimates. Path estimates for age, gender, education, and income were included as covariates but are not shown in this figure. See Table S1 Supplementary Material for these estimates

positively predicted beliefs that the problem can be collectively addressed ($\beta = .26$; $p < .001$ and $\beta = .14$; $p < .001$, respectively).

Also as hypothesized, mitigation responsibility emerged as the strongest mediator of the two types of attributions, accounting for 22% of the variance in the total effect of perceived threat on collective control. The proportion of the total effect mediated by attributions of causal responsibility was substantially smaller—around 9%. Overall, the model explained 57% of the variance in collective control beliefs, 34% of the variance in attributions of responsibility for mitigation, and 22% of the variance in attributions of causal responsibility (see Table 2 and Table S1 in Supplementary Materials).

3.2 Multigroup analysis

Model fit was first tested separately on each of the three political groups. In all three subsamples, fit indices indicated that the model fit the data well (see Fig. 2; also Table S1 in Supplementary

Table 2 Direct, indirect, and total effect estimates

	Full sample	Democrats	Republicans	Independents
Indirect effects				
Mitigation responsibility	.15** (.10, .19)	.04* (.00, .08)	.19** (.09, .29)	.17** (.09, .24)
Causal responsibility	.06** (.03, .10)	.05* (.01, .08)	0.01 (-.05, .08)	.10* (.03, .16)
Direct effects				
	.46** (.40, .52)	.37** (.26, .47)	.58** (.47, .69)	.40** (.28, .52)
Total effects				
	.67** (.63, .71)	.45** (.36, .56)	.78** (.73, .83)	.66** (.57, .75)

All effect size values are standardized. 95% confidence intervals are in brackets. Gender, age, education, and income were included as covariates

* $p < .05$, ** $p < .001$

Materials). Although the RMSEA index in the Republican and Independent groups was slightly above the established cutoff for rejection of the model (i.e., .07), the two other fit indices were well within the range of acceptable values. Overall, the model explained 69% of the variance in perceived collective control for Republicans, 59% for Independents, and 32% for Democrats.

Further examination of the SEM results in the three groups revealed one key distinction between the Republican sample and the two other samples. Whereas the path estimates were similar for Democrats and Independents, which were similar to the complete sample model (Fig. 2), for Republicans, the relationship between attributions of causal responsibility and collective control beliefs was not significant ($\beta = .02$; $p = .72$), indicating that attributions of responsibility for mitigating climate change, but not causal attributions, mediated the link between perceived threat and perceived collective control among Republicans.

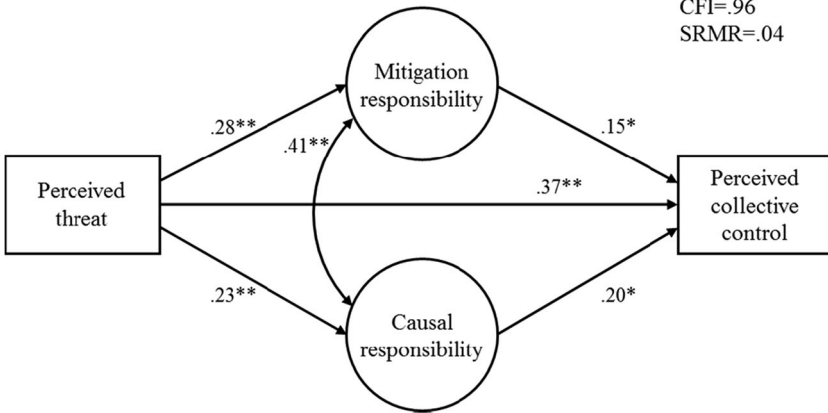
To investigate the differences in the size of path coefficients between the party groups, we conducted additional invariance tests. Wald test of parameter constraints offered converging evidence that there were significant differences in paths from perceived causal responsibility to perceived collective control between Republicans and each of the two other political groups (Wald $\chi^2_{\text{REPvsDEM}} = 3.98$, $df = 1$, $p < .05$; Wald $\chi^2_{\text{REPvsIND}} = 4.33$, $df = 1$, $p < .05$). Conversely, the relationship between perceived mitigation responsibility and collective control beliefs did not differ across the three subsamples (for more details, see Supplementary Materials, Table S2).

4 Discussion

Drawing on prior research that showed a positive link between threat and control perceptions in the context of climate change (Heath and Gifford 2006; Kellstedt et al. 2008; Milfont 2012; Roser-Renouf et al. 2015) and Hornsey et al.'s (2015) findings documenting a causal effect of perceived climate threat on enhanced collective control beliefs, we set out to extend research on this paradoxical relationship by testing the role of attribution processes as a set of explanatory mechanisms. We hypothesized that attributions of responsibility to government entities for either causing or addressing climate change could help to explain the link between threat and control perceptions. Specifically, we predicted that perceiving the government as causing climate change and as more responsible for its mitigation would make the threat of climate change seem more tractable. Government entities are not immutable and can

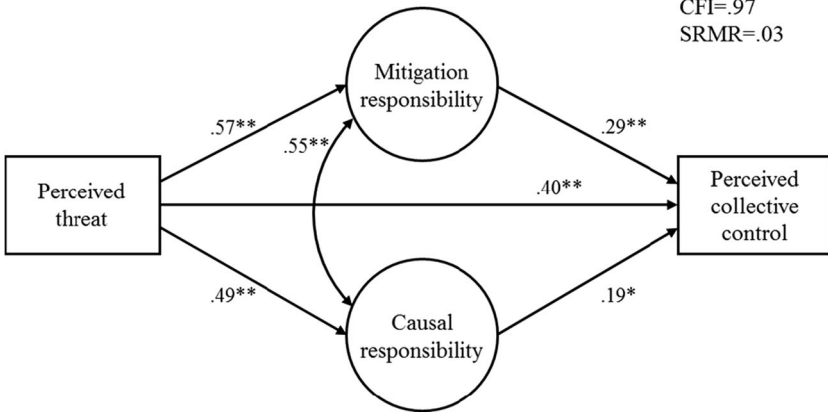
Democrats

RMSEA=.06
CFI=.96
SRMR=.04



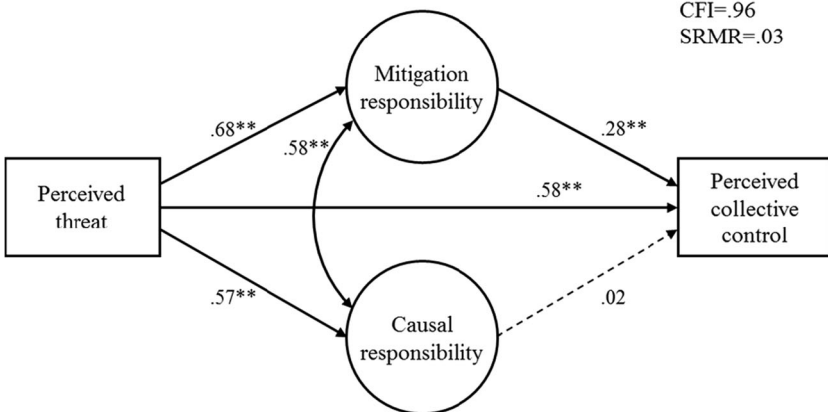
Independents

RMSEA=.07
CFI=.97
SRMR=.03



Republicans

RMSEA=.07
CFI=.96
SRMR=.03



◀ **Fig. 2** Structural equation models by political affiliation. Coefficients are significant at $*p < .05$ and $**p < .001$. Path values are standardized. The estimates of age, gender, education, and income that were included as covariates are not shown in these models and can be found in Supplementary Material (Table S1)

potentially be influenced to change the way they act toward the environment. We reasoned that, for those who perceive climate change as a serious threat, these attributions could consequently influence perceptions that climate change can be collectively mitigated.

Our results lend support for our hypotheses. In a large socioeconomically diverse sample of the US adults, both types of attributions were found to partially mediate the relationship between climate-related threat perceptions and collective control beliefs, with both mediators together accounting for nearly one third of the relationship between threat and perceived control in our sample. Additionally, consistent with our predictions, attributions of responsibility for mitigating climate change emerged as the stronger mediator of the two. This finding is consistent with the notion that although attributing the cause of the problem to the government may enhance perceived collective control for some individuals, it may also undermine it for others by drawing attention to the ways that governments are contributing to, rather than mitigating, the problem. Directing attention to the government's role in addressing climate change, on the other hand, may shift the focus from cause toward collective remedies, which may enhance feelings of collective control more generally.

Additional support for the key role of attributional processes in accounting for paradoxical effects of threat on perceived collective control over climate change was obtained from the multigroup analysis. Motivated cognition is often associated with climate change denial among political conservatives—a tendency to actively process and filter scientific information about climate change to align with pre-existing views and the beliefs of other conservatives (e.g., Feygina et al. 2010; McCright and Dunlap 2011). Nevertheless, the positive association between threat perception and collective control beliefs among all three political groups examined here suggests a potentially broader role for motivated perception in the processing of climate risks on some dimensions in ways that may be shared across partisan groups (see Campbell and Kay 2014). When comparing the mediating roles of attributions across groups, we found that irrespective of party affiliation, attributions of responsibility for mitigating the crisis to government mediated the link between climate change threat perceptions and collective control beliefs. Moreover, we found that causal attributions also simultaneously explained the paradoxical effect of Democrats' and Independents' threat perceptions, but not Republicans' threat perceptions on collective control beliefs. This finding suggests that, for Democrats and Independents, believing that the government is also responsible for causing climate change helps to explain why perceived threat is related to enhanced perceptions of collective control. These findings are consistent with other research showing that although partisans disagree about the causes of climate change, among non-skeptics, there is less divergence in opinions regarding the need for the role of government in helping to mitigate the effects of climate change (see Leiserowitz et al. 2017; YouGov 2013).

These findings have important practical implications for the design of messages that seek to bolster public engagement in climate change mitigation. Specifically, communication efforts that seek to motivate collective action by emphasizing the severity of the threat of climate change may benefit from additional messaging that highlights the key role that governments have in both contributing to the crisis (among Democrats and Independents) and the levers it has to reduce the threat (among all partisans, including Republicans). Future studies might experimentally test the efficacy of pairing messages that heighten perceived climate change threat

with information about the responsibility of government entities for causing and, especially, for managing the crisis. Additional studies might also investigate the impact of messages that convey *how* the government can help address climate change on collective control beliefs.

Our analysis was informed by Hornsey et al.'s (2015) experimental findings that provide evidence of a positive effect of threat perceptions on collective control beliefs and specifically aimed to test explanatory mechanisms underlying this relationship. To account for the role that skepticism might play in explaining the relationships between the variables of interest, we also conducted analyses excluding deniers of climate change. These additional tests resulted in similar path estimates and fit indices across models (see Supplementary Materials, Table S3, for details). Nevertheless, we note that the correlational nature of our study does not allow us to make causal claims about the relationships we tested (Thoemmes 2015). Future research could offer more insight into causal mechanisms by manipulating both the level of perceived threat and the attributions of responsibility. Additionally, based in part on Hornsey et al.'s (2015) findings, we chose to focus specifically on perceptions of collective control rather than personal control. It is possible, however, that perceived threat might affect personal control beliefs in a manner similar to collective control beliefs, either directly or indirectly, through other causal pathways not examined here. One possibility is that individuals derive a sense of control from the realization that many have a role to play in contributing to and managing a global threat. Consequently, perceiving many actors responsible may lessen perceptions of one's own role in causing or mitigating climate change, and, consequently, feelings of personal control (see Fleishman 1980; Mynatt and Sherman 1975).

Moreover, guided by existing public opinion research and the critical role of governments in addressing climate change (see Leiserowitz et al. 2016, 2017; YouGov 2013; also Moser 2016), we focused specifically on attributions of responsibility to government entities as an explanatory mechanism for the perceived threat-control link. We reasoned that perceptions of control over the crisis might arise from attributing responsibility to societal actors with power and resources that match the scale and the complexity of the problem. Nevertheless, future studies might also productively explore the extent to which attributions to other key actors, such as corporations, industry, and regular citizens, show similar patterns to the effects documented here. Similarly, the felt psychological proximity to these actors may also impact a sense of collective control. Ascribing responsibility to those more similar to oneself could result in less abstract and more concrete thoughts about the many actions needed to mitigate the threat, as well as costs and barriers to mitigation, that may lower perceived control (Milfont 2010). Additional studies might examine this possibility.

Finally, we note that the present data were collected in 2015, in a different political environment. The current political environment in the USA—with a congress led by Republicans who have expressed skepticism of climate change, and a president who has called global warming a “hoax”—suggests a need to re-examine the role of attributions of responsibility to government entities as a critical mediator of perceptions of collective control as political power and priorities shift over time. It is possible, for example, that the current political climate and declining trust in government within the USA (Pew Research Center 2017) might make it harder for Democrats to derive a sense of collective control when thinking about the actions of the president and the congress, as compared to in 2015. Alternatively, an awareness of resistance to efforts to address climate change among today's political leadership may heighten attention to the critical role of cooperative governments (e.g., local and state governments and leaders) in collectively addressing the threat. In short, the role of attributions of responsibility to government entities (e.g., the

US congress and the president) in mediating the effects reported here are likely to be highly context-dependent and may depend on the perceived priorities of political leaders, which may have important implications for the interpretation of the present findings and future research in this area.

5 Conclusion

Understanding how people can maintain or restore a sense of collective control in the face of a mounting global threat like climate change is a critical question for researchers and practitioners to address, particularly as political polarization and conflict over the issue grow (Dunlap et al. 2016). Our findings suggest that climate change communication that emphasizes the risks posed by this environmental crisis may paradoxically buttress a sense of collective control to the extent that people perceive a role for government as responsible for causing or helping to mitigate the problem. Moreover, we find that attribution processes (specifically for mitigating climate change) can have similar explanatory power across partisans. Our findings underscore the need for further research into the explanatory mechanisms that help to explain the relationship between perceived threat and control beliefs in the context of climate change, and their policy implications, and highlight the value of considering how attribution processes, more generally, can impact a sense of control in the face of growing climate threats.

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