RESEARCH ARTICLE

Emotional signatures of climate policy support

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Abstract

The optimal emotional tone for climate communication has been debated by scholars and the press, but little is known about the effects of emotions on different types of policy support. In this paper we examine multiple discrete emotions people experience in reaction to climate change, and assess the strength of these emotions as predictors of support for different types of mitigation and adaptation policies. Using multi-wave, cross-sectional, nationally representative samples of American adults, we test whether guilt, anger, hope, fear, and sadness are uniquely associated with support for different types of climate policies. Guilt is most strongly related to support for personally costly policies, hope to support for proactive policies, and fear to support for regulatory policies. This research suggests that communicators should consider how their climate campaign's emotional tone aligns with their policy goals.

Introduction

> "*You are right to be frustrated. Folks in my generation have not done enough to deal with a potentially cataclysmic problem that you now stand to inherit. . .I want you to stay angry. I want you to stay frustrated. Channel that anger, harness that frustration, keep pushing harder and harder for more because that's what's required to meet this challenge.*"
>
> - *Former U.S. President Barack Obama, November 8, 2021, at COP26 in Glasgow, addressing youth climate activists* [1]

As we enter a seminal era in responding to the climate crisis, leaders (such as former President Obama, quoted above) are using emotionally evocative language in an attempt to harness the myriad of emotional responses to the climate crisis and drive greater demand for action. Researchers, too, have identified emotions as critical to climate responses. Brosch concludes: "Recent empirical and meta-analytic research has consistently found affect and emotions experienced toward climate change to be **among the most important predictors** of climate change-related judgments" [2, p. 25, emphasis added, see also 3,4].

Although for many years emotions were discredited as elements of rational consideration [see 5,6, for reviews of the theoretical development], contemporary work, such as the Affective Intelligence Model, has demonstrated that affective emotional reactions serve as cues that draw attention to an issue and signal that an issue deserves prioritization; in effect incorporating emotional cues into a rational decision framework [7,8]. Similarly, according to Nabi [8], discrete emotions can be frames that privilege certain information and influence future judgments. Core to this perspective is the idea that different emotions result from distinct situational appraisals [9–12] and lead to divergent action paths, or tendencies [13–16; also called "action readiness," 5]; with some arguing that what distinguishes emotions from transient experiences of feeling (un)pleasantness are these proclivities to act in different ways in response to an event, defining emotions as "felt action tendencies" [9]. Emotions, in sum, arise as a response to appraising a situation as relevant to a person's interests or welfare; distinct (or discrete) emotions emerge depending on the multiple ways that individuals assess the situation [2,14,17]. In turn, these emotional responses prime individuals to act.

Therefore, as emotional reactions lead to different action tendencies, and emotions are strong predictors of climate policy support, understanding the role of emotional reactions in responding to the climate crisis should include examining how these emotions are associated with specific preferences for policy action. In this paper we consider how different emotions (guilt, anger, hope, sadness, and fear) relate to distinct policy preferences, asking the question: are different discrete emotional reactions to climate change associated with support for different types of climate policies?

The connections between emotional responses to climate change, their corresponding action tendencies, and policy preferences

Many emotions have been linked to climate change and a long tradition of research in the psychological sciences has shown that these emotional states give rise to distinct action tendencies (examples described in detail below) [13–15]. Researchers have argued that it is essential to differentiate and clarify the ways that emotions are linked to various outcomes [17], but to this point, the link between emotions and policy support has not systematically differentiated the types of policy content, although broader work on climate policy support has sought to clarify various dimensions of climate policy that can influence support [18,19]. Therefore, taking several of the emotions most frequently found concerning climate change–guilt, anger, hope, sadness, and fear–we examine how the action tendencies associated with these emotions may lead to specific policy preferences.

Guilt → Internal blame → Atonement → Support for personally costly policies. The emotional experience of guilt arises from an appraisal of internal blame, that is connecting a negative situation with one's own (in)actions [14]. This experience of distress associated with believing oneself (or one's ingroup) to have contributed negatively to an outcome, has been shown to lead to behavior that seeks to repair the harm caused [20,21]. In the general environmental context, guilt has been positively associated with both intention and behavior [22–24], including willingness to engage in personally costly practices such as conserving energy and paying green taxes [25]. In the context of climate change, research has shown that individuals experience guilt when responsibility is focused on individuals, and that such guilt feelings are associated with a desire for atonement, that is to make right the wrong the person believes they have committed [26]. Atonement action tendencies may therefore be more associated with support for *personally costly* policy options, in comparison to other types of public policies. *Personally costly policies* are policy mechanisms where the costs are clear to the public, rather

than hidden as is often the case [27,28], and include examples like paying a fee to promote renewable energy or having a gasoline tax.

H1: Guilt will be more strongly related to support for personally costly policies than other policies.

Anger → External blame → Retribution → Support for regulatory policies. Conversely, anger arises when an individual assesses that the blame for a negative situation is external. This external blame then leads to the tendency to seek retribution to neutralize the obstacle [29]. Anger arising from perceiving injustice that resulted in unfair outcomes has been associated with participation in collective action [30] and desire for retribution [13]. Anger is often centered on a concrete and identifiable culprit as the cause of the situation [12,14]. This tendency toward retribution may manifest in increased support for *regulatory policies*. According to Lemaire, "regulation is commonly referred to as the government's 'stick.' Regulatory instruments are used to define norms and acceptable behavior, or to limit activities in a given society. The law, backed up with the threat of sanction, represents the "stick" used to prescribe or prevent certain types of behavior. Any infringement of the rules brings the specter of sanction" (p. 59) [31]. In the context of climate policy options, we anticipate that anger will be more associated with a preference to regulate emissions from carbon producers, in an attempt to address the perceived wrongs that they have perpetuated [*regulatory policy support*; 32,33] than to support for other types of climate policy options.

H2: Anger will be more strongly related to support for regulatory policies than other policies.

Hope → Positive future expectation → Goal pursuit → Support for proactive policies. Hope is a future-oriented positive assessment of an uncertain situation [14] and can be an emotion that arises from a longing to prevent a dreaded outcome, assessing that doing so might be possible, and has been highlighted as a missing component in the climate-action chain [16,34–36]. Hope has been theorized to be a motivator for action [37,38], and has been linked to movement toward the goal that one desires [14]. Therefore, hope may be more linked to support for *proactive* policies, in comparison to other policy options. Proactive policies are future-oriented policies that address climate change by investing in new technologies, infrastructure, or financial incentives for behavioral change (similar to positive remuneration [39], aka "carrots" [27]). These might include providing tax incentives or rebates for energy efficiency improvements or the physical installation of railway networks or electric vehicle charging stations.

H3: Hope will be more strongly related to support for proactive policies than other policies.

Sadness → Irrevocable loss → Restitution → Support for climate justice policies. Sadness arises when an irreparable loss is thought to have occurred and can lead to an effort to reestablish what has been lost [15]. In the context of climate change, research in the U.S. has found that people perceive more losses for people who are distant in time and space, and to other species, rather than to themselves [40–42]. This psychological distance may lead individuals to support policies that provide restitution for those most affected (although importantly, people may also experience sadness for their own losses and desire restitution for their own suffering). Thus, we propose that sadness may be associated with support for policies that produce climate justice and protect people who are disproportionately harmed by the impacts of and responses to climate change [43,44].

H4: Sadness will be more related to support for climate justice policies than other policies.

Fear → Uncertainty → Protection → Support for self-protective policies: regulatory and/or proactive?. Fear and anxiety often stem from perceiving a threat to oneself or

emotionally significant others and can lead to a desire for protection [6,8,12,45,46]. However, the relationship between fear and action is unclear [47], with some studies finding a link between fear and action outcomes [48–51], while others do not, perhaps due to differences in self-or response efficacy, the level of fear experienced [52], or the novelty of the threat [45]. Fear has been specifically linked to support for more severe regulation in some arenas [53] and to a desire for implementation of new laws (vs. enforcement of existing laws) in others [54], including support for new fuel efficiency standards in the context of climate change [46]. Given these tendencies, it may be that fear is more associated with support for *regulatory* and/ or *proactive* policy options, in comparison to other types of policies (both defined above).

RQ1: Will fear be more related to support for regulatory and proactive policies than other policies?

Methods

Sample

Data for this project comes from a multi-wave nationally representative cross-sectional survey of US adults administered approximately every six months since 2010 by Ipsos (formerly Knowledge Networks). Ipsos recruits panel members using both random digit dialing and address-based sampling techniques to generate maximum coverage of US adults. Individuals who chose to participate but did not have Internet access were loaned computers and given Internet access. The surveys were designed to measure attitudes and beliefs about climate change. Only waves that included relevant emotion and policy support items were included in this analysis, resulting in an inclusion of fifteen waves from 2010 to 2022 (N = 16,605, see S1 Table for the month and year of each survey wave that was included and for access to the data and S1 Data for the data used in the analysis). 51% of participants were female and the average age of participants was in the 45–54 age range. 73% of participants reported their race and ethnicity as "White, Non-Hispanic." Education was measured on a 14-point scale from no formal education (1) to a professional or doctorate degree (14), with the average level of education as "some college, no degree" (10.5). Political ideology was measured with the stem: "In general, do you think of yourself as. . .", with the response options: "very liberal" (1), "somewhat liberal" (2), "moderate, middle of the road" (3), "somewhat conservative" (4), and "very conservative" (5). The average was 3.10, closest to "middle of the road", SD = 1.075.

Ethics statement

This research was reviewed and approved by the George Mason University and Yale University Institutional Research Boards (GMU IRB protocol number 531283–19; Yale IRB protocol number 2000031972). Written formal consent was obtained from all participants, online.

Measurement

For both policy support and emotion measurement, not all items were asked on all waves; therefore, means were calculated with the available items from a given wave (see S1 Table for item wording and availability of items by wave).

Policy support.   To develop the policy support measures an iterative approach was used. First, all policy support items across the dataset were coded as matching one or more of the four categories defined (see S1 Table for item wording). As there was substantial variation in the number of times each item was asked, as well as variation in the number of co-occurrences that any two measures were asked in a given wave, traditional means of assessing reliability

could not be used (i.e. Cronbach's alpha or a structural equation measurement model). Therefore, we ran correlations between all measures coded in a given category (i.e. regulatory) and took the average of the correlations. If any measure had an average intercorrelation of less than $r = .5$, the item with the lowest intercorrelation was removed and the averages for the remaining measures recalculated in an iterative fashion until all measures had an average intercorrelation of .5 or above with the other items in a given category.

As the response options varied across items, all items were standardized before being averaged to calculate the policy support measures. This process resulted in the following measures: ***personally costly policy support*** was measured with 16 items (M = 0.015, SD = 0.924, average intercorrelation = 0.595; example item: "How much would you support or oppose a cap and trade system if it significantly reduced global warming pollution, but raised your household energy costs by 15 dollars a month?"); ***regulatory policy support*** was measured with 32 items (M = -0.002, SD = 0.846, average intercorrelation = 0.613; example: "How much do you support or oppose the following policies? 'Regulate carbon dioxide (the primary greenhouse gas as a pollutant.'"); ***proactive policy support*** was measured with 17 items (M = 0.009, SD = 0.856, average intercorrelation = 0.588; example: "How much do you support or oppose the following policies? 'Generate renewable energy (solar and wind) on public land in the U.S.'"); and ***climate justice policy support*** was measured with 10 items (M = -0.012, SD = 0.919, average intercorrelation = 0.689; example item: "How much do you support or oppose the following policies? 'Increase federal funding to low-income communities and communities of color who are disproportionately harmed by air and water pollution.'"). For all measures higher scores indicate higher support for that type of policy.

Emotions. Emotions were measured with the stem: "How strongly do you feel each of the following emotions when you think about the issue of global warming?" Response options ranged from "not at all" (1) to "very strongly" (4). All items were standardized for inclusion in the analysis to maintain consistency with the policy support items, but unstandardized means and standard deviations are provided here for context. Guilt was measured with the average of two items–guilty and ashamed ($r = 0.743$, $p < .001$, M = 1.871, SD = 0.877), anger with the average of four items–angry, disgusted, outraged, and betrayed ($\alpha = 0.908$, M = 2.297, SD = 0.965), hope with the average of four items–hopeful, courageous, brave, and resilient ($\alpha = 0.766$, M = 2.312, SD = 0.885), sadness with the average of three items–sad, depressed, and hopeless (not all items were asked every wave, so reliability was not able to be assessed with Cronbach's alpha; however, the average intercorrelation was 0.687, all $p's < .001$, M = 2.256, SD = 0.969), and fear with the average of three items–afraid, anxious, and panicked ($\alpha = 0.895$, M = 2.105, SD = 1.062).

Analysis

Analyses were conducted in Mplus version 7, utilizing maximum likelihood estimation with robust standard errors (MLR; this approach also allows the inclusion of incomplete data, that is cases with missing items, by estimating the coefficients with the data that is available). A fully saturated structural equation model was fit, predicting each of the types of policy support from all of the emotions, controlling for political ideology, age, race, education, gender, and wave. Wave was treated categorically, using a fixed effect regression approach; in this approach, a dummy variable is entered for each wave included, and therefore the estimates of the predictors (in this case the discrete emotions) represent the common relationship across waves, controlling for any wave-level heterogeneity [55, p. 289–290]; see Table A and Table B in S1 Text for coefficients of controls predicting emotions and types of policy support). All covariances between types of policy support and between the emotions were freely estimated.

Table 1. Relationships between emotion and each type of policy support.

	Guilt	Anger	Hope	Sadness	Fear
Personally Costly	0.115***	0.051***	0.064***	0.043***	0.163***
Regulatory	0.093***	0.011	0.078***	0.087***	0.186***
Proactive	0.051***	0.020*	0.099***	0.099***	0.135***
Climate Justice	0.083***	-0.006	0.080***	0.086***	0.115***

Notes: Boxed cells indicate the hypothesized strongest relationship of each emotion to type of policy support (the box in the fear column is because it represents a research question rather than a hypothesis); highlighted cells indicate the strongest positive relationship observed (in comparison to that emotion's relationship to other types of policy support).

* $p < .05$

** $p < .01$

*** $p < .001$.

Model constraints tested whether the paths between each emotion on a specific type of policy support were equal (H1-H4, and RQ1; see the bottom of S1 Text for model code).

Results

The analyses tested whether the strength of the relationship of each emotion to policy support depended on the type of policy: personally costly policies, regulatory policies, proactive policies, or climate justice policies. Results showed that guilt was most strongly associated with personally costly support (supporting H1; see Table 1 for all coefficients and Table C in S1 Text for the statistical comparison of the strength of each of the coefficients, also see Fig 1 for visualization of the relationships). Anger was most strongly associated with personally costly policy support (not supporting H2); hope was most strongly associated with proactive policy support (supporting H3); and sadness was also most associated with proactive policy support (not supporting H4). Fear was most associated with regulatory policy support (in line with research question four).

Discussion

Results show promising support for our core argument–that each discrete emotion is more strongly associated with support for a specific type of climate policy than for other types. Specifically, as predicted, guilt was most strongly related to personally costly policy support, and hope to proactive policy support. Also, as predicted, fear was most strongly related to regulatory policy support, suggesting that regulatory policies may be viewed as more self-protective than other forms of policies, including those that are proactive. Contrary to our predictions, anger was more strongly related to support for personally costly policies (rather than regulatory policies; which may be because we did not measure the target of anger, see limitations section), and sadness was most strongly related to support for proactive policies (rather than climate justice policies).

As a whole, these results are in line with previous research that found that the discrete emotional reactions were linked with discrepant political outcomes in other contexts, such as immigration policy (where anxiety and fear were associated with support for cooperative immigration policy and anger associated with support for domestic-focused policy [56]) and voter support following a terrorist event (anger was associated with support for far-right politics, while fear reduced support for those policy options [45]). Thus, this current research furthers our understanding that emotionality, in general, is important for understanding climate
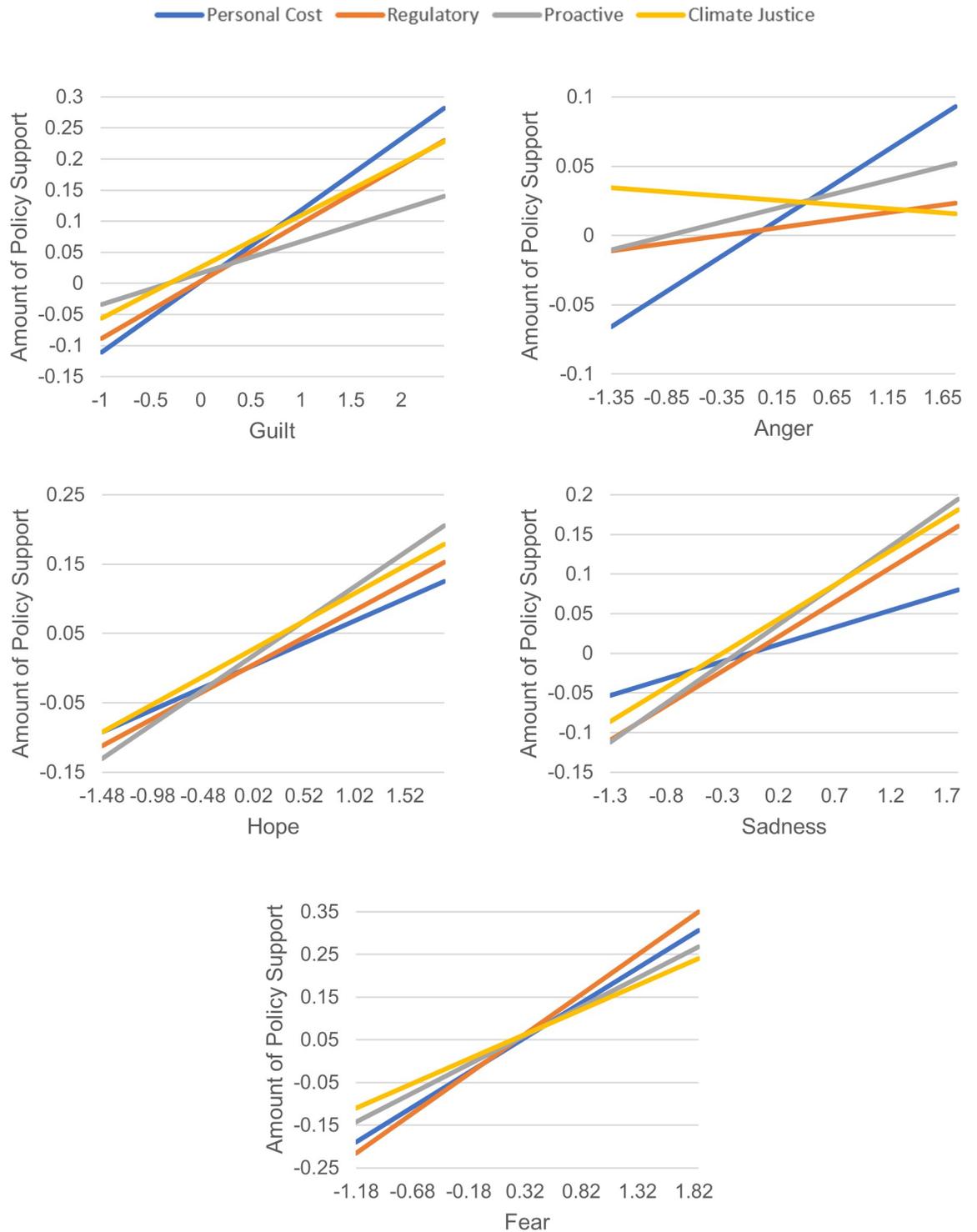
Fig 1. Relationship of each emotion to each type of policy support. Note: All of the measures of emotions and policy support were standardized. Additionally, the figure scales are restricted to the minimum and maximum observed values on both the x and y-axes to allow readers to more clearly see the pattern of results. See Table 1 for all coefficients.

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policy support, and begins to make the case that understanding the link between specific emotions and support for particular policy outcomes adds to our ability to predict such support.

These findings are relevant to people and organizations seeking to promote greater public support for climate policies. Research on political advertising has demonstrated that emotional political campaigns are more successful at engaging voter turnout than less emotional campaigns [6], and the same may prove true for generating support for climate policy engagement–sustained presentation of information that engages audiences emotionally may encourage publics to support—and voice their support—for particular climate policies. As previously shown, emotions are important predictors of policy support [2–4] and this work indicates that advocates should consider tailoring their emotional appeals based in part on the types of policy options they are promoting–especially if they are seeking to advance one particular type of policy proposal. Thus, for those supporting regulatory options, communicating fear about climate change might be a useful strategy. Similarly, when advocating for personally costly solutions, arousing guilt might resonate with some audiences, especially audiences not predisposed to support climate policies. And when advocating for proactive solutions, messengers could emphasize hope for the future. Finally, for those advocating for general climate policy solutions, fear was the emotion most strongly associated with all types of policy support (compared to the other emotions).

Limitations

This analysis has several important limitations. Foremost is that this research is correlational and cross-sectional in nature and therefore cannot make causal claims; however, we believe that the theoretical direction of causality from emotion to policy support is more plausible than the reverse directionality (a claim we cannot test in this analysis). Further research should test these relationships experimentally.

Secondly, there was intercorrelation between the emotions (see Table D in S1 Text and between some types of policy support (see Table E in S1 Text), indicating that people who feel strongly about climate change experience a range of emotions and people who support one type of policy often support other types as well. This high intercorrelation might show that "a rising tide lifts all boats"–or that, strong emotionality about climate change is likely associated with strong support for any type of policy; however, the analysis does also indicate unique relationships between specific emotions and specific types of policy support in addition to this general trend. As margins for political engagement on any contemporary issue are often razor thin, any additional edge can be useful, and we think this perspective offers one potential way to incrementally increase the effectiveness of policy appeals.

Additionally, we note that the measurement of anger fails to assess the target of the anger that the respondent is feeling, and as such, it is likely that people across the ideological spectrum are angry about different aspects of climate change (e.g., inaction or action on the issue, respectively) and thus, the nature of the relationship between anger and support for policies likely differs by political ideology, so that it is more positive for liberals than conservatives. Future research should measure the target of anger to correct for this limitation.

Furthermore, due to practical constraints, we do not explore the potential moderating role of political identity and ideology. However, we know that political affiliation is associated with both climate emotions and support for climate policy [17,57–59]. Additionally, some emotions, such as anger and fear have been found to increase biased processing [60], while guilt may be associated with a willingness to reconsider support for a political position, even if it is in opposition to one's political identity [61]. Therefore, future work should consider the moderating influence of political identity.

Finally, we note that our measurement of key items varies by wave of the instrument. While combining data from multiple data collections into one analysis provides the advantage of expanding the breadth of measurement across contributing data collections, allowing for fuller measurement of concepts than any single collection [62], it also introduces exogenous heterogeneity and potential measurement invariance concerns into the modeling. We addressed this limitation by reviewing the codebooks from all individual data collections and flagging potential policy support items from each domain (step 1); narrowing the item set on theoretical grounds (step 2); and, finally, performing correlational tests to identify problematic items (removing an item if it's average intercorrelation was less than .5; step 3). These three steps correspond to the recommendations of Integrative Data Analysis [IDA] experts. IDA methodologists further recommend conducting a factor analysis across data collections, which necessitates a set of items that is the same across all datasets that would allow disparate items to be linked into the measurement structure. When such a set of items is not available, IDA proponents recommend conducting a bridging calibration study (a new data collection) that includes some items from each contributing study to allow for formal linking [62]. While that step was not feasible for this analysis, future research would benefit from improving measurement by conducting a bridging study.

Conclusion

Further policy action is vital to address the mounting challenges arising from our changing climate, and engaging the public's emotions is an integral component of generating and sustaining support for policy action. This research finds that specific emotions are uniquely associated with support for specific types of climate policy preferences. These findings indicate that the types of emotions aroused may influence the type of solutions that will be preferred. As climate policies vary along many dimensions—including, and perhaps most importantly, their ability to effect real-world improvements, understanding how these specific emotions are evoked—and what results when they arise—is important to consider. Future work should examine experimentally whether messages that target these emotions are more effective at increasing support for the specific policy types, but in the meantime, communicators may wish to consider how their campaign's emotional tones match their targeted policy goals.

Supporting information

S1 Table. This file contains the item wording for each emotion and policy support measure, as well as the survey wave in which each item appeared.
(XLSX)

S1 Text. This file contains tables with supplemental statistical information, along with the MPlus code for the model presented in the paper.
(DOCX)

S1 Data. This file contains the data analyzed in this manuscript.
(SAV)

Author Contributions

Conceptualization: Teresa A. Myers.

Data curation: Teresa A. Myers, Connie Roser-Renouf.

Formal analysis: Teresa A. Myers.

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