Emotional predictors of environmental policy support and opposition

Benedict Hignell[1], Zorzeta Bakaki[2], Elia Valentini[3*]

[1]*Institute for Social and Economic Research and Department of Psychology, University of Essex, UK*

[2]*Department of Government, University of Essex, UK*

[3]*Department of Psychology and Centre for Brain Science, University of Essex, UK*

*Correspondence should be addressed to

Elia Valentini PhD,

Centre for Brain Science, Department of Psychology,

University of Essex, Wivenhoe Park, Colchester CO4 3SQ, UK

Phone: +44 1206 873733

E-mail: evalent@essex.ac.uk

Abstract

Understanding the affective responses to the climate and ecological emergency is essential to the development of and compliance with mitigation and adaptation policy. Empirical evidence suggests that individuals feeling negative emotions about the state of nature and the climate are more likely to show greater support for environmental policy. This is the first study investigating which among twenty discrete emotions predict attitudes to nationally relevant British policies.

We presented UK residents with three sets of contemporary environmental policies in two cross-sectional online web surveys whereby respondents rated their support (or opposition) for the Conservative Government's manifesto, the Climate and Ecology Bill, and the Green New Deal Bill. By capitalising on a hierarchical approach that combined both evidence-based and theoretically informed expectations, we found that higher levels of worry and terror predicted greater policy support. In contrast, those who reported boredom were less supportive.

These findings dovetail with previous literature and provide new fine-grained insights on complex relationship between emotions and environmental policy support. Our analytical strategy underscores the importance of integrating both a priori and explorative models to enhance statistical sensitivity, thereby capturing a broader spectrum of affective states that might otherwise be overlooked but may be crucial for designing targeted interventions.

Keywords: affective state, climate, emotion, nature, policy.

1. Introduction

1.1. The climate and ecological emergency

The number of local and national governments declaring a "climate emergency" has been dramatically increasing since 2016 and now entails over 2350 declarations, including 18 nations (1). Meanwhile, scientists have been delivering a series of warnings using the terms climate emergency, ecological emergency, nature emergency, planetary or biospheric emergency to indicate the high level of threat that climate change and biodiversity loss are representing for humanity and life on earth (2–5). Here, we refer to the compound effects of planetary climate and nature crises as the climate & ecological emergency (CEE).

The CEE has been linked to the deterioration of our psychological health. For example, learning about CEE is linked to an increase in the frequency and intensity of mood and anxiety changes (6), especially in the young (7). A recent survey on ten thousand young adults (aged 16-25 years) from ten countries revealed that CEE evoked a wealth of negative emotions, driven by an overwhelming report of worry (84% were at least moderately worried) (8). The role of negative affect, particularly worry, has been recently examined across countries both with quantitative (9–11) and qualitative methods (12). Arguably, there has been a significant growth of public concern over the past years that has led to substantial ontological and taxonomic confusion wherein a multiplicity of new psychological and psychiatric constructs has been coined that hardly differentiate from the existing terms (13). Terms such as eco-anxiety and climate anxiety are suggested to indicate anxiety associated with perceptions about climate change, or more general negative environmental information (14).

The present study originated from the observation that affective responses to the CEE have become progressively more central to the scientific assessment of mitigation and adaptation strategies as testified by the recent inclusion of mental health within the IPCC AR6 (15). Specifically, we add to this literature by surveying public's emotional reaction to existing and potential environmental policies.

1.2. Emotions and environmental policy support

Understanding the influence of emotions on policy support is crucial for policymakers and environmental activists because emotions *can* trigger or alter motivational drives and eventually determine environment-relevant behaviour. Recent studies emphasise the role of risk perception and emotions to understand policy support. Scholarship has examined the role of moral emotions in shaping environmental behaviour (16–18). Participants reported guilt when exposed to human-caused environmental damages, and those individuals were more likely to exhibit pro-environmental attitude (18).

Affect and emotions are conducive of motivational components that introduce further complexity in the quest for theoretical expectations. For example, negative emotions such as anger and guilt are thought to generate approach/positive activation that can promote collective action (19). Likewise, a positive emotion can have detrimental effects on policy support (20). In fact, both negative (e.g., fear) and positive (e.g., hope) emotions can contribute to both pro-environmental and anti-environmental behaviour (see also 21). Although previous work has examined the impact of some affective states (e.g., worry, anxiety, hope), no attention has been given to other more complex emotions (e.g., confusion, disappointment). Here we seek to offer a more inclusive examination to a wider range of emotions apt to affect specific environmental policy.

2. Study rationale

Our empirical work targeted feelings and emotions as general terms commonly used in current language to refer to affective states (22) and does not distinguish between emotion and affect. This is because most of the surveyed respondents would have drawn no distinction between these terms (23). In our work, the concept of emotion is used as a synonym of affect and feeling (cf. 24 for detailed discussion) and can be defined as a psychophysiological state associated with changes in cognition, experience, autonomic arousal, and behaviour originating from the appraisal of a significant event/information (25).

94 People's decision making on environmental policy is complex as it can be influenced by
95 emotions that are shaped by epistemic beliefs (26,27) and cognitive thinking (28). Due to lack
96 of agreement on what could be an exhaustive list of environmentally relevant emotions (29–
97 31), we opted for a large range of context-relevant emotions (Table 1) to investigate the effect
98 of emotion intensity on support for a range of specific environmental policies aimed at tackling
99 the CEE in the United Kingdom (UK). Existing literature has examined several affects,
100 conceptualised as discrete (e.g., anger, fear, interest, guilt) or clustered (e.g., positive and
101 negative affects) (e.g., 22,32). First, we revisit these emotions to examine their impact on
102 environmental policy support and we offer additional theoretical and empirical evidence on
103 those with mixed results (e.g., anxiety). Second, we extend the list of affects with several less
104 distinct yet complex emotions that would ultimately shape one's preferences for environmental
105 policy support (e.g., confidence). Such complex emotions have generally received less
106 attention leaving us wondering whether they may still account for people's preferences on
107 environmental policy. We cannot disregard the full range of emotions because they may
108 produce mixed results. On the contrary more effort is needed to disentangle their impact. In
109 fact, these complex emotions are commonly observed in environmental public opinion surveys
110 due to the scientific nature and sophistication of the issue (33). Particularly, issues like the
111 climate change are still sometimes presented like a debate by the media creating either
112 confusion or misinformation (see also 34), driving a variety of emotions that cannot be
113 described only by anger or anxiety.

114 The UK political scenario provides a perfect context to assess how emotions may influence
115 support for environmental policies because despite the UK public's perception of climate
116 change as one of the biggest issues facing the UK remaining relatively low, it has generally
117 increased from around 5% in 2015 to 15% in 2022 (35). Exceptions to this trend include a
118 peak during the 2019 General election, a drop during the first year of the COVID-19 pandemic,
119 and an all-time peak of 40% during the COP26 Climate Change Summit in 2021.

We developed two online web-surveys delivered in two separate distributions. We first surveyed about 260 residents in the UK in 2021, and then another 400 participants in 2022. Specifically, we investigated respondents' emotional response to 3 sets of proposed policies that were put before the UK Parliament with the aim of tackling the CEE. These were the Conservative government's 'ten-point plan for a green industrial revolution' (36), the Green New Deal's 'Decarbonisation and Economic Strategy Bill' (37), and the Climate and Ecology Bill (C&E Bill) (38). Hence, our findings explicitly offer insights on how UK residents emotionally respond to specific policies purportedly tackling the CEE.

Given public opinion's ability to set important constraints on which policies can be implemented and ultimately produce effective outcomes, we focus on the individual. We understand that citizens may express different degrees of support for environmental policies due to the large amount of pressing societal issues they may perceive as more important (e.g., social welfare). To offer a more fine-grained analysis on what are the emotions that drive environmental policy support, we assumed emotion and environmental support as a parametric construct with distinct levels of more or less of emotion and support. We then expected participants' degree of support/opposition to vary with the intensity of their emotions.

Our analytical strategy was twofold. First, we set out to perform an evidence-based and theoretically informed analysis of the relationship between the intensity of discrete emotions and the degree of policy support by examining the effect of only those emotions that have been repeatedly reported to affect policy preference. In other words, we selected some of the emotions we asked participants to rate and specified a directional hypothesis for them (e.g., worry predicts increased support for environmental policies). Second, we adopted a data-driven statistical model including those emotions that were linked to inconclusive results or could not be supported by a strong expectation.

The status quo of empirical evidence seems to support the general expectation that individuals feeling negative emotions about the environment are more likely to show high levels of support for environmental policies (24,39). Note that studies often interchangeably refer to behavioural

engagement and intentional support towards environmental protection. We believe these are different yet related. Specifically, we expect that environmental policy support is a pre-requisite for individuals who engage with environmental protection but not the other way around (40). For the purposes of this study, we only focus on environmental policy support as an entry strategy to people's emotional preferences before assessing attitudes and behaviours in future. Below we offered detailed explanation and theoretical expectation on how each emotion may affect environmental policy support.

2.1. Emotions with clear link to the CEE

Smith and Leiserowitz (22) pioneered the investigation of the influence of discrete emotions on global warming policy support and opposition. Besides discrete emotions, the authors compared several significant predictors of policy support, including cultural worldviews, negative affect, image associations and sociodemographic variables. In addition, Wang and colleagues (11) showed that strong negative emotions (i.e., anger, fear) are significantly more likely to support climate change policies and greater budget allocation to the environmental objects of care (e.g., future generations, animals).

Worry is a central feature of anxiety (see 41 for a clinical review), and when non-pathological, it may trigger positive behavioural change. For example, the Opinion and Lifestyle Survey (42) revealed that adults worried about the impact of climate change expressed the intention to change their lifestyle more than those who were unworried. Similarly, worry has been associated with personal climate mitigation behaviours such as energy efficiency and energy reduction behaviours, support for fossil fuels taxation and renewable energy subsidies, and support for law banning energy-inefficient products (9). Along the same lines, Smith and Leiserowitz (22) and Goldberg et al. (10) found that worry also predicted greater support of policies tackling global warming. Hickman et al. (8), reported that 84% of their survey respondents were at least moderately worried. In addition, the authors reported how anxiety and distress were correlated with perceived inadequate government response and associated feelings of betrayal.

Distress is a construct that can contain several negative emotions. In fact, a "climate change distress" scale proved useful in documenting the experience of individuals surveyed both in the UK and Australia (43). More recently, Lawrance et al. (44) used the scale in a study of young people (aged 16-24 years) in the UK and reported greater climate change distress than COVID-19 pandemic related distress. This finding was explained by higher levels of guilt, sense of personal responsibility, and exposure to media coverage.

Anxiety can express a variety of feelings, and the complexity of multiple interfering variables makes this prediction susceptible to a high degree of uncertainty. Effectively, national, and international events are linked to substantial but often temporary fluctuations in public perception. For example, the COVID-19 pandemic rapidly reduced public perception of the CEE to near 2015 levels but discourse around the COP26 Climate Change Summit in 2021 resulted in 40% of the UK public viewing climate change as a major threat (45). Possible reasons as to why the CEE may or may not be perceived as a major threat by the majority of the UK public include the conception that it is a looming threat as opposed to an immediate danger (46–48). A looming threat can induce anxiety, and the intensity of this anxiety increases as the threat approaches (49). Anxiety has been shown to impair decision making (50), and trigger public opposition to governmental policies (32). Yet, Ogunbode et al. (51) showed that anxiety is a predictor of pro-environmental behaviour (51). Therefore, we settled that worry, distress, and anxiety can all be positive predictors of environmental policy support.

Fear can boost pro-environmental motivation when combined with anxiety. However, earlier research indicated that fear on its own can be ineffective in motivating engagement (52). This is in contrast with the general conclusion drawn by a large metanalysis, that is fear-eliciting communication is effective in influencing attitudes, intentions, and behaviours (53). In this context, Witte and Allen (54) also showed that strong appeals to fear are most effective when coupled with high individual efficacy messaging. These findings agree with more recent experimental evidence showing that pessimistic climate change appeals increase risk perception and perceived efficacy, likely due to increased emotional arousal (55). Although a

recent mega-study (56) highlighted that fear may result in less pro-environmental behaviour (i.e., tree planting), at the time of our pre-registration we concluded that the appraisal of fear, alike worry, can be positively associated with environmental policy support.

Despite little research on an emotion such as **horror**, we reasoned that based on the Protection Motivation Theory (PMT) (e.g., 56,57), this emotion may lead to increased environmental policy support. PMT explains how people react to potential threats such as fear messages that motivate protective actions. In fact, worry, fear, horror and anxiety may all rely on a similar biological response to the existential threat that triggers compensatory behavioural responses (59). Although these emotions may generate similar responses because they share a common biological foundation related to stress and survival, their triggers are distinct along with their intensity or duration. Accordingly, the PMT would explain why the more vulnerable individuals feel to the threats of climate change, the more likely they are to purchase electric cars (60), take action to mitigate drought (61), and be willing to engage in personal pro-environmental behaviours (62). Hence, despite the lack of empirical evidence for the emotion of horror, we reasoned it could be conceived as a positive predictor of environmental policies.

The inclusion of **guilt** as a predictor of policy support is backed up by experimental evidence whereby inducing guilt promoted pro-environmental behaviour (18,63) and support for mitigation policy (64). In a complementary fashion, the anticipated guilt of not acting predicts pro-environmental behaviour (65). Participants who felt guilty in response to climate change were more likely to support climate policies according to Smith and Leiserowitz (22). Also, Stollberg and Jonas (19) explain that guilt is an approach activating emotion that can promote collective and preventative action (66). Similarly, **anger** is an approach activating emotion that can promote individual (67) and collective action (19). There seems to be substantial consensus that both anger and guilt are determinants of collective action (e.g., van Zomeren, Postmes, and Spears 2008). Hence, we considered both emotions as positive predictors of policy support.

Other negative emotions received little research attention in the context of environmental policies but were still associated with a clear prediction. For example, Smith and Leiserowitz (22) reported that **disgust** (i.e., moral disgust) negatively predicts climate and energy policy support. This conclusion agrees with the notion of disgust sensitivity being a determinant of protectionist policies in different domains (69). It is however unclear what is the object/target of the disgust. Nonetheless, research in the field of health policy suggest that disgust may be linked to anti-vaccination beliefs and purity attitudes (70). A disgust driven anti-scientific attitude towards environmental policies may well support the interpretation of disgust as a negative predictor of policy support.

In general, positive affect and emotions such as **interest (or curiosity)** stimulate broader thinking and are more likely to activate creative and innovative processes (71). In fact, interest or curiosity about climate change was reported to be a positive predictor of environmental policy support (11,22). Despite the limited amount of evidence, we reasoned there would be no sufficiently strong counterargument for not considering this emotion as a positive predictor of policy support.

Calm and **confidence** entail a neutral or positive affect often linked to hopeful beliefs. Individuals who report being calm in the face of the climate crisis may do so because they trust the government or institutions to take care of climate change and hence, remain emotionally unaffected by it (72). Calm also implies less uncertainty potentially driven by the provision of accurate and reliable information on the issue at stake (see 72 for a study on Covid-19). Equally, the feeling of confidence when thinking about climate change may support positive beliefs that governments will engage in international treaties and action or that scientific, energy, and manufacturing innovations will happen before the most devastating effects of climate change start impacting the surveyed individual (74). Therefore, we expected a positive relationship between the feelings of calm and confidence and environmental policy support.

Geiger et al. (75) suggest that requiring people to contemplate their participation in climate action would trigger anticipatory emotional reactions, such as hope, anxiety, helplessness, and boredom. In doing so, they reported a strong negative relationship between **boredom** and climate action (75). Although our design did not entail a specific induction of action-contemplation there would be no strong rationale for considering boredom as a positive predictor of policy support. We thus expect a negative relationship for our study**.**

Hope, on the other hand, has been linked with lower policy support (20). However, Smith and Leiserowitz (22) found that participants who were hopeful in response to climate change were more likely to support climate policies. Importantly, both Hornsey and Fielding (76) and Feldman and Hart (77) demonstrated how perceived-self-efficacy can be an important covariate of individual pro-environmental behaviour and political participation. Notwithstanding the methodological nuances that can affect the outcome of the emotional experience and rating in study participants, we treat hope as a positive predictor of policy support.

2.2. Emotions with unclear link to the CEE

Some of the emotions we classified as unclear were not considered predictive either because there was not enough evidence or because there was substantial conflicting evidence (or both). Amongst the negative emotions, **disappointment** is one of those that received no attention. Disappointment is linked to withdrawal motive that may generate disinterest or indifference for the source of disappointment, providing a coping mechanism for frustration, and thus justifying the expectation of a non-significant impact of this emotion on environmental policy. However, the less effectively policy makers act on the planetary emergency (78) the more this emotion becomes relevant. Individuals may increasingly feel disappointment when they compare their desired climate actions to the weak policies that are implemented and are failing to prevent the CEE. Disappointment is particularly relevant in modern democracies where distrust and scepticism towards politicians and political institutions has become the norm (79). Disappointment is characterized by a negative affect originating from counterfactual thinking (80) that is thought to generate withdrawal from societal matters (81).

However, if combined with hope for example, disappointed citizens may see scope in supporting environmental policies.

Feelings of **sadness** and **hopelessness** are powered by greater negative valence that often predicts social withdrawal and loneliness (82). As such these emotions may predict lack of interest or motivation to even greater extent than disappointment alone. Nonetheless, Smith and Leiserowitz (22) found that individuals who felt sad and helpless when thinking about climate change were no more or less likely to support climate policies. These findings may highlight the "freezing" effect of low arousal emotions such as sadness and hopelessness. In other words, these negative emotional states generate frustration while dampening motivation and reduce initiative (83).

We also added some emotions that could single out individuals' ignorance, defensive reactions and/or negative attitude towards environmental policies. These were **excitement/thrill** and **amusement.** Respondents feeling these emotions would have been affected by scientific ignorance or even motivated by subscription to false beliefs and conspiracy theories. For example, these affective states could be manifestation of a proximal cognitive defence against the awareness of the environmental threat (i.e., denial – e.g., laughing emoticons on Facebook), and thus predict opposition to environmental policy (84,85). However, to date there is no clear indication on whether these emotions could reflect genuine emotions or instrumental sabotaging behaviour in survey respondents. We therefore considered these emotions as potential controls for response pattern screening and exclusion.

On the upper end of the emotional arousal spectrum, we also added **surprise.** This emotion may be triggered in response to one's schemas or belief systems about the future being violated. Individuals can respond to surprise by revising their schemas or taking action (86). In this instance, individuals may wish to take action to avoid climate catastrophe so that their schema of a healthy planet and future can be restored. However, it is unclear whether individuals could be expected to overcome the shock of their surprise in time to decide how they should support climate policies during our survey. The feeling of surprise can be

superseded by **confusion** and the feeling of being **conflicted** about the topic and engagement with it. Confusion is usually driven by cognitive incongruity (27). Hence, we reasoned that both surprise and confusion might promote actions aimed to reduce the gap between new information and previous knowledge/beliefs. Nonetheless, a dissonance reduction motive might equally justify support or opposition to environmental policies.

We summarised our theoretical expectations regarding emotions and environmental policy support in Table 1.

Table 1: Summary of Expectations

Emotions	Policy attitude
Worry/concern	+
Distress	+
Anxiety	+
Fear	+
Guilt	+
Anger	+
Disgust	+
Horror	+
Interest/curiosity	+
Calm	+
Confidence	+
Hope	+
Boredom	-
Disappointment	/
Sadness	/
Hopelessness	/
Excitement/Thrill	/
Amusement	/
Surprise	/
Confusion/confliction	/

Note. + indicates policy support; - indicates reduced support or opposition; / indicates ambivalent policy attitude.

3. Methods

3.1. Sample

The study involves two internet-based cross-sectional surveys (developed and distributed using Qualtrics XM, Provo, UT) that are analysed jointly but also separately in the Supporting Information. The surveys took place between January 2021 and July 2022.

The first survey recruited three hundred and seventy-six respondents in four successive rounds of data collection. One hundred and six of these were excluded either because they did not complete the survey or failed to satisfy study entry criteria or attentional checks. The data were collected online between January and July 2021. The second survey was also delivered online (July 2022) and allowed us to collect a larger balanced sample of 400 participants (Refer to the Supporting Information S1 for a comparison of our sample with the most recent census in the United Kingdom). Acknowledging that correlation coefficients derived from samples smaller than 250 may exhibit less stability (87), we also used G*power (88) for a sensitivity analysis for both the combined and separate samples analyses to determine the effect sizes of our samples. We set the power at 0.95 and used 24 predictors. The sensitivity analysis showed that the combined sample allowed us to have at least one predictor with an effect size of $f2 \geq 0.05$ ($\lambda=33.70$; $Fc=1.53$; $df=635$) for us to detect a significant deviation from zero. The first survey was associated with an effect size of $f2 \geq 0.14$ ($\lambda=35.31$; $Fc=1.56$; $df=235$). The second survey was associated with an effect size of $f2 \geq 0.09$ ($\lambda=34.36$; $Fc=1.55$; $df=375$).

Respondents gave their informed consent before beginning the study, which was approved by the University of Essex ethics committee (project codes ETH2021-0434 and ETH2122-2163). The survey materials, structure, and data analysis files are available on the Open Science Framework, where the hypotheses were pre-registered (https://osf.io/p9vcm/?view_only= 692b28bc94ab461e83074171c9bec47e). In the first survey round, we recruited participants through SONA, a cloud-based participant management software used to recruit psychology undergraduates at the University of Essex in exchange of course credits. In

parallel, we gathered volunteers using the research team's social media platforms and physical adverts displaying a brief overview of the study. The social media platforms included Facebook, Instagram, Twitter, Snapchat, and WhatsApp. The other three recruitment rounds of the first survey involved respondents recruited through Prolific (www.prolific.com), a website dedicated to recruiting research respondents, who received a monetary reward. All the respondents recruited through Prolific were classed as a representative sample for the UK population and with a minimum approval rate of 80 out of 100 (an index reflecting the quality of the respondent's performance on the platform; the higher the better the quality of the respondent).

The second survey also relied on the Prolific platform with improved requirements of recruiting a sex-balanced UK residents' sample and only individuals with a respondents' performance approval rate of 99-100. To increase the number of responses and reduce the chance of disengagement with the survey, we reduced the length of the survey by eliminating some of the previously used items that were not needed for the pre-registered study.

3.2. Procedure

We first asked respondents to provide us with some demographic information along with their position on political ideology. Respondents were then provided information on the CEE via a brief extract from The UK Government and the C&E Bill (Refer to the Supporting Information S2 for wording of the survey instruments). Respondents were then presented with 5 more blocks (in randomised order) of questions regarding their emotions and environmental policy support. At the end of the survey, respondents were presented with links containing further information on topics mentioned throughout the study. Respondents were required to answer all questions.

3.3. Variables and Measures

3.3.1. Environmental policy support

The main variable of interest is environmental policy support. This is measured on a scale ranging from completely oppose (0) to completely support (100). Respondents were tasked

with expressing their support for or opposition to a variety of policies aimed at tackling the environmental crisis. These were the same in both surveys. The scale is generated using actual policy proposals that were presented to UK Parliament. A total of thirteen items were used (list of policy items in Supporting Information S2). Five of these items were from the Conservative government's 'ten-point plan for a green industrial revolution' (36) including 'End the sale of new petrol and diesel vehicles by 2030 and end the sale of hybrid cars by 2035'. Four items were from the Green New Deal's 'Decarbonisation and Economic Strategy Bill' (37) including 'An immediate end to any expansion of fossil fuel exploration, extraction and production'. The remaining items were from the Climate and Ecology Bill (C&E Bill) (38) including 'UK government to account for its entire carbon footprint (both in the UK and the products it imports from overseas)'. An overall environmental policy support score was calculated based on the summary of opposition/support expressed for each item. One Ten-point Plan policy, "UK government to invest in new large and smaller-scale nuclear plants" (M = 50.66; SD = 32.07) is omitted from the summary score because it had very weak correlation with all other policy support items ($-.06 \leq r \leq .06$). It was also the policy item with least support.

3.3.2. Emotions

For our main explanatory variables, respondents were asked to rate how intensely they felt each of twenty different emotions when they thought about "climate change" on a seven-point Likert scale, from not at all (1) to very strongly (7). The emotions used were derived from the studies conducted by Nabi (89) and Smith and Leiserowitz (22) (see also Supporting Information S2.2).

3.3.3. Socio-demographics and control variables

Beside age, gender (0 = male; 1 = female), and ethnicity (0 = non-White; 1 = White), we asked respondents to indicate their political ideology (using a seven-point Likert scale from extremely liberal to extremely conservative), and their subjective social status using a ten-point scale from worst off to best off (90). A variable was also created to indicate which survey a respondent answered (survey 1 = 0; survey 2 = 1).

3.4. Data analysis strategy

We performed the analyses in R language (91). We report central tendency and variability as mean and standard deviation (M ± SD). We assessed normality using Q-Q plots. We analysed the surveys as a merged sample but also separately (Supporting Information S3).

Table 2 shows descriptive statistics for all variables presented in our analysis. On average, respondents declared strong support for environmental policies (*M* = 76.15 on the 1-100 scale). They reported worry more than any other emotion, with fear and sadness being next most intensely felt. As expected, participants felt amused and excited least strongly. The mean ideology of the sample was centre left. It consisted of 346 liberals (ideology = 1-3), 192 centrist (= 4), and 113 conservative participants.

Table 2: Descriptive Statistics

Variable	*N*	Mean	Standard Deviation	Min	Max	VIF
Policy	651	76.15	16.61	2.08	100	
Worry	651	5.29	1.65	1	7	3.23
Distress	651	3.78	1.78	1	7	2.60
Anxiety	651	4.56	1.66	1	7	3.05
Fear	651	4.67	1.61	1	7	3.09
Guilt	651	3.73	1.65	1	7	1.62
Anger	651	4.37	1.80	1	7	2.79
Disgust	651	4.16	1.91	1	7	3.02
Horror	651	4.24	1.81	1	7	3.77
Interest	651	3.92	1.70	1	7	1.30
Calm	651	2.70	1.48	1	7	2.16
Confidence	651	2.46	1.26	1	7	1.92
Boredom	651	1.95	1.35	1	7	1.42
Hope	651	3.37	1.57	1	7	1.67
Disappointment	651	4.92	1.69	1	7	2.35
Sadness	651	4.88	1.74	1	7	2.74
Hopelessness	651	3.82	1.65	1	7	1.75
Excitement	651	1.43	0.90	1	6	1.45
Amusement	651	1.29	0.81	1	7	1.50
Surprise	651	2.15	1.30	1	7	1.33
Confusion	651	3.25	1.66	1	7	1.34
Ideology	651	3.38	1.24	1	7	1.26
Gender	651	0.58	0.49	0	1	1.24
Female	377					
Male	274					
Subjective Social Status	651	5.45	1.58	1	10	1.05

Ethnicity	651	0.89	0.32	0	1	1.10
White	578					
Non-White	73					

Note. Information is based on the merged survey sample. See Supporting Information S3 for descriptive statistics separated by survey sample. Multi-collinearity between all the predictors in the regression models was not substantial, as the variance inflation factors (VIF) were < 5 (Kim 2019).

To better understand the outcome variable of policy support we look at each individual policy. Fig 1 shows all policies in the measure of policy support received over 60% support from most participants. The most supported policy was for the UK to plant 30,000 hectares of new trees every year. The least supported policy was for the UK government to form a citizen's assembly to advise on environmental policies.

Fig 1: Level of Support for each Environmental Policy. ♦ = Mean support. In the boxplot for each policy the central line shows the median and the extents are 25th and 75th percentiles. Policy descriptions are presented in the Supporting Information (S2). See Supporting Information S3 for results separated by survey.

When looking at the intensity of each emotion we find that most emotions listed in our study were relevant as at least some of the respondents felt each emotion to some degree when thinking about climate change. However, the least experienced emotions were boredom, excitement/thrill, and amusement in this context.

Fig 2: Frequency Distribution of Emotion Intensity when Thinking about Climate Change. The left side of the graph shows the percentage of participants who selected 1 ("Not at all") for how much they felt each emotion. The right side of the graph shows the stacked percentages of participants who identified that they felt an emotion to some degree by selecting 2-7 where 7 was labelled "Very strongly". See Supporting Information S4 for results separated by survey.

As per our registration, we performed multiple linear regressions. Model 1 in Table 3 examines the emotions with clear theoretical hypothesis and the control variables. Model 2 in Table 3 is a full model of all emotions and control variables. Each model was also analysed without covariates (Supporting Information S4), and the results remain qualitatively the same. For further comparison, the interaction between surveys and each variable was also analysed, but no interactions were significant (Table S11).

Two emotions, excitement/thrill and amusement, were considered to be potential indicators that respondents were actively engaging deliberate response distortion (93) or displaying careless attitude towards the survey. So, the analyses were all repeated after removing respondents who experienced excitement/thrill or amusement more than “not at all” (Results and discussion in Supporting Information S5) and after removing outliers (Supporting Information S6).

As we tested multiple models, the two-stage sharpened method for false detection rate (FDR) adjustment was used to adjust the significance threshold for all variables without a pre-registered directional hypothesis (i.e., emotions not included in Model 1 of Table 3 and all covariates) (94,95).

4. Results

4.1. Inferential statistics

Using the combined sample of both surveys, Table 3 shows results for the regression of policy support on each emotion presented in our survey instrument and all covariates. The results show a great variation in the strength of the association between the different emotions and environmental policy support. Participants who worried more about climate change were found to be more likely to support environmental policies. Feelings of horror also positively predicted policy support. However, boredom was negatively associated with policy support, as in respondents who reportedly felt bored when thinking about climate change were less supportive or even opposed environmental policy. No other emotions were as consistent

predictors of policy support as worry, horror, or boredom. For instance, anxiety only significantly positively predicted policy support when all the predictors were included in the model. Regarding the control covariates, only ideology was a significant predictor of policy support, with respondents who were more conservative being less likely to support environmental policies.

Table 3: Regression for Policy Support using data from Surveys 1 and 2 (merged)

	Model 1					Model2				
Variable	*b*	*SE*	CI	*p*	*q*	*b*	*SE*	CI	*p*	*q*
Intercept	64.2	5.26	[53.87, 74.53]	******		66.52	5.35	[56.02, 77.03]	******	
Boredom	-2.56	0.51	[-3.56, -1.56]	******		-1.9	0.53	[-2.93, -0.86]	******	
Horror	1.38	0.55	[0.31, 2.45]	*	*	1.5	0.55	[0.42, 2.59]	**	**
Worry	1.79	0.62	[0.57, 3.02]	**	**	1.56	0.63	[0.33, 2.79]	*	*
Disgust	-0.21	0.49	[-1.18, 0.75]			-0.52	0.5	[-1.51, 0.47]		
Anxiety	1.04	0.57	[-0.07, 2.15]			1.3	0.57	[0.18, 2.42]	*	*
Interest	0.39	0.33	[-0.26, 1.04]			0.46	0.34	[-0.21, 1.13]		
Calm	-0.51	0.57	[-1.62, 0.60]			-0.44	0.56	[-1.54, 0.66]		
Guilt	0.13	0.37	[-0.60, 0.86]			0.57	0.38	[-0.17, 1.31]		
Fear	0.77	0.64	[-0.48, 2.03]			0.79	0.63	[-0.46, 2.03]		
Hope	0.63	0.42	[-0.20, 1.45]			0.39	0.43	[-0.45, 1.24]		
Anger	0.2	0.46	[-0.69, 1.10]			0.19	0.45	[-0.70, 1.08]		
Confidence	0.1	0.53	[-0.95, 1.14]			0.35	0.58	[-0.80, 1.49]		
Distress	-0.26	0.45	[-1.15, 0.62]			-0.02	0.45	[-0.90, 0.86]		
Disappointment						1.14	0.46	[0.24, 2.04]	*	
Confusion						-0.91	0.35	[-1.60, -0.22]	**	
Hopelessness						-0.96	0.39	[-1.73, -0.19]	*	
Sadness						-0.47	0.49	[-1.43, 0.49]		
Amusement						-2.04	0.78	[-3.57, -0.51]	**	
Excitement						0.35	0.77	[-1.15, 1.86]		
Surprise						-0.13	0.46	[-1.03, 0.78]		
Political Ideology	-2.48	0.49	[-3.44, -1.52]	******		-2.48	0.48	[-3.43, -1.53]	******	
Gender (1:M, 2:F)	-0.98	1.15	[-3.24, 1.28]			-0.81	1.18	[-3.13, 1.51]		
SSS	0.23	0.34	[-0.44, 0.90]			0.28	0.34	[-0.39, 0.95]		
Ethnicity	-0.92	1.8	[-4.46, 2.62]			-1.29	1.78	[-4.79, 2.21]		
Survey	-0.41	1.16	[-2.68, 1.87]			-0.42	1.14	[-2.66, 1.82]		
N	651					651				
R^2	0.42			***		0.45			***	
Adjusted R^2	0.41			***		0.43			***	
ΔR^2						0.03			***	

Note. *b* = unstandardized estimate, *SE* = standard error, CI = 95% confidence intervals, *q* = FDR adjusted *p*-values for variables not in Model 1, SSS = Subjective Social Status. *p < 0.05, **p < 0.01, ***p < 0.001. Note the inclusion of the factor "survey" as a predictor.

474 To facilitate a comparison across emotions, Table 4 provides a synthetic representation of our
475 theoretical expectations against our empirical findings resulting from the omnibus regression
476 model that included all emotions and control variables (Model 2 in Table 3).

477

478 **Table 4: Summary of Expectations and Findings**

Emotions	Policy Attitude Expectations	Policy Attitude Findings (Model 2)
Worry	+	+*
Distress	+	NS
Anxiety	+	+*
Fear	+	NS
Guilt	+	NS
Anger	+	NS
Disgust	+	NS
Horror	+	+**
Interest	+	NS
Calm	+	NS
Confidence	+	NS
Boredom	-	-***
Hope	+	NS
Disappointment	/	+* | NS
Sadness	/	NS
Hopelessness	/	-* | NS
Excitement	/	NS
Amusement	/	-** | NS
Surprise	/	NS
Confusion	/	-** | NS

479 *Note*. + indicates policy support; - indicates reduced support or opposition; / indicates ambivalent
480 attitude; NS indicates not significant; | indicates that significance level changes following FDR. *p <
481 0.05, **p < 0.01, ***p < 0.001.

482

483 Fig 3 shows regression coefficients for each emotion based on Model 2 (Table 4). The results
484 here indicate that worry, horror, anxiety, and disappointment are significantly positive
485 predictors of environmental policy support. At the same time, the emotions of confusion,
486 hopelessness, boredom, and amusement are significant negative predictors of environmental
487 policy support.

488

489 **Fig 3: Regression Coefficients for Policy Support. Horizontal bars indicated 95%**
490 **confidence intervals, and the dashed vertical line marks a null effect. SSS = Subjective Social**
491 **Status. Following FDR correction, *hopeless*, *confused*, *disappointed* and *amused* were no**
492 **longer significant at q <.05.**

493

4.2. Control analyses

In the Supporting Information (S5 and S6) we provide sensitivity analyses that allowed us to estimate the impact of excited and amused participants as well as of outliers on the main results. One hundred and ninety-two participants reported feeling to some extent excited (N = 86), amused (N = 32), or both (N = 74) when they thought about climate change. We reasoned that the emotions of excitement/thrill and amusement could cause potential interpretation bias. Those emotions may reflect genuine emotions resulting from defensive reactions and/or negative attitude towards environmental policies. Equally, they may reflect instrumental sabotaging behaviour. As a precaution against the later possibility affecting our results, we excluded these participants from the analyses in survey 1, survey 2 and the full dataset (merged surveys). In these analyses, 61 participants were omitted from survey 1 and 131 participants were omitted from survey 2 (Supporting Information S5). Moreover, we produced another control regression which combined the exclusion of excited or amused participants with the removal of those who were classed as outliers (defined as respondents with Cook's Distance above threshold (4/(N-k-1) where k = number of predictors). We used heteroscedasticity-consistent covariance matrix estimation because the data was heteroscedastic. Results on this subsample remained virtually identical for the emotions of worry, horror, and boredom. In addition, we found that among all the other emotions with clear or unclear link to the CEE, only guilt and disgust predicted policy in Model 4 of the merged surveys, especially after FDR correction was applied (Table S16).

5. **Discussion and conclusions**

Our study explored the relationship between emotion and policy support within the specific context of the UK current political scenario (Supporting Information S2). Results revealed a strong support for the policies mix from most participants (Fig 1). This can be partly explained by the fact that each proposed policy has a CEE-mitigating element, albeit in different sectors and with different implications. A host of negative emotions were felt to *at least some degree* when thinking about climate change in the merged sample (Fig 2). Amongst those felt most intensely by our respondents we could identify worry, disappointment, and sadness; in contrast, amusement, excitement, and boredom were the least reported emotions (Table 2). When using only those emotions with established links to the CEE as predictors of policy support/opposition (Model 1, Table 3), we found that worry, horror, and boredom were consistently explaining changes in policy ratings. Those plus anxiety were significant predictors when all the emotions were included (Model 2, Table 3). Our results also revealed that emotions for which we could not establish a specific *a priori* effect, namely disappointment, confusion, hopelessness, and amusement, were also significant predictors (Fig 3). Importantly though, following FDR correction ($q < .05$), these emotions were no longer significant.

By combining an evidence-based and data-driven strategy we teased out the emotional milieu predictive of environmental policy support/opposition. Our control and sensitivity analyses were instrumental in further evaluating the robustness of our findings (Supporting Information S5 and S6). In particular, the stringent approach of combining the exclusion of respondents who felt excitement or amusement and were labelled as outliers (Table S16), as well as applying the FDR correction of the alpha value, allowed to determine which of the effects reported by the main analysis would remain significant (see Tables S17, S18, S19). The analysis with the merged (and larger) sample ($N = 432$; Table S17), revealed that feeling worried and horrified significantly predicted policy support whilst feeling bored predicted opposition, both when only *a priori* established emotions (Model 2) and when all the emotions

were included in the model (Model 4). Similarly, political ideology was confirmed as a strong predictor in this analysis too.

Predicting support for environmental policies has been a prominent focus in existing literature, with recent studies examining a wide array of factors at both individual and country levels. These factors encompass financial circumstances, such as the general economic situation of a country sociodemographic features (40,96,97), and risk perception (43,98). Since environmental policy, like any other ambitious policy, requires strong positive public support (99,100), democratic governments are interested in satisfying public concerns (101). Our study offers significant theoretical and methodological insight into public opinion as it does not capture policy support (or lack thereof) based only on socio-demographic or exogenous indicators, but rather focuses on emotions that set a policy as an urgent matter.

The constructs of worry and anxiety have been central in the scientific discourse on climate change and a great deal of societal conversation has revolved around the newly minted concept of *ecoanxiety* (13). We already highlighted the extent to which worry has been positively associated with pro-environmental attitudes and behaviours. However, less is known about other negative emotions like horror. According to the PMT (e.g., 56,57), worry, fear, horror and anxiety may rely on a similar biological response to the existential threat that triggers compensatory behavioural responses (59). The theory also suggests that protective behaviours are dependent on the degree of perceived threat and personal efficacy. In other words, the greater the perceived threat to one's health and the belief one has the capability to reduce that threat, the more likely they will (or be willing to) engage in pro-environmental behaviours 61).

Although our design did not require our respondent to contemplate actions (e.g., to mitigate their personal carbon footprint before rating the selected policies), we conceptually replicate the strong negative relationship between boredom and climate action reported by Geiger et al. (74). The psychological mechanism mediating the relationship between boredom and the CEE may be explained by the construal-level theory. The theory posits that as events are

perceived as psychologically closer (more proximal), they give rise to mental representations (construal) that are more concrete, more detailed, vivid, and contextualized. Likewise, as events are perceived as psychologically farther away (more distal), they give rise to mental representations that are more abstract (102). In this vein, climate change may be perceived as an issue that is typically more relevant in distant places and times than in the here and now. Consequently, an individual bored by the climate change discourse may experience a mix of factors, including psychological distance and a pre-existing lack of interest or motivation to engage with the complexity of the problems at hand. For example, attempting to understand the implications of the climate models may require individuals to deploy a considerable amount of cognitive resources. These models also present extreme changes in a distant future that most affect other regions of the world. A situation that triggers an aversive response to divert attention to more rewarding thoughts and activities (103,104), which are less abstract and more concretely relevant to one's life.

Lastly, we found that participants who were more conservative were less likely to support the environmental policies. This evidence supports previous research that identified a belief polarisation. Studies indicated that liberals support regulatory measures to control pollution, stringent environmental policies aimed at mitigating climate change, advocate for investments in renewable energy. In contrast, conservatives are less likely to support such measures, tend to express more scepticism about the severity of environmental issues, and emphasize the economic costs of environmental regulations (see 104 for a review).

5.1 Conclusions

A series of studies have focused on single emotions or a small range of emotions (16–18). Recently, by means of a cross-sectional survey, Myers et al. (106) questioned whether guilt, anger, hope, sadness, and fear were associated with support for distinct types of climate policies. They concluded that guilt was most strongly related to support for *personally costly policies*, hope to support for *proactive policies*, and fear to support for *regulatory policies*. Myers et al.'s diversification of policy items may explain why we found e.g., a significant effect

of guilt only in our control analysis. Yet, other explanations cannot be dismissed. For example, respondents expressing these emotions may have conflicted views about the CEE due to confusing messaging conveyed by traditional press and other media resources (e.g., 106,107) or, again, by the complexity and technicality of the subject matters (109).

Alike Myers et al. (106), we cannot rule out that relevant emotions might have been missed. Recent research highlights how self-reports of emotional states may defy rigid categorical separation and better be described according to fuzzy and dimensional representation with smooth transitions between states that are contiguous in the complex categorical space (110). Future research may give more consideration to what the best methodological approach to identifying emotional states may be. For example, a promising research path may consist of combining the approach used in our work in association with the mapping of specific types of policies, as in Myers at al., to develop a mapping of the interaction of emotional states and environmental policy support over time using ecological momentary assessment in a longitudinal fashion. Such a study may provide especially important insights into the dynamics of this interaction and thus offer crucial findings for designing communication campaigns.

We argue that the combination of 1) evidence-based and data-driven CEE-relevant emotions, 2) nation-relevant contemporary policies, 3) fine-grained and hierarchical analytical approach grounded on theoretical expectations and statistical robustness, increased the sensitivity and precision of our estimates. These ultimately confirmed the notion that individuals feeling negative emotions such as worry about the CEE are more likely to show high levels of support for environmental policies (24,39). However, they also highlighted that other potentially less frequently reported emotions may explain the opposition to environmental policies, such as boredom, and may be important target for designing specific interventions.

620

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626

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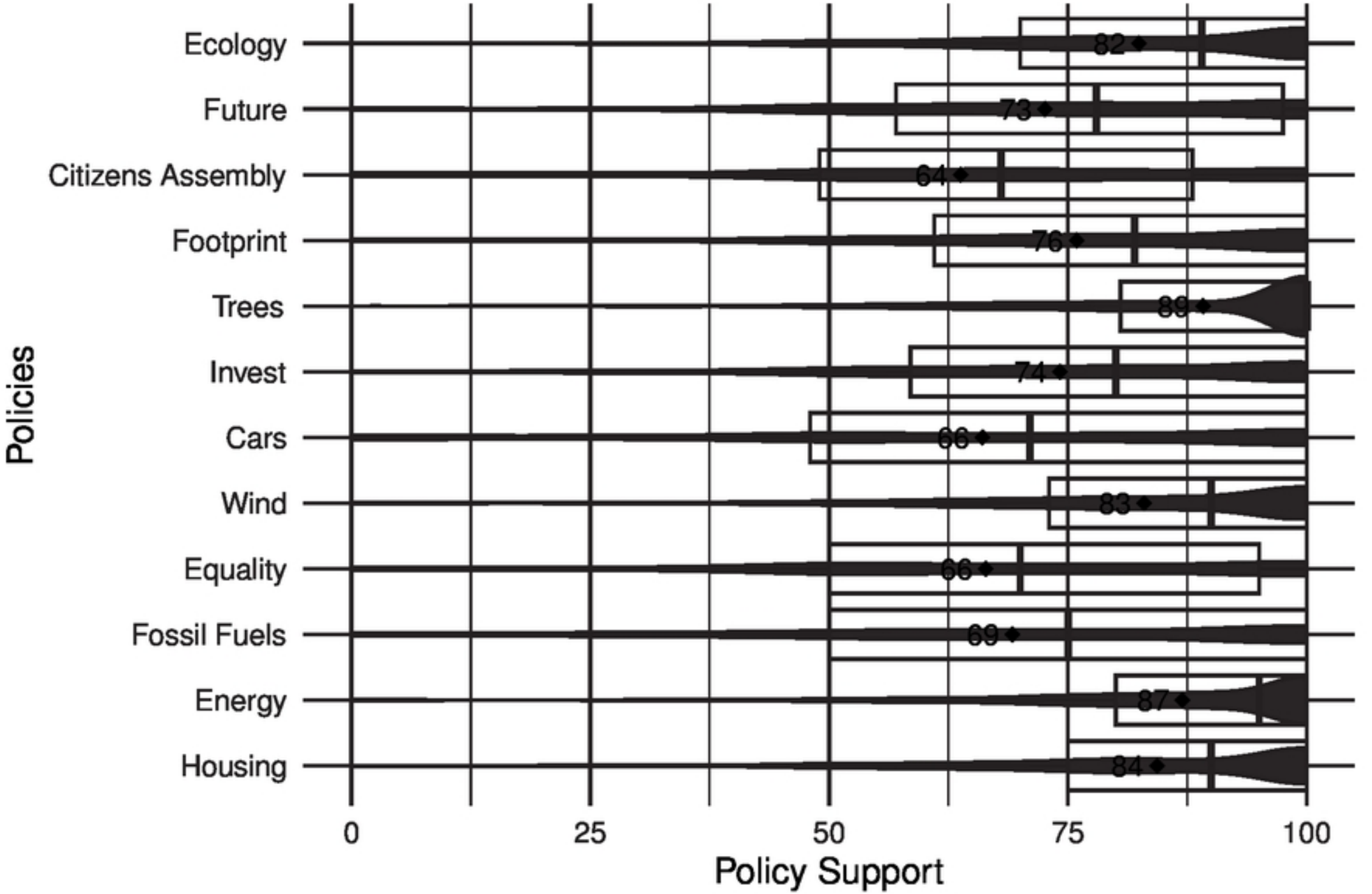
Ecology
Future
Citizens Assembly
Footprint
Trees
Invest
Cars
Wind
Equality
Fossil Fuels
Energy
Housing
Policies
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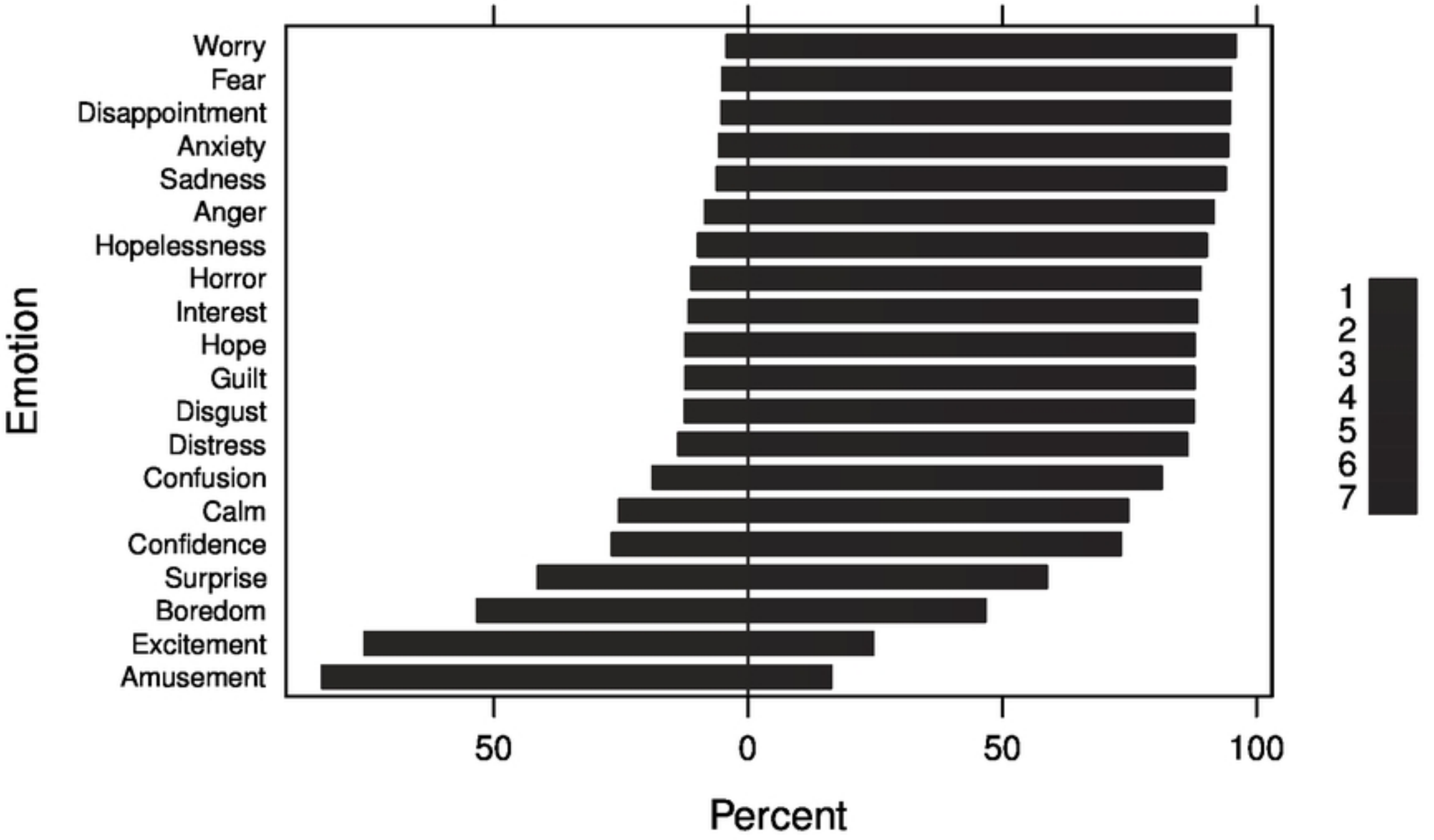
Policy Support

Fig 1


Worry
Fear
Disappointment
Anxiety
Sadness
Anger
Hopelessness
Horror
Interest
Hope
Guilt
Disgust
Distress
Confusion
Calm
Confidence
Surprise
Boredom
Excitement
Amusement
Emotion
50
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Percent
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Fig 2

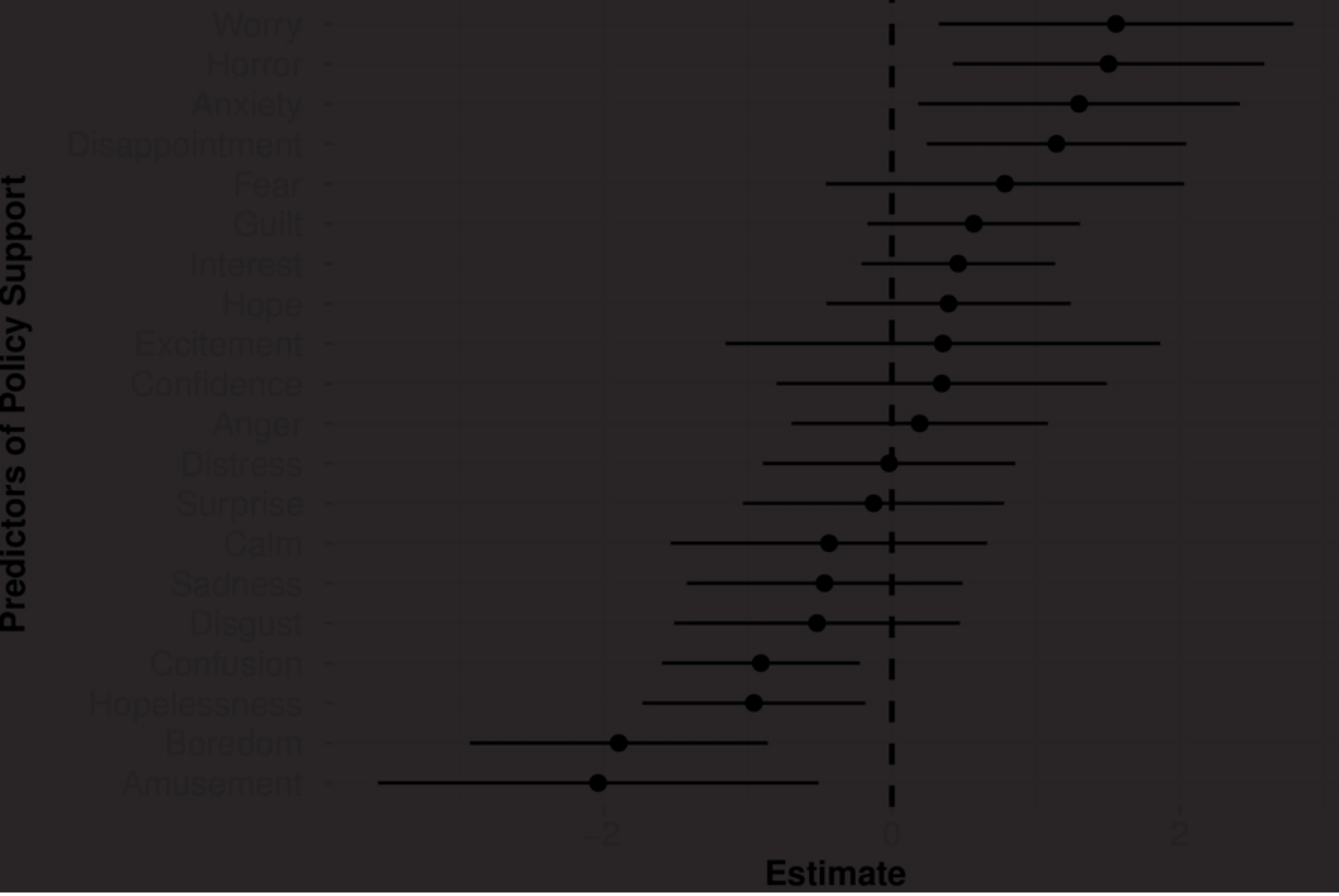
Predictors of Policy Support
Worry
Horror
Anxiety
Disappointment
Fear
Guilt
Interest
Hope
Excitement
Confidence
Anger
Distress
Surprise
Calm
Sadness
Disgust
Confusion
Hopelessness
Boredom
Amusement
−2
0
2
Estimate

Fig 3