



The strength and content of climate anger

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ABSTRACT

Climate-related anger is present in Greta Thunberg's speeches and the acts of Extinction Rebellion, but also in the rise of movements protesting climate policies, such as the Yellow Vests. The current study ($N = 2,046$) gives insight into the content of climate anger among the Norwegian public, as well as the relationship between anger and climate change engagement. Analyzing responses to the open-ended survey question "What is it about climate change that makes you angry?", we find that the most common reason was human actions causing climate change. Respondents also frequently pointed to responsible agents, especially politicians. Controlling for other climate emotions, as well as socio-demographics, anger strength was differentially related to three types of climate change engagement; it was the strongest predictor of self-reported activism, positively related to policy support, but not related to individual mitigation efforts. Among those reporting anger, directing it towards human qualities or actions was consistently and positively related to individual behavior, policy support, and activism while referring to responsible agents was not related to either. 'Contrarian' anger, reflecting skepticism towards the threat of climate change or dissatisfaction with mitigation measures, constituted 10% of the responses and had a negative effect on all outcomes. Overall, we find that both the strength and content of climate anger are relevant for climate change engagement. Our findings illustrate the need to avoid simplistic discussions of climate emotions and their motivational potential.

1. Introduction

Climate emotions are "affective phenomena which are significantly related to the climate crisis" (Pihkala, 2022, p. 1). Emotional reactions to climate change tell us that people care about the issue, and negative emotions indicate dissatisfaction with the current situation (Brosch & Steg, 2021). Some emotions – such as fear and hope – have received considerable attention in relation to climate change perceptions and engagement, while the effect of climate anger is less well-known (Brosch, 2021; Pihkala, 2022). Still, the motivational potential of anger can be recognized in everything from Greta Thunberg's speeches to the uprising of protest movements such as the Yellow Vests. In the current paper, we investigate the strength and content of people's climate anger, as well as the relationship between climate anger and different types of climate change engagement.

1.1. What about climate change makes people angry?

According to appraisal theories (e.g., Frijda, 1987; Lazarus, 1991),

emotions are seen as adaptive responses. People's appraisals of a phenomenon or a situation are central to both the intensity and the quality of their emotions. The type of emotional response a situation evokes is decided by appraisal variables, such as the degree to which an event is congruent with people's values and goals, the cause of the event, and the coping potential (for an overview of appraisal theories, see e.g., Moors et al., 2013). While all negative emotions can be elicited by goal incongruence, anger is specifically related to perceived injustice and to experiencing that an obstacle (someone or something) is blocking a desired goal (Frijda, 1986; Kuppens et al., 2003; Lazarus, 1991). The obstacle is usually perceived to be an external agent, but anger can also arise from attributing the responsibility of an aversive situation to oneself or to ambiguous causes (Ellsworth & Tong, 2006; Kuppens & Tuerlinckx, 2007).

When directed at external agents, the agents are typically blamed for failing to act or intentionally acting against a desired goal (Lazarus, 1991). The blame is founded on a belief that the agents could have chosen to act differently. In line with this, anger is associated with moral violations (Goldberg et al., 1999; Mikula et al., 1998) and is considered a

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'moral emotion' (Lomas, 2019). Moral emotions (such as anger, guilt, and compassion) are based in morality and can arise from events that do not directly impact oneself (Antadze, 2020; Haidt, 2003). Previous research discussing anger in the context of climate change often equates 'climate anger' with 'moral anger' (Pihkala, 2022), measured with items such as "I am angry about the fact that many people act carelessly toward nature" (e.g., Reese & Jacob, 2015).

However, not all anger is 'moral anger'; Batson et al. (2007) argue that one can differentiate between moral anger (a reaction to someone overstepping moral boundaries, also referred to as moral outrage), empathetic anger (a reaction to the unfair treatment of someone one cares for) and personal anger (a reaction to being unfairly treated). While the goal of moral anger is to restore fairness, the goal of empathetic or personal anger is first and foremost to protect one's interest and punish the perpetrator (Batson et al., 2007). With regard to climate change, the harm-doer could be politicians, industry actors, or other people. Anger can also be self-directed, aimed at oneself at the individual level (e.g., I do not act on climate change) (Ellsworth & Tong, 2006) or as part of an advantaged in-group (e.g., My country's oil production is hindering climate change mitigation) (Thomas et al., 2009).

Climate change has multiple, complex, and interrelated causes and consequences, and there are several reasons why people might be angry about it. The responsibility for historical and current emissions is distributed unequally, both between and within countries (Chancel, 2022). Further, both the direct (e.g., more frequent extreme weather events) and indirect (attempts to mitigate or adapt to the threat) impacts of climate change can feel unfair. For example, people could be angry about political inaction (causes), the impact on future generations (consequences), or because they consider climate policies to be unjust or unnecessary. To our knowledge, not a lot of research has tapped into the content of climate anger. One exception is du Bray et al. (2019), who used semi-structured interviews to investigate climate emotions in four island nations (Fiji, Cyprus, New Zealand, and the United Kingdom). They found that expressions of anger were related to concern for younger generations, inability to cause change, political structures, and a sense that other people do not care or do not take responsibility. Lorenzini and Rosset (2023) report that, among climate activists, anger is related both to defending one's interest and putting pressure on politicians. Results from interviews conducted among people reporting high levels of worry about climate change show that different climate emotions are related to different aspects of climate change (Marczak et al., 2023). Anger was especially relevant when referring to injustice, lack of engagement among those in power or people in general, seeing human nature as destructive, and harmful political-economic systems.

The importance of understanding the content of climate emotions can be illustrated by research on climate hope and doubt. Marlon et al. (2019) used open-ended survey questions to investigate the rationale people give for being hopeful or doubtful about climate change mitigation. Their results led to a theoretical separation between 'constructive hope' (belief that people individually or collectively can act on climate change) and 'false hope' (belief that the issue will be fixed by technology or nature), as well as 'constructive doubt' (skepticism about whether people will act on climate change) and 'fatalistic doubt' (nothing can be done). While constructive hope and constructive doubt were positively associated with climate change engagement, false hope and fatalistic doubt had a negative effect.

In the current paper, we take an explorative approach to investigate the content of climate anger among a representative sample of the Norwegian public. Norwegian climate policy and debate is characterized by a large oil and gas sector that employs about 5% of the working force, constitutes about half of the value of total Norwegian exports, and is understood as closely linked to the construction and maintenance of the Norwegian welfare state. The country has an almost fossil-free electricity sector dominated by hydropower and has successfully implemented an extensive domestic program to phase in electric vehicles (Andersen et al., 2022). The national CO₂ emissions have declined <5%

since 1990 and emission from oil and gas production has increased by 48% (Norwegian Environment Agency, 2023). Previous research indicates that Norwegians generally have high trust in its stable political institutions (OECD, 2022) and that they worry about climate change but typically consider it to be a distant global problem that could be solved by technological solutions, such as carbon capture and storage (Merk et al., 2022; Steentjes et al., 2017).

1.2. The relationship between anger and climate change engagement

In addition to understanding the causes of climate anger, we also aim to gain a better understanding of how anger relates to climate change engagement. Different emotions are related to different ways of acting (action tendencies) (Frijda, 1987). Lazarus (1991) refers to anger as "one of the most powerful emotions" (Lazarus, 1991, p. 217) and it is considered a more 'active' emotion as compared to other negative emotions such as fear, sadness, or guilt (Carver & Harmon-Jones, 2009; Lazarus, 1991). Still, anger has often been viewed in a negative light due to its association with blame and aggression (Lazarus, 1991) and to action tendencies such as punishment and retaliation (van Doorn et al., 2014). One exception is self-directed anger, which shares some similarities with shame and guilt (Ellsworth & Tong, 2006; Thomas et al., 2009). This type of anger has been related to withdrawal when aimed at oneself (Ellsworth & Tong, 2006) and a wish for compensation and self-correction when aimed at an unfairly advantaged in-group (Thomas et al., 2009).

Recent research supports a more positive view of anger (van Doorn et al., 2014), also in the context of climate change. As a moral emotion (Haidt, 2003), anger might first and foremost relate to prosocial behavior, such as reacting against injustice towards those most affected by climate change. In general, anger has clear links to collective action and social movements working against inequality (Antadze, 2020; Jasper, 2014; Thomas et al., 2009; van Zomeren et al., 2008; Włodarczyk et al., 2017). However, previous research has also connected climate anger to other types of climate change engagement. The following three studies all measured climate anger in a similar way to the current paper, by asking people to indicate how angry or frustrated they feel when thinking about climate change. Stanley et al. (2021) conclude that anger can be an adaptive and important emotional predictor for both collective and individual pro-climate behaviors. Chu and Yang (2019) found that anger was related to an intention to engage in mitigation behaviors (e.g., turning off lights and using public transport), but not directly related to policy support (e.g., regulating carbon dioxide) or climate change concern. Similarly, Smith and Leiserowitz (2014) found no relationship between anger and climate change policy support. In sum, the relationship between anger and climate change engagement is not always clear and may differ based on the type of engagement in question.

The motivating potential of anger may also depend on the anger content (see e.g., Thomas et al., 2009). For example, moral or empathetic anger might be especially effective in motivating political and social actions aimed at mitigating climate change, while self-focused anger could motivate individual behaviors or policy support. The effect of personal anger might differ based on whether the perceived injustice is related to the consequences of climate change (e.g., young people protesting against intergenerational injustices) or to mitigation efforts (e.g., Yellow Vest protesting against economic inequality).

1.3. Control variables (gender, age, education, and political affiliation)

Several socio-demographic variables are relevant with regard to climate anger and climate change engagement. For example, Swim et al. (2022) found that younger generations more frequently reported anger and that anger increased from 2010 to 2019 for the young (only). Further, although the findings related to socio-demographic factors have been mixed, women, younger age cohorts, those placing themselves to

the political left, and people with higher levels of education typically score higher on climate change concern (Driscoll, 2019; Van der Linden, 2017). The same groups are overrepresented in climate protests (de Moor et al., 2021; Svensson & Wahlström, 2023). In the current study, we look at the distinct effect of climate anger on different types of self-reported behavior intentions, when controlling for other climate emotions (sadness, fear, guilt, and hope) and socio-demographic variables.

1.4. Aims and research questions

Climate emotions are recognized as important predictors of climate change perceptions and engagement (Brosch, 2021; Brosch & Steg, 2021). However, while some emotions – such as worry and hope – are frequently researched, climate anger has received far less attention (Pihkala, 2022). The current paper takes an explorative approach to investigate self-reported reasons to feel angry about climate change. Further, we explore the relationship between the strength and content of climate anger on one side, and individual behaviors, policy support, and activism on the other (referred to as ‘climate change engagement’ when discussed together). This leads to the following overarching research questions:

- What reasons do people give for their climate-related anger?
- How is anger strength related to different types of climate change engagement?
- How is anger content related to different types of climate change engagement?

2. Materials and methods

2.1. Data collection and participants

Data was collected through round 24 of the Norwegian Citizen Panel (NCP) (Ivaresflaten et al., 2022) in May and June 2022. The NCP collects data three times a year. Some variables, such as placement of the political left–right spectrum, are seen as relatively stable ‘core questions’ and are not asked in every round. Instead, these questions are meant to be combined with data from subsequent rounds. Data from rounds 18 (collected 2020), 20, and 22 (collected 2021) were combined to create the variable for political orientation. The NCP sample is drawn from the National Population Registry of Norway and is nearly representative of the adult population above the age of 18. The sample for round 24 consisted of 49% women. As regards age, two percent of the respondents were born in 1939 or earlier, 17% between 1940 and –1949, 26% between 1950 and –1959, 23% between 1960 and –1969, 15% between 1970 and 1979, 10% between 1980 and 1989 and seven percent in 1990 or later. Five percent of respondents reported not having finished any education or only primary school, 30% upper secondary school, and 65% college or university. Mean political orientation, measured on the political left–right axis where 0 represents far left and 10 represents far right, was ($M = 4.85$, $SD = 2.38$). The full sample for round 24 ($N = 10,160$) was randomly divided into sub-samples consisting of about 2,000 respondents, one of which got the questions used in the current paper ($n = 2,046$). To correct for observed bias, weights (based on age, gender, geography, and education) are added to the analyses to better represent the Norwegian population.

2.2. Measurements

Climate anger was measured with the question “When it comes to climate change and everything you associate with it, how strongly do you experience the following emotions?”. Anger was listed together with sadness, fear, guilt, and hope. The respondents indicated the strength of each emotion on a scale from 0 (*Not at all*), 1 (*To a small extent*), 2 (*To some extent*), 3 (*Strongly*), to 4 (*Very strongly*). Thirty-six respondents did not answer the question about anger.

The respondents who reported feeling anger *To some extent*, *Strongly*, or *Very strongly* ($n = 960$) were asked the following open-ended question: “What is it about climate change that makes you angry? Please write down the first thing that comes to mind. We welcome all types of answers – a couple of sentences, or just a few words if that suits you better.” A total of 832 respondents wrote an answer in the open textbox.

All respondents were asked to consider three statements about their intentions to engage with climate change mitigation: (1) I try to limit my climate emissions in everyday life, (2) I would support a political proposal to increase the tax level on petrol and diesel and (3) It is likely that I will participate in a climate protest in the next 12 months. All three statements started with the intro “How much do you agree or disagree with the following statement?” and could be answered on the following scale: – 3 (*Strongly disagree*), –2 (*Disagree*) –1 (*Somewhat disagree*) 0 (*Neither agree nor disagree*) 1 (*Somewhat agree*) 2 (*Agree*) 3 (*Strongly Agree*). In the original data set, the answer scale spans from 1 (*Strongly agree*) to 7 (*Strongly disagree*). The scale has been reversed so that higher numbers indicate stronger agreement, and recoded to span from – 3 to 3, so that *Neither agree nor disagree* has the value 0. Two respondents refrained from answering the first statement, nineteen from the second, and eight from the third.

Because climate anger can be considered a moral emotion, we also included the question “To what extent do you see it as a moral duty for the individual to contribute to preventing climate change?” with the answer categories 0 (*Not at all*), 1 (*To a small extent*), 2 (*To some extent*), 3 (*To a large extent*) and 4 (*To a very large extent*).

The variables for gender (0 = *man*/ 1 = *woman*) and age cohort (0 = 1990 or later, 1980 – 1989, 1970 – 1979, 1960–1969, 1950–1959, 1940–1949, and 6 = 1939 or earlier) were extracted from the Norwegian national population register. The variable for age cohort is treated as continuous in the analyses. Level of education was reported by the respondents themselves and coded as 0 (*no education/primary school*), 1 (*upper secondary school*), and 2 (*college/university*). Political orientation was measured by asking respondents to place themselves on the political left–right axis: “In politics people often talk about the ‘left wing’ and the ‘right wing.’ Below is a scale where 0 represents those who are on the far left politically, while 10 represents those who are on the far right. Where would you place yourself on such a scale?”. All response scales have been recoded so that the lowest response option is coded as 0 rather than 1 (as in the original data set). The questions were originally asked in Norwegian and have been translated for publication. The Norwegian wording can be found in the [Supplementary material](#) (S1).

2.3. Statistical analysis

Differences in anger strength between socio-demographic groups were investigated through a multiple linear regression model predicting the level of anger. The relationship between climate anger and other climate emotions was identified through correlations.

The coding scheme (see [Table S2](#)) for the open-ended responses was developed by two researchers reading through the first 100 responses and noting recurring themes. This formed the basis of two exclusive categories, issue anger, and contrarian anger. The ‘issue anger’ responses were sorted into eight different main categories. Two of the main categories had sub-categories to further capture the content of climate anger. The categories were not mutually exclusive, meaning that each response could be sorted into several categories. All categories were coded in a binary manner, reflecting whether the category was mentioned (1) or not (0). The answers coded as ‘contrarian’ got no additional codes. The coding was done independently by the two researchers who developed the coding scheme. Coding principles and potential new codes were discussed in the coding process. Inter-coder reliability was 93.7% for the independent coding and increased to 100% after differences were discussed and resolved. Twenty responses were removed from the coding because the anger content was unclear. Non-coded responses include the answers “I don’t know what to say” and

“I am not angry, just sad and worried”.

To investigate the potential moral motive behind climate anger, we used independent t-tests to look at whether mentioning any of the anger categories was associated with considering climate engagement a moral duty. We also used logistic regressions to examine whether the reported reasons for being angry differed based on gender, age cohort, political orientation, or level of education. To avoid very small group sizes, we only looked at the four largest categories, mentioned in more than 20% of the responses.

With regards to predicting climate engagement, multiple linear regression models were used to look at relationships between climate anger on the one hand and individual behavior, policy support, and activism on the other. The first set of regression analyses looked at the associations between the continuous climate anger variable (anger strength) and the outcomes while controlling for other climate emotions and socio-demographics. In a second set of regressions, we used the content categories as dummy variables (anger content) to predict climate engagement. Because of the small sample sizes, sub-categories were not included. The post estimation command `test` was used to compare whether relevant coefficients were different from each other. The command performs Wald tests.

All statistical analyses were conducted in STATA 17.0. Weights were added when appropriate by using the survey prefix command `svy:`. Since the regressions focusing on anger content only included a subset of the respondents (those who were angry), and thereby did not aim to be representative of the Norwegian population, survey weights were not applied.

3. Results

In this section, we first describe the relationship between climate anger and the other study variables, as well as how anger can vary based on socio-demographics. Secondly, we look at what people reported to be the reason for their climate anger. Finally, we focus on the relationship between climate anger (strength and content) and climate change engagement. Means and standard deviations for the study variables can be seen in Table 1. Apart from guilt, another ‘moral’ emotion, anger is the climate emotion with the lowest mean value.

3.1. Who is angry?

Based on correlations, those who reported being angry were also likely to feel sad, fearful, and guilty, but somewhat less likely to feel hopeful (See Table 2). The correlation with sadness was particularly strong. Anger was further higher among those with stronger intentions to engage in individual behavior, policy support, and activism.

Table 1
Means and Standard Deviations for study variables (weighted).

Variable	M	SD	Min	Max
<i>Emotions:</i>				
Anger	1.46	1.10	0	4
Sadness	1.82	1.14	0	4
Fear	1.64	1.01	0	4
Guilt	1.33	0.93	0	4
Hope	1.86	0.89	0	4
<i>Engagement:</i>				
Individual behavior	1.42	1.24	-3	3
Policy support	-0.77	2.07	-3	3
Activism	-1.56	1.67	-3	3
Morality	2.66	0.99	0	4

Note. The emotions were answered on a scale from 0 = Not at all to 4 = Very strongly. The engagement outcomes were answered on a scale from -3 = Strongly disagree to 3 = Strongly agree. The question about morality was answered on a scale from 0 = Not at all to 4 = To a very large extent. Weighted based on age, gender, geography, and education.

Table 2
Pairwise correlations between study variables (weighted).

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Anger	-												
2. Sadness	0.72***	-											
3. Fear	0.64***	0.74***	-										
4. Guilt	0.53***	0.53***	0.54***	-									
5. Hope	-0.16***	-0.16***	-0.08***	0.01	-								
6. Individual behavior	0.33***	0.41***	0.42***	0.31***	0.12***	-							
7. Policy support	0.45***	0.49***	0.50***	0.43***	-0.03	0.37***	-						
8. Activism	0.56***	0.54***	0.51***	0.40***	-0.10***	0.38***	0.55***	-					
9. Morality	0.42***	0.51***	0.49***	0.45***	0.12***	0.66***	0.44***	0.41***	-				
10. Gender ^a	0.16***	0.18***	0.21***	0.23***	0.05*	0.20**	0.08***	0.11***	0.21***	-			
11. Education ^b	0.13***	0.20**	0.17***	0.12***	0.01	0.16***	0.31***	0.11***	0.17***	0.06***	-		
12. Age cohort ^c	-0.18***	-0.18***	-0.15***	-0.10***	0.25***	0.02	-0.22***	-0.12***	0.03	0.02	-0.09***	-	
13. Political orientation	-0.34***	-0.34***	-0.32***	-0.22***	0.20**	-0.18***	-0.39***	-0.43***	-0.19***	-0.09***	-0.05***	0.21***	-

Note: *** $p < .001$ (2-tailed). ^a0 = male, ^b0 = no education/primary school, ^c0 = youngest cohort of those born in 1990 or later. The correlations are weighted based on age, gender, geography, and education.

Multiple regression results (see Table 3) show that climate anger was stronger among women, younger age cohorts, and those placing themselves further left on the political spectrum. We found no effect for education. The socio-demographic variables explained about 17% of the variance in anger $R^2 = 0.17$, $F(5, 1714) = 27.67$, $p = < 0.001$.

3.2. What about climate change makes people angry?

Only people who reported that they felt anger (to some extent, strongly, or very strongly) when thinking about climate change were asked to answer the open-ended question. This constituted 48% of respondents in the current study (and corresponds to about 46% of adults in Norway according to the weighted results). While most responses reflected anger related to climate change as a problem (90%), 78 responses (10%) did not reflect anger related to climate change as a problem, but rather skepticism towards the severity of the issue or disapproval of mitigation measures. These answers were coded as ‘contrarian’ and not placed into any other categories. Examples of responses include “One-sided media coverage pro IPCC”, “The measures”, “Hysteria” and “The sun is responsible for climate change”.

The answers not coded as ‘contrarian’ were sorted into one or more categories. All categories can be seen in Table 4 and the coding scheme including example responses is available in the Supplementary material (Table S2). The average answer length was 120.5 characters excluding spaces. Most respondents mentioned one (47%) or two (38%) of the main categories in their responses.

The most frequently mentioned reason for being angry was human actions. This category was mentioned in 57% of the responses and reflected anger related to human action or inactions causing or failing to mitigate climate change (e.g., “Not enough measures” or “insane overuse of resources”). Another frequently mentioned category was human qualities (mentioned in 26% of the responses, e.g., “Get angry when there are so many people who don’t care at all”). The categories human actions and human qualities both refer to the human causes of climate change. Thirty-one percent of the responses specifically mentioned responsible agents, most frequently politicians (e.g., “Political ability to do what is needed, too much talk and too little action”). Some also reported being angry about the prioritization of money over the environment (10%) (“seems like money is more important than the environment”) and climate change denialism (6%) (“That, despite all the evidence, people deny that climate change is human made”).

Generally, it was far more common to report anger about the (continued) causes of climate change as compared to its consequences. Those who mentioned consequences referred to how climate change impacts nature (13%) (“Loss of natural diversity that has built up over hundreds of thousands of years”) or humans (11%), mainly future generations or vulnerable populations (“everything in nature is destroyed and affects the next generation”, “Constant natural disasters

Table 3
Regression predicting anger strength (weighted).

Variables	B (SE)	95% CI
Intercept	2.08 (0.24)***	[1.60, 2.56]
Gender ^a		
Women	0.34 (0.10)***	[0.15, 0.53]
Education ^b		
Upper secondary	0.11 (0.19)	[-0.25, 0.48]
College/univ	0.18 (0.19)	[-0.18, 0.55]
Age cohort ^c	-0.11 (0.04)**	[-0.18, 0.03]
Political orientation (further right)	-0.13 (0.03)***	[-0.19, -0.07]
R ²	0.17	

Note. N = 1,719. CI = confidence interval; LL = lower limit; UL = upper limit. ^a0 = male, ^b0 = no education/primary school, ^c0 = youngest cohort of those born in 1990 or later. The regression is weighted based on age, gender, geography, and education.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4

Main categories of climate anger coded from open-ended responses, frequency, and percent.

Category	Frequency, n (%)
Human actions	464 (57%)
Agents	255 (31%)
Subcategories:	
Politicians	179 (22%)
Countries	45 (6%)
Industry	42 (5%)
The rich	20 (2%)
Human qualities	208 (26%)
Consequences for nature	105 (13%)
Consequences for humans	88 (11%)
Subcategories:	
Vulnerable	33 (4%)
Future generations	34 (4%)
Money	78 (10%)
Denial	46 (6%)
Lack of control	23 (3%)

Note. The percentages are calculated from the codable responses (n = 812). The categories were not mutually exclusive.

for poor people in vulnerable areas”). The least mentioned category was ‘lack of control’, mentioned in 3% of responses (“it feels unfair and hopeless”, “no matter what I do, it won’t help”).

Next, we examined how the different content categories related to considering climate engagement a moral duty and found that the score on our five-point moral duty variable was significantly higher for individuals mentioning human qualities ($M = 3.3$, $SD = 0.72$) than for those not mentioning human qualities ($M = 3.1$, $SD = 0.81$), $t(829) = 3.5$, $p < .001$. The score on the moral duty variable was also higher for those mentioning human actions ($M = 3.3$, $SD = 0.71$) than for those not mentioning it ($M = 3.0$, $SD = 0.88$), $t(829) = 4.0$, $p < .001$. Likewise, those mentioning money reported higher values on the moral duty dimensions ($M = 3.4$, $SD = 0.69$) than those not mentioning it ($M = 3.1$, $SD = 0.80$), $t(829) = 2.5$, $p = .01$. Conversely, those mentioning contrarian anger had much lower levels of agreement with the statement that contributing to preventing climate change is a moral duty ($M = 2.4$, $SD = 1.2$) compared to those who did not ($M = 3.2$, $SD = 0.71$), $t(829) = 9.2$, $p < .001$. Mentioning climate change denial, agents, consequences for nature, consequences for humans, or lack of control were not related to considering climate action a moral duty.

To find out whether socio-demographic factors relate to different reasons to be angry, we ran logistic regressions to examine the four categories mentioned in more than 20% of responses: human qualities, human actions, agents in general, and politicians in particular. The dependent variable for each of these expressed whether the respondent had mentioned the given category or not. The models had gender, age cohort, education, and ideological self-placement as explanatory variables. For details see Table S3 in the Supplementary material. For all four categories, self-placement on the political left was a significant and positive predictor, all else equal. Human actions – the most prevalent object of anger – was more frequently mentioned by women and those with higher levels of education, in addition to the effect of political leanings. Human qualities were more frequently mentioned as an object of anger by the young, while those with higher levels of education more frequently mentioned responsible agents. Finally, politicians were mentioned by those with higher levels of education.

3.3. The relationship between anger and climate change engagement

Next, we examine associations between climate anger and climate change engagement, specifically individual behaviors, policy support, and activism. Self-reported policy support, and especially activism, was reported far less frequently than individual behaviors. Individual behaviors also had the least variability. We first look at the effect of anger

strength (measured by asking how angry people feel with regard to climate change) followed by anger content (the different categories reflecting reasons to be angry).

3.3.1. Anger strength and climate change engagement

When controlling for other climate emotions, as well as socio-demographics, we find that climate anger relates differentially to distinct types of climate change engagement (see Table 5). Among the five emotions, climate anger was the strongest predictor of self-reported activism (participating in climate protest). Anger furthermore related positively to policy support (increased taxes on petrol and diesel) but did not predict individual mitigation efforts (trying to limit greenhouse gas emissions in everyday life). Combined, all variables explained about 24% of the variance in individual behaviors $R^2 = 0.24$, $F(10, 1696) = 14.63$, $p < 0.001$, 41% in policy support $R^2 = 0.41$, $F(10, 1688) = 80.29$, $p < 0.001$, and 44% in activism $R^2 = 0.44$, $F(10, 1691) = 64.88$, $p < 0.001$. Results from Walds tests ($p < .05$) showed that the coefficient for anger was different from sadness, fear, guilt, and hope when predicting activism, but not when predicting individual behavior and policy support.

Among the other climate emotions, sadness related positively to individual behaviors and activism, but was not related to policy support. Fear was the only emotion consistently related to all three outcomes. Guilt was only related to policy support, while hope was related to both individual behaviors and policy support. With regard to the control variables, individual behaviors were more frequently reported by women. By contrast, policy support was stronger among men, younger age cohorts, those with education at the college/university level, and those placing themselves further left on the political spectrum. Only placement to the left of the political spectrum related to activism.

3.3.2. Anger content and climate change engagement

Focusing only on the respondents who reported at least some amount of anger, we find that also the content of anger can be relevant for climate change engagement (see Table 6). Anger fueled by human qualities or actions related (positively) to all three outcomes. Still, the strongest predictor was the category ‘contrarian’, which had a negative effect on individual behavior, policy support, and activism. According to Walds tests ($p < .05$), the coefficients for this category differed from all other content categories when predicting individual behaviors and policy support. With regard to activism, contrarian anger differed from all other categories except for consequences for nature. Pointing to responsible agents, consequences for humans, or a lack of control as the

reason for one’s anger did not have a distinct effect on any of the outcomes. The remaining anger content categories predicted each outcome in different ways. While the categories ‘denial’ and ‘money’ was reported more frequently by those likely to participate in protests, it was not related to individual behaviors or policy support. Consequences for nature were only (negatively) related to policy support. Notably, the content of people’s anger explains far more of the variance in policy support (increased taxes on petrol and diesel) than in individual behaviors and activism. Concerning the control variables, political orientation was related to all three outcomes, while gender predicted individual behavior.

4. Discussion

The goal of the current paper was to increase our understanding of the reasons behind people’s climate anger and how it relates to different forms of climate change engagement. Emotional reactions only occur when a situation is perceived as relevant to one’s values, goals, or moral principles (Haidt, 2003; Lazarus, 1991). The fact that many reported climate-related emotions indicates that collective and global issues, such as climate change, are considered personally relevant. In line with this, climate emotions such as anger, fear, sadness, and guilt have previously been connected to a lower perceived (spatial and social) distance of climate change (Chu & Yang, 2019).

Although climate anger was reported less frequently than the other emotions, except for guilt, almost half of the respondents reported feeling at least somewhat angry. As expected, climate anger was higher among women, younger age cohorts, and those placing themselves further left politically. There might be several reasons why the remaining half does not report feeling angry about climate change. Some of them might experience other climate emotions, but not anger, because they appraise the situation differently (for appraisals, see e.g., Moors et al., 2013). Others might not experience climate change as relevant to their values, goals, or moral principles, and thereby not become emotionally engaged at all.

4.1. What about climate change makes people angry?

Theoretically, anger is especially prevalent in situations perceived to be unjust or unfair and as a reaction to perceived moral violations, such as an agent intentionally blocking a desired goal (Lazarus, 1991; Mikula et al., 1998). Below, we discuss the rationale people give for their climate anger. Apart from contrarian anger and lack of control, the

Table 5
Predicting climate change engagement from anger strength and socio-demographics (weighted).

Variables	Individual behavior		Policy support		Activism	
	B (SE)	95% CI	B (SE)	95% CI	B (SE)	95% CI
Intercept	-0.07 (0.34)	[-0.74, -0.60]	-1.88 (0.39)***	[-2.65, -1.11]	-2.28 (0.36)	[-2.98, -1.58]
<i>Climate emotions:</i>						
Anger	0.04 (0.07)	[-0.10, 0.17]	0.22 (0.10)*	[0.02, 0.41]	0.50 (0.06)***	[0.37, 0.63]
Sadness	0.24 (0.06)***	[0.13, 0.36]	0.16 (0.09)	[-0.02, 0.34]	0.16 (0.07)*	[0.02, 0.31]
Fear	0.23 (0.06)***	[0.10, 0.35]	0.35 (0.11)**	[0.13, 0.56]	0.22 (0.08)**	[0.07, 0.37]
Guilt	0.03 (0.06)	[-0.09, 0.16]	0.33 (0.11)**	[0.10, 0.55]	0.11 (0.08)	[-0.04, 0.27]
Hope	0.19 (0.06)**	[0.07, 0.32]	0.19 (0.09)*	[0.00, 0.37]	0.07 (0.07)	[-0.07, 0.21]
<i>Gender^a</i>						
Women	0.28 (0.09)**	[0.11, 0.45]	-0.26 (0.13)*	[-0.52, -0.00]	-0.09 (0.11)	[-0.30, 0.12]
<i>Education^b</i>						
Upper secondary	0.12 (0.18)	[-0.23, 0.48]	0.09 (0.25)	[-0.41, 0.58]	-0.28 (0.20)	[-0.67, 0.12]
College/univ	0.18 (0.17)	[-0.16, 0.51]	1.06 (0.25)***	[0.56, 1.56]	-0.01 (0.22)	[-0.44, 0.41]
<i>Age cohort^c</i>						
0	0.05 (0.03)	[-0.01, 0.11]	-0.12 (0.04)**	[-0.21, -0.04]	0.02 (0.03)	[-0.04, 0.09]
<i>Political orientation (further right)</i>						
0	-0.03 (0.02)	[-0.06, 0.01]	-0.17 (0.03)***	[-0.23, -0.10]	-0.16 (0.03)***	[-0.22, -0.10]
R^2	0.24		0.41		0.44	

Note. $N = 1706$ for individual behaviors, $n = 1698$ for policy support and $n = 1701$ for activism. CI = confidence interval; LL = lower limit; UL = upper limit. ^a0 = male, ^b0 = no education/primary school, ^c0 = youngest cohort of those born in 1990 or later. The regression is weighted based on age, gender, geography, and education. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 6
Predicting climate change engagement from anger content.

Variables	Individual behavior		Policy support		Activism	
	B (SE)	95% CI	B (SE)	95% CI	B (SE)	95% CI
Intercept	1.43 (0.26)***	[0.92, 1.94]	1.05 (0.48)*	[0.11, 1.99]	0.32 (0.46)	[-0.58, 1.22]
Contrarian	-0.45 (0.14)**	[-0.72, -0.17]	-1.60 (0.26)***	[-2.10, -1.10]	-0.63 (0.24)*	[-1.11, -0.15]
Human actions	0.31 (0.08)***	[0.14, 0.47]	0.42 (0.15)**	[0.11, 0.72]	0.30 (0.15)*	[0.01, 0.59]
Agents	-0.02 (0.08)	[-0.17, 0.13]	0.11 (0.15)	[-0.18, 0.39]	0.24 (0.14)	[-0.03, 0.51]
Human qualities	0.28 (0.09)**	[0.11, 0.44]	0.42 (0.16)**	[0.11, 0.73]	0.51 (0.15)***	[0.21, 0.80]
Consequences for nature	-0.13 (0.11)	[-0.34, 0.18]	-0.59 (0.20)**	[-0.98, -0.21]	-0.20 (0.19)	[-0.57, 0.17]
Consequences for humans	0.07 (0.11)	[-0.15, 0.29]	0.30 (0.20)	[-0.10, 0.70]	0.32 (0.20)	[-0.06, 0.70]
Money	0.19 (0.12)	[-0.04, 0.42]	0.05 (0.22)	[-0.38, 0.49]	0.63 (0.21)**	[0.21, 1.04]
Denial	0.13 (0.15)	[-0.16, 0.43]	0.17 (0.28)	[-0.38, 0.72]	0.59 (0.27)*	[0.06, 1.12]
Lack of control	0.20 (0.20)	[-0.19, 0.59]	0.17 (0.37)	[-0.55, 0.90]	0.56 (0.35)	[-0.13, 1.25]
Gender ^a						
Women	0.17 (0.07)*	[0.03, 0.30]	-0.05 (0.13)	[-0.30, 0.20]	-0.23 (0.12)	[-0.47, 0.01]
Education ^b						
Upper secondary	0.32 (0.23)	[-0.14, 0.78]	-0.46 (0.43)	[-1.31, 0.39]	-0.69 (0.41)	[-1.50, 0.12]
College/univ	0.28 (0.23)	[-0.17, 0.73]	0.48 (0.42)	[-0.35, 1.32]	-0.36 (0.40)	[-1.15, 0.44]
Age cohort ^c	0.03 (0.02)	[-0.02, 0.07]	-0.07 (0.04)	[-0.15, 0.01]	0.06 (0.04)	[-0.02, 0.14]
Political orientation (further right)	-0.06 (0.02)***	[-0.09, -0.03]	-0.20 (0.03)***	[-0.26, -0.14]	-0.23 (0.03)***	[-0.28, -0.18]
Adjusted R ²	0.12		0.30		0.22	

Note. All predictors are binary (0 = category not mentioned, 1 = mentioned). The regressions are not weighted. $N = 714$ for individual behavior, $n = 711$ for policy support and $n = 711$ for activism. ^a0 = male, ^b0 = no education/primary school, ^c0 = youngest cohort of those born in 1990 or later. * $p < .05$. ** $p < .01$. *** $p < .001$.

identified categories can be roughly divided into anger directed at climate change *causes* and *consequences*.

Most respondents referred to the *causes* of climate change when explaining the reason for their climate anger. Specifically, many are angry about human actions (mentioned in 57% of responses) and/or human qualities (mentioned in 26% of responses) causing climate change. These categories include responses such as “nothing is being done” and “people don’t care”, respectively. Anger related to the prioritization of money over the environment was also noticeable in the responses. These cause-directed categories align well with findings from qualitative research (du Bray et al., 2019; Marczak et al., 2023). Human qualities, human action, and the prioritization of money were the only categories related to higher scores on considering climate action a moral duty. This indicates that anger directed at these aspects at least partly reflects moral anger (a reaction to people overstepping moral boundaries; Batson et al., 2007).

Identification of a responsible actor is central to anger (Lazarus, 1991). Several responses directly mentioned climate denialism as a reason for their anger, and many (31%) specified specific agents responsible for climate change, such as politicians or industry actors. The identification of actors with the ability to influence structural factors is known from earlier research, for example pointing to the need for international political cooperation and for policies and measures to facilitate climate-friendly choices (Tvinnereim et al., 2017). People also frequently refer to “people” or “humanity”, which could reflect that the anger is partly self-directed (Ellsworth & Tong, 2006; Thomas et al., 2009). Although we find no traces of people blaming themselves as individuals, some refer to their country (Norway) as responsible (“that Norway partly seems to want to buy its way out of the challenges”, “Norway’s role as an oil producer”).

The negative view of humankind, especially seen in answers categorized as ‘human qualities’, is in line with findings reported by Fischer et al. (2011), who used qualitative interviews to understand how people view climate change inaction and governance approaches. Their respondents frequently referred to people in general as “self-centered, driven by habit and money- and consumption-oriented” (Fischer et al., 2011, p. 1025).

Such beliefs might reflect pluralistic ignorance (here: the tendency to underestimate other people’s concern about climate change and/or overestimate climate denialism). This can be problematic because people are influenced by what (they think) others think and do. While pluralistic ignorance can increase the likelihood of conforming to the (falsely) perceived majority agreement and thereby discourage climate

action (Leviston et al., 2013), messages that emphasize public anger have been found to increase support for climate change mitigation (Sabherwal et al., 2021). Further, believing that people are inherently egoistic or careless, or that nothing is being done, could reflect fatalistic beliefs, which are associated with less climate-friendly behavior, even among those who consider climate change a serious risk (Mayer & Smith, 2019).

However, our results show that referring to human qualities or actions as the source of climate anger relates to more, not less, climate change engagement. Consequently, these anger categories seem to align more with what Marlon et al. (2019) identify as ‘constructive doubt’ (realism regarding the severity of the threat and the inadequateness of current action) than ‘fatalistic doubt’ (effective action is impossible). Recognizing the need for change combined with the proactive nature of anger might motivate people to push for action rather than hinder it. Further, since strong emotions (including anger) is linked with a wish to share one’s feelings (Coillie & Mechelen, 2006; Rimé, 2009; Rimé et al., 1991), it might help people connect with like-minded people.

The perceived victims of climate change are apparent in answers referring to climate change *consequences*. While answers referring to consequences for humans could have reflected personal anger (a reaction to oneself being unfairly treated), the answers within this category rather tend to focus on future generations or vulnerable populations, which might reflect empathetic anger (a reaction to the unfair treatment of someone one cares about, such as grandchildren) or moral anger (violation of a moral standard related to fairness or justice) (Batson et al., 2007). Consequences for nature are mentioned somewhat more frequently than consequences for humans, and consequences are in general mentioned far less often as compared to climate change causes. This is somewhat surprising given the focus on generational justice in climate movements, particularly Friday For Future (de Moor et al., 2021).

Although few responses (3%) fall into the ‘lack of control’-category, they clearly stand out from the other answers by referring to powerlessness, helplessness, or stating that it is too late to mitigate climate change. Given that anger is generally considered an ‘active’ emotion, these responses are quite untypical and might reflect that people feel a combination of several emotions (e.g., also sadness) related to climate change. This is supported by the correlations between anger and the other negative emotions.

Finally, 10% of the angry respondents were categorized as ‘contrarian’. This category represents anger that is not directed at the threat of climate change, but rather dissatisfaction with aspects such as

climate communication or mitigation efforts. The finding shows that climate-related anger is not reserved for those who think too little is being done, complicating the process of making climate policy. Answers categorized as contrarian anger was associated with lower scores on considering climate action a moral duty. 'Contrarian' responses might reflect personal anger (a reaction to being unfairly treated; [Batson et al., 2007](#)), and could potentially relate to participation in protest movements such as the anti-toll road movement in Norway (see e.g., [Aasen & Sælen, 2022](#)).

4.2. The relationship between anger and climate change engagement

4.2.1. Anger strength and climate change engagement

Climate anger was the strongest predictor of self-reported activism, related positively to policy support, but was not related to individual mitigation efforts. Given that anger is typically associated with seeing other people as responsible, individual behaviors might not be considered effective in mitigating climate change. The effect of anger on policy support is likely to differ based on the type of policy suggested. In our study, we focus on one of the least popular policies; taxes on petrol and diesel (see e.g., [Smith & Leiserowitz, 2014](#)). Previous studies have found that climate anger might first and foremost relate to support for policies targeting industry, not to support for policies targeting individuals ([Lu & Schuldt, 2015](#)). The findings reported by [Lu and Schuldt \(2015\)](#) are in line with focusing on an external perpetrator (industry). However, our results revealed that people often point a finger at "people" in general rather than "industry", which could explain why we find a positive relationship between climate change and a tax that would (also) affect individuals.

The clear relationship between anger and activism is the most obvious one. [Antadze \(2020\)](#) uses climate movements to illustrate how climate anger can be a justified response to environmental injustice with the potential to motivate action and [Thomas et al. \(2009\)](#) refers to anger as a core prosocial emotion for motivating social change. Still, the role of different emotions in climate activism may vary between groups. Through interviews with climate activists from several countries, [Kleres and Wettergren \(2017\)](#) found that different (mixes of) emotions were highlighted by activists from the global north as compared to the south. Similarly, [Lorenzini and Rosset \(2023\)](#) report that anger is an especially relevant emotion among older climate activists, while younger activists report less anger and more fear.

4.2.2. Anger content and climate change engagement

Our results show that also the content of people's climate anger is relevant for how anger relates to climate change engagement. Note that since all respondents included in the analysis are feeling angry, the likelihood of reporting any of the three outcomes is higher than in the regressions looking at the effect of anger strength. Contrarian anger (e.g., skepticism towards the severity of the issue or the need for climate policies) was the strongest predictor of the outcomes – in a negative direction. Consequently, only looking at quantitative relationships between climate anger and climate engagement can lead us to underestimate the proactive and motivational potential of climate anger. Differences in anger content, and particularly whether contrarian anger is caught up in the measurements, could help explain why previous studies on climate anger report somewhat different results ([Chu & Yang, 2019](#); [Smith & Leiserowitz, 2014](#); [Stanley et al., 2021](#)).

The content categories most consistently related to climate change engagement were human qualities and human actions. The effect of these two categories on individual behaviors and policy support could reflect that the anger and blame are partly directed at the in-group ("we aren't doing anything" rather than "they aren't doing anything"). Given the effect of these categories, as well as their relationship with considering climate action a moral duty, future research should consider using more specific questions (e.g., "I am angry about the fact that many people act carelessly toward nature"; [Reese & Jacob, 2015](#)) when

focusing on anger and engagement. Using more specific questions, rather than asking whether people feel angry in general, is likely to exclude contrarian anger.

The remaining categories were differently related to the outcomes. Anger directed at climate skepticism and the prioritization of money over the environment was uniquely related to climate activism. Notably, our data cannot reveal the direction of the relationship between anger content and actions. Those who participate in protest might do so because they are angry about specific issues or they might adopt and paraphrase issue framings communicated by the environmental protest organizations (e.g., Fridays for Future or Extinction Rebellion). Consequences for nature were only associated with policy support. Somewhat surprisingly, the relationship was negative. One potential explanation could be a higher psychological distance to nature-related impacts, but this would need to be investigated further.

[van Zomeren et al. \(2004\)](#) argue that anger is less motivating if people lack a sense of efficacy. In line with this, our results show that, among people who report being angry, answers referring to a lack of control were not related to any type of climate change engagement. Further, blaming (only) responsible actors, such as politicians or industry, might reflect a lack of personal responsibility and efficacy and may therefore be less effective ([Reese & Jacob, 2015](#)).

4.3. Limitations and future research

One limitation of the current study is the cross-sectional nature of the data, as already mentioned regarding anger content in part 4.2.2. Due to this, we cannot conclude the direction of the established relationships. With regard to anger strength, it is possible that people are motivated to engage in climate activism because they are especially angry. However, it is also possible that they initially engage due to (for example) social reasons and become angrier as they learn more about the issue from other protesters or the protest organizers. Longitudinal methods could be used to examine how climate anger is initiated and develops over time. Further, it is possible that the strength and content of anger could vary, for example depending on climate-related events and policy development, especially within sub-groups of the populations ([Swim et al., 2022](#)).

Our sample is exclusively Norwegian, and the national context could influence our findings. Although there is a general tendency to perceive climate change as spatially distant ([Spence et al., 2012](#); [Tvinnereim et al., 2020](#)), this could be a particularly strong factor in the Norwegian context and replicating the study in countries more vulnerable to direct impacts of climate change could yield other responses. The national context could influence the specific profile we find for anger content; for example, the share that mentions human actions and human qualities could be relatively high in Norway because of the continued expansion of a fossil economy, and the share that mentions (particularly personal) consequences could be low because the country is perceived to be somewhat protected from consequences of climate change. A recent study compared climate emotions across several European countries and found that Norwegian citizens are characterized by relatively low anger and high hope levels ([Böhm et al., 2023](#)). In line with this, future studies could aim to compare the strength and content of climate change across different countries and specifically investigate effects from national contexts.

Open-ended survey questions give us unique insights into a large number of people's immediate associations. However, mentioning only one category in a response does not necessarily mean that the respondent is not angry about the other categories. The qualitative data is limited as compared to in-depth interviews, and it is possible that the respondents would have mentioned more or different categories during a conversation. Further, the coding of the open-ended responses depends on decisions made by the researchers and the categories might have been different if coded by another team. Rather than following our explorative approach, future research could aim to code responses based

on predefined anger categories, such as moral-, empathetic, personal, or self-directed anger.

Self-reported intentions to reduce emissions, support climate policy and engage in activism are all measured with single-item measurements. Consequently, we do not know what kind of measures people take in their everyday life to reduce emissions, how likely people are to support other types of climate policies, or how active they are in environmental protest organizations. Going forward, one interesting avenue is to investigate the effect of climate anger on more specific outcomes.

Finally, we have found that examining textual responses describing the content of climate anger helps identify an important sub-category, contrarian anger, with implications for how we interpret fixed-response survey results about the topic. Future research should therefore to a greater extent combine closed and open-ended questions to measure not just the extent but also the content of climate emotions.

5. Conclusions

The current study supports that climate anger is related to climate change engagement, but that its effect depends on the specific outcome. While anger was the strongest emotional predictor of activism and positively related to policy support, other emotions, such as sadness or fear, were more relevant for individual behaviors. We also find that climate anger can stem from various sources - not all equally motivating. Anger directed at human qualities or (the lack of) human actions was consistently related to climate change engagement, while referring to responsible (external) actors did not have a unique effect on any of the outcomes. Further, differences in anger content can relate to different types of engagement: anger directed at climate change denial, or the prioritization of money was related to climate activism, but not to the other outcomes. Overall, our results support that “even ‘basic’ human emotions such as anger do not generally operate as simple mechanisms that reflexively turn specific responses on or off” (Chapman et al., 2017, p. 851). Not all types of anger correlate positively with engagement, and the strength of the effects varies. One important finding is that ten percent of those reporting being angry about climate change are in fact skeptical about the seriousness of climate change or dissatisfied with climate policies or measures. This implies a need for clear definitions and operationalizations of climate anger when investigating how it relates to climate change outcomes.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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is publicly available for use in research and education. Data from the NCP are available for use in research and education upon request from Sikt – Norwegian Agency for Shared Services in Education and Research. For access to time series data, or text data, please contact DIGSSCORE (digsscore@uib.no).

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.gloenvcha.2023.102738>.

References

- Aasen, M., Sælen, H., 2022. Right-wing populism and climate policies: Explaining opposition to road tolls in Norway. *Transp. Res. Part D: Transp. Environ.* 105, 103222. <https://doi.org/10.1016/j.trd.2022.103222>.
- Andersen, G., Nordø, Å.D., Tvinnereim, E.M., 2022. Chapter 7 - Trends in Norwegian views on oil and gas export. In: Boudet, H., Hazboun, S. (Eds.), *Public Responses to Fossil Fuel Export*. Elsevier, pp. 105–120. <https://doi.org/10.1016/B978-0-12-824046-5.00010-2>.
- Antadze, N., 2020. Moral outrage as the emotional response to climate injustice. *Environ. Justice* 13 (1), 21–26. <https://doi.org/10.1089/env.2019.0038>.
- Batson, C.D., Kennedy, C.L., Nord, L.-A., Stocks, E.L., Fleming, D.Y.A., Marzette, C.M., Lishner, D.A., Hayes, R.E., Kolchinsky, L.M., Zenger, T., 2007. Anger at unfairness: Is it moral outrage? *Eur. J. Soc. Psychol.* 37, 1272–1285. <https://doi.org/10.1002/ejsp.434>.
- Böhm, G., Pfister, H.-R., Doran, R., Ogunbode, C.A., Poortinga, W., Tvinnereim, E., Steentjes, K., Mays, C., Bertoldo, R., Sonnberger, M., Pidgeon, N., 2023. Emotional reactions to climate change: a comparison across France, Germany, Norway, and the United Kingdom [Original Research]. *Front. Psychol.* 14. <https://doi.org/10.3389/fpsyg.2023.1139133>.
- Brosch, T., 2021. Affect and emotions as drivers of climate change perception and action: a review. *Curr. Opin. Behav. Sci.* 42, 15–21. <https://doi.org/10.1016/j.cobeha.2021.02.001>.
- Brosch, T., Steg, L., 2021. Leveraging emotion for sustainable action. *One Earth* 4 (12), 1693–1703. <https://doi.org/10.1016/j.oneear.2021.11.006>.
- Carver, C.S., Harmon-Jones, E., 2009. Anger is an approach-related affect: evidence and implications. *Psychol. Bull.* 135 (2), 183–204. <https://doi.org/10.1037/a0013965>.
- Chancel, L., 2022. Global carbon inequality over 1990–2019. *Nat. Sustainability* 5 (11), 931–938. <https://doi.org/10.1038/s41893-022-00955-z>.
- Chapman, D.A., Lickel, B., Markowitz, E.M., 2017. Reassessing emotion in climate change communication. *Nat. Clim. Chang.* 7 (12), 850–852. <https://doi.org/10.1038/s41558-017-0021-9>.
- Chu, H., Yang, J.Z., 2019. Emotion and the psychological distance of climate change. *Sci. Commun.* 41 (6), 761–789. <https://doi.org/10.1177/1075547019889637>.
- Coillie, H.V., Mechelen, I.V., 2006. A taxonomy of anger-related behaviors in young adults. *Motiv. Emot.* 30 (1), 56–73. <https://doi.org/10.1007/s11031-006-9000-6>.
- de Moor, J., De Vydt, M., Uba, K., Wahlström, M., 2021. New kids on the block: taking stock of the recent cycle of climate activism. *Soc. Mov. Stud.* 20 (5), 619–625. <https://doi.org/10.1080/14742837.2020.1836617>.
- Driscoll, D., 2019. Assessing sociodemographic predictors of climate change concern, 1994–2016. *Soc. Sci. Q.* 100 (5), 1699–1708. <https://doi.org/10.1111/ssqu.12683>.
- du Bray, M., Wutich, A., Larson, K.L., White, D.D., Brewis, A., 2019. Anger and sadness: Gendered emotional responses to climate threats in four island nations. *Cross-Cult. Res.* 53 (1), 58–86. <https://doi.org/10.1177/1069397118759252>.
- Ellsworth, P.C., Tong, E.M.W., 2006. What does it mean to be angry at yourself? Categories, appraisals, and the problem of language. *Emotion* 6, 572–586. <https://doi.org/10.1037/1528-3542.6.4.572>.
- Fischer, A., Peters, V., Vávra, J., Neebe, M., Megyesi, B., 2011. Energy use, climate change and folk psychology: Does sustainability have a chance? Results from a qualitative study in five European countries. *Glob. Environ. Chang.* 21 (3), 1025–1034. <https://doi.org/10.1016/j.gloenvcha.2011.04.008>.
- Frijda, N.H., 1986. *The emotions*. Cambridge University Press.
- Frijda, N.H., 1987. Emotion, cognitive structure, and action tendency. *Cogn. Emot.* 1 (2), 115–143. <https://doi.org/10.1080/02699938708408043>.
- Goldberg, J.H., Lerner, J.S., Tetlock, P.E., 1999. Rage and reason: The psychology of the intuitive prosecutor [Article]. *Eur. J. Soc. Psychol.* 29 (5–6), 781–795. [https://doi.org/10.1002/\(sici\)1099-0992\(199908/09\)29:5/6<781::aid-ejsp960>3.0.co;2-3](https://doi.org/10.1002/(sici)1099-0992(199908/09)29:5/6<781::aid-ejsp960>3.0.co;2-3).
- Haidt, J., 2003. *The moral emotions*. In: Davidson, R.J., Scherer, K.R., Goldsmith, H.H. (Eds.), *Handbook of Affective Sciences*. Oxford University Press, pp. 852–870.
- Ivarsflaten, E., Dahlberg, S., Lovseth, E., Bye, H. H., Bjånesoy, L., Gregersen, T., Böhm, G., Elgesem, D., Schakel, A., Fimreite, A., Nordø, Å., & Knudsen, E. (2022). *Norwegian Citizen Panel, wave 24 (May - June 2022) [Dataset]*, v100. Data available from DIGSSCORE, UiB.
- Jasper, J.M., 2014. Constructing indignation: Anger dynamics in protest movements. *Emot. Rev.* 6 (3), 208–213. <https://doi.org/10.1177/1754073914522863>.
- Kleres, J., Wettergren, Å., 2017. Fear, hope, anger, and guilt in climate activism. *Soc. Mov. Stud.* 16 (5), 507–519. <https://doi.org/10.1080/14742837.2017.1344546>.
- Kuppens, P., Tuerlinckx, F., 2007. Personality traits predicting anger in self-, ambiguous-, and other caused unpleasant situations. *Pers. Individ. Differ.* 42 (6), 1105–1115. <https://doi.org/10.1016/j.paid.2006.09.011>.

- Kuppens, P., Van Mechelen, I., Smits, D.J., De Boeck, P., 2003. The appraisal basis of anger: specificity, necessity and sufficiency of components. *Emotion* 3 (3), 254. <https://doi.org/10.1037/1528-3542.3.3.254>.
- Lazarus, R.S., 1991. *Emotion and adaptation*. Oxford University Press.
- Leviston, Z., Walker, I., Morwinski, S., 2013. Your opinion on climate change might not be as common as you think. *Nat. Clim. Chang.* 3 (4), 334–337. <https://doi.org/10.1038/nclimate1743>.
- Lomas, T., 2019. Anger as a moral emotion: A “bird’s eye” systematic review. *Couns. Psychol. Q.* 32 (3–4), 341–395. <https://doi.org/10.1080/09515070.2019.1589421>.
- Lorenzini, J., Rosset, J., 2023. Emotions and climate strike participation among young and old demonstrators. *Soc. Mov. Stud.* 1–17. <https://doi.org/10.1080/14742837.2023.2178406>.
- Lu, H., Schuldt, J.P., 2015. Exploring the role of incidental emotions in support for climate change policy. *Clim. Change* 131 (4), 719–726. <https://doi.org/10.1007/s10584-015-1443-x>.
- Marczak, M., Winkowska, M., Chaton-Østlie, K., Morote Rios, R., Klöckner, C.A., 2023. “When I say I’m depressed, it’s like anger”: An exploration of the emotional landscape of climate change concern in Norway and its psychological, social and political implications. *Emot. Space Soc.* 46, 100939. <https://doi.org/10.1016/j.emospa.2023.100939>.
- Marlon, J.R., Bloodhart, B., Ballew, M.T., Rolfe-Redding, J., Roser-Renouf, C., Leiserowitz, A., Maibach, E., 2019. How hope and doubt affect climate change mobilization. *Front. Commun.* 4 (20). <https://doi.org/10.3389/fcomm.2019.00020>.
- Mayer, A., Smith, E.K., 2019. Unstoppable climate change? The influence of fatalistic beliefs about climate change on behavioural change and willingness to pay cross-nationally. *Clim. Pol.* 19 (4), 511–523. <https://doi.org/10.1080/14693062.2018.1532872>.
- Merk, C., Nordø, Å.D., Andersen, G., Lægred, O.M., Tvinnereim, E., 2022. Don’t send us your waste gases: Public attitudes toward international carbon dioxide transportation and storage in Europe. *Energy Res. Soc. Sci.* 87, 102450. <https://doi.org/10.1016/j.erss.2021.102450>.
- Mikula, G., Scherer, K.R., Athenstaedt, U., 1998. The role of injustice in the elicitation of differential emotional reactions. *Pers. Soc. Psychol. Bull.* 24 (7), 769–783. <https://doi.org/10.1177/0146167298247009>.
- Moors, A., Ellsworth, P.C., Scherer, K.R., Frijda, N.H., 2013. Appraisal theories of emotion: State of the art and future development. *Emot. Rev.* 5 (2), 119–124. <https://doi.org/10.1177/1754073912468165>.
- Norwegian Environment Agency, 2023. Norwegian greenhouse gas emissions. Retrieved June 16 from: <https://www.environment.no/topics/climate/norwegian-green-house-gas-emissions/>.
- OECD. (2022). *Drivers of trust in public institutions in Norway* (Building Trust in Public Institutions, Issue. 10.1787/81b01318-en.
- Pihkala, P., 2022. Toward a taxonomy of climate emotions. *Front. Climate* 3. <https://doi.org/10.3389/fclim.2021.738154>.
- Reese, G., Jacob, L., 2015. Principles of environmental justice and pro-environmental action: A two-step process model of moral anger and responsibility to act. *Environ Sci Policy* 51, 88–94. <https://doi.org/10.1016/j.envsci.2015.03.011>.
- Rimé, B., 2009. Emotion elicits the social sharing of emotion: Theory and empirical review. *Emot. Rev.* 1 (1), 60–85. <https://doi.org/10.1177/1754073908097189>.
- Rimé, B., Mesquita, B., Boca, S., Philippot, P., 1991. Beyond the emotional event: Six studies on the social sharing of emotion. *Cogn. Emot.* 5 (5–6), 435–465. <https://doi.org/10.1080/02699939108411052>.
- Sabherwal, A., Pearson, A.R., Sparkman, G., 2021. Anger consensus messaging can enhance expectations for collective action and support for climate mitigation. *J. Environ. Psychol.* 76, 101640. <https://doi.org/10.1016/j.jenvp.2021.101640>.
- Smith, N., Leiserowitz, A., 2014. The role of emotion in global warming policy support and opposition. *Risk Anal.* 34 (5), 937–948. <https://doi.org/10.1111/risa.12140>.
- Spence, A., Poortinga, W., Pidgeon, N., 2012. The psychological distance of climate change. *Risk Anal.: Int. J.* 32 (6), 957–972. <https://doi.org/10.1111/j.1539-6924.2011.01695.x>.
- Stanley, S.K., Hogg, T.L., Leviston, Z., Walker, I., 2021. From anger to action: Differential impacts of eco-anxiety, eco-depression, and eco-anger on climate action and wellbeing. *J. Clim. Change Health* 1, 100003. <https://doi.org/10.1016/j.joclhm.2021.100003>.
- Steenjtes, K., Pidgeon, N. F., Poortinga, W., Corner, A. J., Arnold, A., Böhm, G., Mays, C., Poumadère, M., Ruddat, M., & Scheer, D. (2017). *European perceptions of climate change (EPCC): Topline findings of a survey conducted in four European countries in 2016*.
- Svensson, A., Wahlström, M., 2023. Climate change or what? Prognostic framing by Fridays for Future protesters. *Soc. Mov. Stud.* 22 (1), 1–22. <https://doi.org/10.1080/14742837.2021.1988913>.
- Swim, J.K., Aviste, R., Lengieza, M.L., Fasano, C.J., 2022. OK Boomer: A decade of generational differences in feelings about climate change. *Glob. Environ. Chang.* 73, 102479. <https://doi.org/10.1016/j.gloenvcha.2022.102479>.
- Thomas, E.F., McGarty, C., Mavor, K.I., 2009. Transforming “apathy into movement”: The role of prosocial emotions in motivating action for social change. *Pers. Soc. Psychol. Rev.* 13 (4), 310–333. <https://doi.org/10.1177/1088868309343290>.
- Tvinnereim, E., Flottum, K., Gjerstad, Ø., Johannesson, M.P., Nordø, Å.D., 2017. Citizens’ preferences for tackling climate change. Quantitative and qualitative analyses of their freely formulated solutions. *Glob. Environ. Chang.* 46, 34–41. <https://doi.org/10.1016/j.gloenvcha.2017.06.005>.
- Tvinnereim, E., Lægred, O.M., Liu, X., Shaw, D., Borick, C., Lachapelle, E., 2020. Climate change risk perceptions and the problem of scale: evidence from cross-national survey experiments. *Environ. Politics* 29 (7), 1178–1198. <https://doi.org/10.1080/09644016.2019.1708538>.
- Van der Linden, S., 2017. Determinants and measurement of climate change risk perception, worry, and concern. In: Nisbet, M.S.M.C., Markowitz, E., Ho, S., O’Neill, S., Thaker, J. (Eds.), *The Oxford Encyclopedia of Climate Change Communication*. Oxford University Press, Oxford, UK.
- van Doorn, J., Zeelenberg, M., Breugelmans, S.M., 2014. Anger and prosocial behavior. *Emot. Rev.* 6 (3), 261–268. <https://doi.org/10.1177/1754073914523794>.
- van Zomeren, M., Spears, R., Fischer, A.H., Leach, C.W., 2004. Put your money where your mouth is! Explaining collective action tendencies through group-based anger and group efficacy. *J. Pers. Soc. Psychol.* 87, 649–664. <https://doi.org/10.1037/0022-3514.87.5.649>.
- van Zomeren, M., Postmes, T., Spears, R., 2008. Toward an integrative social identity model of collective action: A quantitative research synthesis of three socio-psychological perspectives. *Psychol. Bull.* 134, 504–535. <https://doi.org/10.1037/0033-2909.134.4.504>.
- Włodarczyk, A., Basabe, N., Páez, D., Zumeta, L., 2017. Hope and anger as mediators between collective action frames and participation in collective mobilization: The case of 15-M. *J. Soc. Polit. Psychol.* 5 (1), 200–223. <https://doi.org/10.5964/jsp.5v1i1.471>.