



Self-reported reasons for (not) being worried about climate change

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ABSTRACT

A national sample from Norway ($N = 2001$) was asked to report how much they worry about climate change (closed-ended question), and then to write down their reasons for (not) being worried (open-ended question). Answers to the open-ended question were content analyzed and compared across responses to the closed-ended question. The results showed that the most common reason for being at least somewhat worried was concern about the consequences of climate change. Respondents reporting high worry were in particular more likely to bring up consequences for humans than those reporting medium worry. Respondents who reported low worry referred to a broader range of reasons in their answers, such as believing in natural rather than human causes of climate change, expressing a sense of optimism towards potential solutions, or being discontent with political measures or public discourse on climate change. These findings add novel insights into understanding the subjective meaning associated with the degree to which people report being worried about climate change.

1. Introduction

While some have raised concerns about the potentially harmful effects of experiencing negative emotions toward climate change (Ogunbode et al., 2021; Schwartz et al., 2022), others have highlighted that worrying about climate change constitutes a rational and constructive reaction with the potential to energize mitigative responses (for a discussion see e.g., Ojala et al., 2021; Verplanken et al., 2020). This view is supported by research linking climate change worry with support for climate mitigation policies (Bouman et al., 2020; Goldberg et al., 2020), energy-saving at the household level (Gregersen et al., 2021), seeing climate change as an important voting issue (Campbell et al., 2021), and believing that the public should do more to tackle global warming (Van der Linden et al., 2019). The present study aims to increase our understanding of why some people may report a high degree of worry about climate change, while others (living in the same country) do not.¹

Although previous studies have looked into explanations for climate worry or concern, they have typically focused only on people who experience such emotions. For example, Iniguez-Gallardo et al. (2021) asked adults in Ecuador to explain their reasons for reporting specific emotions. Concern was the most frequently reported emotional state,

which in turn related to the themes of future generations, weather changes, negative health impacts, and the inaction or harmful actions of humans. Similarly, Schwartz et al. (2022) asked university students in the United States what, if anything, made them worry about climate change. Their analysis suggested four recurring themes: environmental damage, collective inaction, human suffering, and individual suffering. Rather than focusing solely on people's reasons to worry about climate change, the current study also addresses reasons for reporting low levels of worry.

Two much-discussed explanations for varying levels of climate change worry are the 'psychological distance of climate change' (Spence et al., 2012; Van Lange & Huckelba, 2021) and 'climate change skepticism' (Poortinga et al., 2011; Rahmstorf, 2004). Worry is a particularly likely emotional response when focusing on the potential negative consequences of environmental risks (Böhm, 2003; Böhm & Pfister, 2001, 2005), and the strength of worry may depend on how personally relevant the consequences are perceived to be. The 'psychological distance of climate change' refers to how climate change impacts can seem distant in time (temporal distance), and space (spatial distance), as mainly impacting other people (social distance), and involving uncertainty (hypothetical distance). It could be that those less worried

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¹ The analyzed data material was collected as part of a master's thesis completed by the third author, under the supervision of the first and second authors.

about climate change imagine more vague or distant consequences, while those high in worry perceive climate change as a near and concrete threat. Associating climate change with negative impacts on humans rather than nature, for instance, may reflect that people perceive climate change as more personally relevant and therefore experience more worry (Böhm & Pfister, 2001; Sundblad et al., 2007).

People's level of worry may also relate to their general beliefs about the causes and consequences of climate change, and particularly skepticism towards whether the climate is changing (trend skepticism), whether these changes are caused by human activity (attribution skepticism), or how severe the negative impacts can be (impact skepticism) (Poortinga et al., 2011). In line with this, those reporting low or no worry about climate change might more frequently refer to uncertainty about its causes and negative consequences. Correlational studies support that these different facets of climate skepticism are associated with lower levels of negative affect, including aspects of worry (Van Valkengoed et al., 2021).

1.1. Aims

During the last few years, there has been an increase in studies focusing on "climate anxiety" – often used as an umbrella term for negative emotions and cognitions related to climate change. While the occurrence of cognitive and functional impairment related to climate change appears to be rare, worry about the issue is widespread (Whitmarsh et al., 2022). In Norway, the level of climate change worry has remained relatively stable over the last 10 years, with around 45% reporting to be either worried or very worried about the issue (Gregersen, 2023a). In the following, we report from a study that combined responses from closed-ended and open-ended questions to categorize people's rationale for reporting a certain level of climate change worry. Given that worrying about climate change has repeatedly been linked with various forms of climate change engagement, understanding the subjective reasons for (not) being worried has potential practical implications. This might be especially relevant in a country such as Norway where carbon emissions are relatively high (Norwegian Environment Agency, 2023), and where many people report to not feel personally threatened by climate change (see e.g., Gregersen, 2023b; PERITIA, 2022).

2. Material and methods

2.1. Sample

Data was collected through Wave 22 of the Norwegian Citizen Panel (NCP), fielded in November 2021. The NCP is an online survey answered by a near-representative sample of the adult Norwegian population, currently consisting of more than 10,000 active panelists. For each survey wave, respondents are randomly divided into sub-samples. The questions used in the current study were asked to one of these sub-samples ($N = 2001$). The sample consisted of 51% women and 49% men, 3% of the respondents were born in 1939 or earlier, 16% between 1940–1949, 26% between 1950–1959, 22% between 1960–1969, 16% between 1970–1979, 10% between 1980–1989 and 7% in 1990 or later. 5% had no education, 29% had finished high school and 64% had finished a university or college degree (the remaining 2% did not provide their level of education). All questions were originally worded in Norwegian and have been translated for publication.

2.2. Measures

A closed-ended question measured people's worry about climate change: "How worried are you about climate change?". The question included the following response options: 1 = Not at all worried, 2 = Not very worried, 3 = Somewhat worried, 4 = Worried, and 5 = Very worried. Note that only labels without numbers were presented as

response options in the online survey; $n = 12$ respondents chose to not answer the question.

This was followed by an open-ended question asking about the reason for their provided answer. The exact formulation was: "You have answered that you are [response to question one] about climate change. What is the reason you are [response to question one]? Please write down the first that comes to mind. We want all types of answers, in a few sentences or keywords if that fits you better". For example, respondents who answered that they were 'very worried' would be asked the following: "You have answered that you are very worried about climate change. What is the reason you are very worried?".

A total of $n = 287$ refrained from answering the open-ended question. The drop-out rate differed based on the level of worry that was reported as part of the closed-ended question. Kruskal-Wallis tests with post-hoc pairwise comparisons showed that those reporting to be 'worried' or 'very worried' had a lower dropout than those reporting to be either somewhat worried ($p < .001$) and not at all worried or not very worried ($p = .037$).

2.3. Analyses

Responses to the closed-ended question were sorted into three separate groups: low worry (1 = Not at all worried, 2 = Not very worried; 17%), medium worry (3 = Somewhat worried; 27%), and high worry (4 = Worried, 5 = Very worried; 56%). For exact percentages of respondents choosing each response option, see Ivarsflaten et al. (2021a). Table 1 illustrates how demographic groups are distributed between the three worry groups.

Answers to the open-ended question were analyzed through a content analysis as outlined by Bos and Tarnai (1999). Rather than allowing to make causal inferences based on the analyzed data material, content analysis can serve as a tool to gain descriptive insights into how a topic of interest is discussed (Maier, 2017). After reading through a subset of answers and noting recurring themes, the authors developed a coding scheme that included a total of six superordinate categories: (1) Causes, (2) Solutions, (3) Barriers, (4) Consequences, (5) Sources, and (6) Disengagement. Aside from this, there was one remnant category that could be used to code answers that did not fit into any of these categories. An overview of the complete coding scheme is provided in the Appendix (Table A1).

The coding scheme had a three-level structure, starting from superordinate codes to two gradually more specific sub-levels. For example, the response "I'm worried about how climate change will impact the

Table 1
Proportion estimation based on gender, year of birth and education by worry level.

	Low worry		Medium worry		High worry	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender						
Male	235	24	277	28	469	48
Female	104	10	257	25	645	64
Year of birth						
1939 or earlier	9	18	11	22	31	61
1940-1949	53	16	77	24	197	60
1950-1959	83	16	149	29	286	55
1960-1969	89	20	133	30	225	50
1970-1979	57	18	76	24	179	57
1980-1989	35	18	61	31	102	52
1990 or later	13	10	27	20	96	71
Education						
No education	21	23	26	28	46	49
High school	152	26	179	31	245	42
University/college	159	12	318	25	804	63
Not answered	7	18	11	28	21	54
Total	339	17	534	27	1116	56

Note. $N = 1989$. Percentages are rounded.

future of my children” would be sorted into the superordinate category ‘Consequences’, the second-level category ‘Consequences for humans’ and the third-level category ‘Future generations’. Each answer could be sorted into one or more categories. A description of the superordinate categories, including example responses, can be found in Table 2.

Answers were categorized by two independent coders who were assigned as research assistants to the study. To assess inter-rater reliability between the coders², we first calculated Krippendorff’s alpha for all of the different content categories combined ($\alpha = .94$) and then for each content category in separation ($\alpha_{\min} = .77$, $\alpha_{\max} = 1.00$). The results indicate that the coders mostly agreed in their assessments (for information on Krippendorff’s alpha, see Hayes & Krippendorff, 2007). After the initial independent coding, the coders discussed all discrepancies and recoded the remaining answers until an agreement was reached in each case. The reported analysis only includes answers that could be classified into one of the superordinate categories specified

Table 2
Category descriptions and examples.

Superordinate Category	Description	Example responses
Causes	The response mentions a presumed (main) cause of climate change.	“It is a natural cycle that humans have little impact on.” “Use more resources than the soil can replace. A lot of emissions of polluting gases. Lots of plastic.”
Solutions	The response mentions a presumed solution to the climate crisis, or that the climate crisis can or will be solved.	“Technology could solve much of the emission problem without much political interference” “It is happening here and now, and no one dares to initiate what they believe are unpopular measures to slow down development. We need comprehensive measures from the world’s leaders”
Barriers	The response mentions barriers or requirements to solve the climate crisis, or general challenges related to this climate change.	“The countries that pollute the most are not included. It’s all talk” “That the transition is going too slowly, the politicians do not dare to speak the truth about the fact that we must reduce our consumption”
Consequences	The response mentions consequences of climate change.	“Concerned about future generations of children/grandchildren. More extreme weather, etc.” “Concerned about developments worldwide. Less worried about Norway. There can be a lot of people moving.”
Sources	The response indicates that their climate worry (or lack thereof) comes from a specific source.	“All the experts and increasing factual evidence to support statements” “Various reports, i.a. from the UN climate panel”
Disengagement	The response indicates disengagement from the issue of climate change.	“It would be devastating if I went around worrying myself to death” “I generally worry little about things”

² The percentage agreement across all content categories combined was at 97%.

above ($n = 12$ answers were categorized in the remnant category).

3. Results

The obtained answers to the open-ended question included on average 20.8 words, most of which were coded into sub-levels; only 3% were only sorted into a superordinate category. A series of Chi-Square tests were computed to compare the distribution of content referring to one or several superordinate categories across the three worry groups. Table 3 shows that the distributions were significantly different for most of the categories. In the following, we describe examples of the content associated with different levels of worry; for a complete overview of the distribution of answers across worry groups, see the Appendix (Table A2).

The most frequent category among those reporting low worry was the (natural) causes of climate change (e.g., “There is no climate crisis. The climate changes that are occurring are natural”), mentioned in 39% of the open-ended answers. It should be noted that only 5% of the low worry group (and one percent of the total respondents) stated that they do not believe that the climate is changing at all. This group further mentioned climate change solutions (31%) more often than the other groups, for example by pointing out how human efforts can or will prevent negative climate change consequences (e.g., “Technology could solve much of the emission problem without much political interference”). Barriers were also mentioned most frequently among the low worry group (44%), for example being unhappy with the climate change discourse, politics, or priorities (e.g., “little Norway cannot save the world alone”), and although 21% referred to possible consequences, they did so far less frequently than respondents who reported either medium worry or high worry. Those who did mention it typically referred to the *lack of consequences*, especially for themselves (e.g., “I do not live in China, India, or Indonesia”). Another 29% referred to some form of disengagement (e.g., “it would be devastating if I went around worrying myself to death”).

Those reporting medium and high worry answered quite similarly as they mainly (82% vs. 87%) focused on negative climate change consequences (e.g., “2 degrees will lead to dramatic changes in climate”). One notable difference between these groups was that the high worry group more frequently (60% vs. 43%) mentioned consequences for humans (e.g., “the fact that we are doing too little now with regard to future generations”). Another difference was that a comparatively larger percentage of those reporting medium worry referred to potential solutions (10% vs. 5%). Around one in four responses in both groups referred to barriers (e.g., “world leaders don’t care”). The remaining categories were mentioned in less than 10% of the responses for either one of these groups.

There were demographic differences concerning the level of self-reported worry, which warrants caution against viewing these groups as homogenous in terms of their individual characteristics (Table 1). One noteworthy finding was that only 10% of women (vs. 24% of men) and 10% of respondents in the age group born 1990 and later (vs. 16 – 20% in the older age groups) fall within the low-worry group.

4. Discussion

The goal of this study was to investigate people’s self-reported reasons for worrying more or less about climate change. The results show that those reporting high or medium levels of worry often explained this with concern for potential negative consequences. The reasons given for low levels of worry were more dispersed, ranging from skepticism towards anthropogenic climate change to technology optimism.

It has previously been found that people’s level of worry is associated with their beliefs about the causes and consequences of climate change (Gregersen et al., 2020; Van Valkengoed et al., 2021). Results from the current study support this literature insofar that attribution skepticism stood out as an important rationale among those reporting low levels of

Table 3
Descriptives and Chi-Square tests of the six superordinate categories by worry level.

Category	Low worry		Medium worry		High worry		Total		χ^2	df	p
	n	%	n	%	n	%	n	%			
Causes	114	41	31	7	53	5	198	12	277	2	< .001
Solutions	85	31	43	10	54	5	182	11	143	2	< .001
Barriers	122	44	99	23	262	26	483	29	39.5	2	< .001
Consequences	59	21	344	82	858	87	1261	75	505	2	< .001
Sources	21	8	16	4	52	5	89	5	4.8	2	.101
Disengagement	80	29	13	3	4	0	97	6	330	2	< .001
Total	278	100	422	100	990	100	1690	100			

Note. $N = 1690$. Percentages are rounded.

worry. While the respondents in this group also showed some indications of impact skepticism (e.g., responses in the ‘barriers’ and ‘consequences’ categories), statements that could be interpreted in terms of trend skepticism remained the exception. In other words, rather than questioning the notion of climate change as such, respondents with low worry cast doubts about the role of human activities. The relative importance of attribution skepticism in the provided answers is in line with research showing that the Norwegian public tends to be more skeptical about the human causes of climate change compared to other European countries (see e.g., 2022).

A recent experimental study from the US found that exposing people to messages about the human causes of global warming made them more likely to attribute global warming to human activities, more concerned about this being a problem, and more supportive of mitigation policies (Bergquist et al., 2022). These effects were not contingent upon having information on anticipated impacts and policy solutions conveyed by the message, nor were there significant differences between respondents based on whether they identified as Democrats or as Republicans. This, combined with the results from the current study, suggests that information about the human causes of climate change may play a part in boosting climate change engagement among Norwegian audiences.

Respondents in the low-worry group further mentioned discontent with measures suggested to mitigate carbon emissions, or with the responsibility attributed to individuals or Norway as a country (which could partly reflect ‘response skepticism’; Capstick & Pidgeon, 2014). It is also noteworthy that the low-worry group often mentioned solutions. Specifically, the answers seem to reflect optimism toward the possibility of avoiding or reducing the negative consequences of climate change through global efforts or technological developments, which could be seen as a way of reducing perceived personal responsibility. Previous research indicates that having a sense of false hope, such as trusting that technology alone will solve the climate issue, tends to be negatively related to policy support and intentions to take mitigative actions at the individual level (Marlon et al., 2019).

While skepticism towards the human causes of climate change stood out as an important reason for the low-worry group, knowledge about these causes was not mentioned among the more worried respondents. Instead, beliefs about possible consequences were central, also for differentiating between those reporting medium levels of worry and those highly worried. While consequences for nature were mentioned at similar rates among respondents reporting medium and high worry, consequences for humans were reported more frequently among respondents in the latter group. A closer look at these data showed that answers in the human consequences category mainly included references to living conditions, social structures, and future generations, whereas more personal consequences such as health effects were barely mentioned. This finding deserves particular attention because it contrasts the empirical insights from research in other geographical contexts in which the issue of climate change was linked with health concerns at the personal level (Iniguez-Gallardo et al., 2021; Sundblad et al., 2007).

Although it is a common assertion that perceived psychological

distance is key to understanding climate change concern and engagement, the empirical literature on the subject has produced mixed results (Keller et al., 2022; Van Valkengoed et al., 2023). Our findings suggest that people can report to be highly worried about climate change even if most of its anticipated impacts are viewed as distant. Rather than mentioning consequences that would affect them personally, like health concerns, respondents in the high worry group tended to mention consequences that are temporally (e.g., future generations) or spatially (e.g., vulnerable areas) distant. This is in line with another recent study from Norway where negative emotions like fear and anxiety were associated with the loss of species or landscapes, changes in ways of life or future opportunities, concern for future generations, catastrophic visions of the future, uncertainty, and perceived time pressure (Marczak et al., 2023).

5. Limitations

There are certain limitations to this study. First, the formulation of the open-ended question was contingent upon the preceding answer to the closed-ended question. Future research that employs a similar approach could consider using the same question for each respondent, thus increasing comparability across groups. Second, the obtained answers were categorized based on a detailed coding scheme that was developed in cooperation between the authors. Besides providing explicit instructions on how the research assistants should proceed in the coding process, the coding scheme listed examples for each category. While this has been done in an attempt to increase reliability during the coding process, the initial selection of the categories remains susceptible to subjective interpretation. Third, there is an argument to be made that the findings are specific to Norway as a country, where relatively few people feel personally threatened by climate change (e.g., PERITIA, 2022). It would be informative to compare our results with samples from other countries, particularly countries where more people feel more vulnerable to the impacts of climate change.

6. Conclusion

This study employed an open-ended survey question to delineate subjective reasons for (not) being worried about climate change. While the reasons provided for medium and high levels of worry were mainly about expectations of negative consequences, the reasons given for low worry were more varied. These included skepticism towards the human causes of climate change, dissatisfaction towards public discourse or politics, and optimism regarding mitigation solutions. The finding that health impacts were hardly mentioned by any of the respondents may point to an important communication opportunity for Norwegian audiences.³ There is a considerable amount of literature showing that messages depicting health impacts can increase individual support for climate policies (Kotcher et al., 2021; Kotcher et al., 2018), and that using a public health frame may have particularly strong effects when it

³ We thank one of the anonymous reviewers for pointing this out.

becomes applied to communication efforts that target audiences who are generally unconcerned about climate change (Dasandi et al., 2022).

Ethical Considerations

The research was conducted in accordance with the principles embodied in the Declaration of Helsinki. The Norwegian Citizen Panel (NCP) deals with human subjects and follows the EU General Data Protection Regulation (GDPR). A data Protection Impact Assessment (DPIA) has been conducted and was approved by the University of Bergen. The DPIA was conducted in cooperation with what is now named Sikt – Norwegian Agency for Shared Services in Education and Research. The DPIA number is 118868. All questions that are to be fielded in the NCP survey are reviewed by the Scientific Committee of the Norwegian Citizen Panel based on ethical issues, scientific issues, and how the questions will impact the respondent. All participants are informed about voluntary participation, storage of data, and confidentiality of the research and give their written consent. The data were stored and analyzed within “SAFE”, a solution for the secure processing of sensitive personal data in research developed by the IT division at UiB.

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

Quantitative data available for use in research and education upon request from Sikt - Norwegian Agency for Shared Services in Education and Research. Text data available upon request to DIGSSCORE.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.cresp.2023.100154](https://doi.org/10.1016/j.cresp.2023.100154).

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