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Climate Anxiety and the Subjective Need for Punishment for Perceived Climate Damaging Behaviour *

Ansiedad climática y la necesidad subjetiva de castigo por comportamientos percibidos como perjudiciales para el clima

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RESUMEN: "Climate anxiety," a relatively recent phenomenon, refers to the challenges individuals face when confronting concerns stemming from climate change. People can tackle this anxiety by seeking to change either themselves or their environment. For instance, some may strive to adopt more eco-friendly behaviours in daily life, while others may express a desire to penalize those engaging in environmentally harmful actions. This article examines two key research questions: (1) What factors could explain eco-anxiety? and (2) Could eco-anxiety trigger a desire to punish? To investigate these questions, a study was conducted in Germany (n = 304). The results indicate that eco-anxiety is influenced by factors such as the prioritization of climate protection, sources of information, a need for closure, and pro-climate behaviour. The inclination to punish individuals for perceived environmentally damaging actions can be partially explained by climate anxiety, other emotions, and signs of authoritarian aggression. The findings are discussed considering existing limitations, and further research questions are proposed.

Palabras clave: *Authoritarian aggression, climate change, eco-anxiety, emotions. need for closure, punitiveness, risk perception.*

ABSTRACT: La "ansiedad climática", un fenómeno relativamente reciente, se refiere a los desafíos que enfrentan las personas al afrontar las preocupaciones derivadas del cambio climático. Las personas pueden abordar esta ansiedad buscando cambios, ya sea en sí mismas o en su entorno. Por ejemplo, algunas pueden esforzarse por adoptar comportamientos más ecológicos en la vida diaria, mientras que otras pueden expresar el deseo de penalizar a quienes realizan acciones perjudiciales para el medio ambiente. Este artículo examina dos preguntas clave de investigación: (1) ¿Qué factores podrían explicar la ecoansiedad? y (2) ¿Podría la ecoansiedad desencadenar el deseo de castigar? Para investigar estas preguntas, se realizó un estudio en Alemania (n = 304). Los resultados indican que la ecoansiedad se ve influenciada por factores como la priorización de la protección del clima, las fuentes de información, la necesidad de cierre y el comportamiento proclimático. La inclinación a castigar a las personas por acciones percibidas como perjudiciales para el medio ambiente puede explicarse en parte por la ansiedad climática, otras emociones y signos de agresión autoritaria. Se discuten los hallazgos considerando las limitaciones existentes y se proponen nuevas preguntas de investigación.

Keywords: *Agresión autoritaria, cambio climático, ecoansiedad, emociones, necesidad de cierre, punibilidad, percepción de riesgo.*

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I. INTRODUCTION

Communication about the "climate crisis" and the actions it initiates reflect a societal discourse that suggests corresponding tendencies in perception and evaluation. The topic exhibits a distinct emotional quality. Authors analyse it by referring to "eco worry" (e.g. Parmentier et al., 2024), "ecoanxiety" (e.g. Clayton et al., 2017), or "climate anxiety" (e.g. Van Valkengoed et al., 2023). These terms highlight the psychological challenges individuals face in response to perceived climate threats, necessitating coping strategies. Individuals often attempt to cope by modifying personal perceptions and behaviours, such as adopting climate-friendly consumption patterns, or by attempting to change their environment. This can involve penalising others to deter climate-damaging behaviours - either to prevent harm (instrumental punishment) or restore social justice (relational punishment) (Gerber & Jackson, 2015).

This paper investigates two primary research questions: Which factors contribute to eco-anxiety, and can eco-anxiety create a need for punishment? Initially, the construct of climate anxiety is briefly contextualized within the broader debate on risk perception and then defined, considering its antecedents and potential consequences with a focus on selected examples. The study subsequently presents empirical results from a cross-sectional survey conducted in Germany, concluding with a discussion of the findings.

1.   Risk perception of the climate change and climate anxiety

Building on the foundational work of Tversky and Kahneman (1974) and Slovic et al. (1978), the psychological study of risk perception emphasises that it is shaped by subjective beliefs about the likelihood and severity of events. Over the decades, research has explored various risks, including ecological ones (e.g., Renn, 1984, 1989; Ullrich-Kleinmanns et al., 2008; BfR, 2008; Lau, 1989; Ruff, 1990). Since the 1990s, publications on eco-anxiety ("Umweltangst") have emerged in Germany (e.g., Gloede, 1993; Wagner, 1994; Künzli & Alsaker, 1999). Interest in climate change risk perception has grown recently, with publications exploring its complexity and inherent uncertainty (Osberghaus et al., 2020; Huneke, 2022). The complexity of climate science and the challenges in predicting climate change outcomes contribute to public uncertainty. The inherent issue is also highlighted by the IPCC (2001, p. 774): "In climate research and modelling, we should recognise that we are dealing with a coupled non-linear chaotic system, and therefore that the long-term prediction of future climate states is not possible. The most we can expect to achieve is the prediction of the probability distribution of the system's future possible states by the generation of ensembles of model solution". The sixth IPCC report again points to uncertainties and a limited predictive power of climate models (IPCC, 2023). It is possible that individuals are overwhelmed by the requirement to engage with the uncertainties inherent in understanding climate fundamentals and the forecasts derived from complex models.

II.   ANTECEDENTS AND POSSIBLE CONSEQUENCES OF CLIMATE ANXIETY

The possible antecedents of climate anxiety, as categorised by Whitmarsh et al. (2022), include demographic factors, experiential factors, mental health, environmental values, frequency of nature visits, and pro-environmental behaviour. An additional category could encompass further attitudes and needs.

Studies indicate that demographic factors influence eco- or climate-related anxiety, with higher levels found among women (e.g., Van der Linden, 2015; Verplanken et al., 2020; Boluda-Verdu et al., 2022) and younger individuals (Hickman et al., 2021; Whitmarsh et al.,

2022; Hajek & König, 2022). In terms of political orientation, a left-wing stance has been identified as an antecedent of climate anxiety (Wullenkord et al., 2021), with Fisher et al. (2022) noting that Green Party voters are particularly more climate-conscious compared to other voters with similar left-wing identities.

Experiential factors encompass direct experiences with natural hazards or climate extremes (Reser & Bradley, 2020) and media-provided information on such events (e.g., O'Neill & Nicholson-Cole, 2009; Brulle et al., 2012; Hart & Feldmann, 2016; Clayton, 2020).

Mental health factors, such as the association between generalised anxiety and climate anxiety, are significant (Clayton & Karazsia, 2020). A large study by Hajek & König (2022) involving 3,091 participants revealed that climate anxiety is not only more prevalent among younger individuals but also correlated with other concerns like elevated COVID-19 anxiety and fear of conventional war.

Environmental values, such as nature connectedness, may also contribute to climate anxiety (Galway et al., 2021). Moreover, attitudes and needs related to climate anxiety may involve ideological beliefs such as system justification (Feygina et al., 2010), social dominance orientation (Pratto et al., 1994), right-wing authoritarianism (Altemeyer, 1981), or the belief in human dominance over nature (Jylhä et al., 2020). Additionally, researchers have explored the connection between climate anxiety and the need for closure (NFC, Kruglanski & Webster, 1996), which is characterised by discomfort with ambiguity and insecurity, as well as a preference for predictability and quick decision-making (e.g., Orr et al., 2020; Roets & Van Hiel, 2011).

The frequency of nature visits and pro-environmental behaviour yield mixed findings (Whitmarsh et al., 2022). For instance, Verplanken et al. (2020) suggest that efforts to act pro-environmentally can sometimes lead to climate anxiety, whereas Schwartz et al. (2023) propose that environmental activism may serve as a buffer.

Furthermore, studies focus on consequences of eco- or climate anxiety , which may include stress, unease, and helplessness (e.g. Tretter et al., 2024; Spitzer, 2022; Heinz & Meyer-Lindenberg, 2023). Climate anxiety can lead to cognitive-emotional issues such as anxiety or depression, and impair day-to-day functioning (Clayton & Karazsia, 2020; Whitmarsh et al., 2022). For example, Schwartz et al. (2023) found that among 284 U.S. students, heightened climate change anxiety significantly correlated with increased symptoms of major depressive disorder. Sangervo et al. (2022), through a survey of 2,070 Finnish respondents, found that eco-anxiety can manifest both pathologically and adaptively. The adaptive form may lead to climate action, supporting Pihkala's (2020a, 2020b) findings that those experiencing climate anxiety often seek information or engage in environmentally friendly actions. Hogg et al. (2021) and Wullenkord et al. (2021) similarly noted a link between eco-anxiety and pro-environmental behaviour.

Empirical studies using multivariate analyses highlight the complexity of the factors associated with climate anxiety. For instance, Whitmarsh et al. (2022) conducted a UK survey with 1,338 participants in 2020 and 891 in 2022, examining 13 factors that may be linked to climate anxiety (Clayton & Karazsia, 2020). While there was significant concern about climate change, actual levels of climate anxiety were low. The authors conclude: "Climate anxiety was higher amongst younger age groups, those with higher climate concern, higher generalised anxiety, lower mindfulness, higher nature relatedness, and more climate change information seeking behaviour. In addition, climate anxiety predicted some (but not all) types of pro-environmental action" (Whitmarsh et al., 2022., p. 1). Similarly, Wullenkord et al. (2021) conducted a survey in Germany with 1,011 participants, which also revealed low levels of

climate anxiety. This study found positive correlations with "general anxiety and depressiveness, avoidance of climate change in every-day life, frustration of basic psychological needs, pro-environmental behavioural intentions, and policy support. It correlated negatively with different forms of climate denial and was unrelated to ideological beliefs" (ibid., p. 1). Pro-environmental intentions were the strongest correlate, with other influential factors including avoidance, denial of climate change severity, human dominance over nature, and competence frustration. However, the authors advise cautious interpretation due to the absence of bivariate correlations between age, left-wing orientation, and climate anxiety. These examples underline that relevant factors may encompass cognitive, emotional, and behavioural dimensions.

Given the complexity, media representation plays a significant, potentially exposing individuals to framing effects (Olausson, 2009); and filter bubbles and echo chambers might occur (Williams et al., 2015). Consequently, risk perception of climate change may hinge on its visualisation (Leiserowitz, 2006) and social representation (Höijer, 2010).

Feeling overwhelmed by complexity, uncertainty, or media portrayals that suggest a dramatic certainty of negative outcomes can provoke emotional reactions—referred to as "climate anxiety" in the context of climate change. In Germany, this term first appeared in magazine commentaries (Markl, 2008) and later entered scientific discussions (e.g., Höfling & Tretter, 2012). Despite being a growing area of research, concepts like eco-anxiety or climate anxiety remain somewhat vague (Orrù & Mannarini, 2024). They are associated with various symptoms, such as anxiety, fear, grief, worry, and despair. The American Psychological Association describes it as "a chronic fear of environmental doom" (Clayton et al., 2017, p. 68), while Parmentier et al. (2024, p. 1) define it as "the anxiety experienced in response to worsening environmental conditions". Van Valkengoed et al. (2023, p. 259) further specify it as "persistent anxiety and worry about climate change, which is difficult to control, and associated with emotional, cognitive, physiological, and behavioural indicators".

1. Punitiveness: need for punishment of undesirable behaviour.

Punitiveness research often focuses on crime-related issues, particularly criminological and penal law aspects (e.g., Drenkhahn et al., 2020; Hoyt et al., 2022; Socia et al., 2022). However, some studies examine punitive perspectives beyond legal problems. For the example of perceived free-riding, Fehr and Gächter (2000) showed with their experiments that individuals call for punishment if free riders negatively deviate from the group standard, even if punishment is costly. Furthermore, observing free-riding is accompanied by strong negative emotions. Other studies investigated a desire for retribution during the COVID-19 pandemic. During the COVID-19 pandemic, Manson (2020) observed that both right- and left-wing authoritarianism predicted support for authoritarian pandemic-mitigation policies. The link between authoritarianism, right-wing ideologies, and punitive tendencies is echoed in other studies (e.g., Duckitt, 2009; Van Hiel et al., 2020). Moral foundations also shape punitive views, as Silver (2017) notes, affecting both offender and victim-centred retribution. Another notable example is Chalmers et al. (2024), who explored the need to penalise women for miscarriage, underscoring how unfulfilled expectations can trigger punitive desires.

Several factors may drive the need for punishment beyond criminal offences, including individual values, beliefs, attitudes, and motives. Gerber and Jackson (2015) distinguish between instrumental punishment, which aims to mitigate risk, and relational punishment, which seeks to restore social justice. A need for punishment might also stem from ideology (ibid.). It can depend on the role and behaviour expectations directed at an individual. It can also depend on their group affiliation, and thus the social values and norms in society. Media can further influence punitive attitudes through language and imagery (e.g., Rosenberger &

Callanan, 2011; Waid-Lindberg et al., 2011). Emotions, as highlighted by Hartnagel and Templeton (2012), play a significant role. Currently, no study is known which examines punitive attitudes related to the perceived climate crisis.

III. THE PRESENT STUDY

The central questions of the article are: What factors influence the experience of eco-anxiety, and is it associated with a desire to punish those who, in the respondents' view, do not behave in an environmentally friendly way?

1.Method

Procedure

The study utilised an online survey, conducted without financial support. Data collection relied on snowball sampling, facilitated by a student assistant. The questionnaire link was distributed among students, who were invited to share it within their social networks. Data was gathered from 19 June to 18 August 2024.

Measures

Informed consent was obtained at the start of the questionnaire. While ethics committee approval wasn't necessary, key points from the APA on informed consent were addressed, alongside German data protection guidelines (DSGVO and BDSG), the DFG's Code of "Safeguarding Good Research Practice"[1], and the University's guidelines. Consequently, the informational text exceeded 500 words.

The questionnaire's content primarily consisted of self-constructed questions, detailed in the following descriptions. Unless specified otherwise, responses were given on a six-point scale. The appendix provides details on items, including means, standard deviations, and, where relevant, Cronbach's alpha or Spearman's correlation coefficient ρ.

The first set of questions, consisting of four items, focused on *views about climate change*. They aimed to determine whether respondents believed it was primarily human-caused or of natural origin, as this might be relevant for the assessment of the issue (Gupta & Tiwari, 2021). Additionally, respondents were asked whether they believed there was a climate "crisis" and/or an unstoppable progression towards a climate "catastrophe" (see table 1, appendix).

The second and third sections inquire about *everyday behaviour*, which other studies found to be important (e.g. Wullenkord et al., 2021; Parmentier et al., 2024), first regarding general significance and purpose, and then specific behavioural actions (see table 2, appendix).

As described above, information provided by media might influence climate anxiety (O'Neill & Nicholson-Cole, 2009; Brulle et al., 2012; Hart & Feldmann, 2016; Clayton, 2020). Therefore, some questions on which *sources of information* individuals used were incorporated (see table 3, appendix).

In addition, anchors were sought which could be used for *reassurance*. These include social agreements (e.g. confirmation because "everyone" sees it that way), confirmation through statistics and statements from scientists, or through educational institutions, and finally one's own weather observations (see table 4, appendix).

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[1] https://zenodo.org/records/6472827 [accessed 02/04/2024].

The next block was on who is thought to be *responsible* for the climate crisis, differentiated by countries (reference were data by Statista, 2024), sectors, and groups of people (see table 5 appendix). For the sectors, energy production, building management, industry, agriculture, and transportation were considered (reference was Kileon, 2020). For the groups, topics that have been discussed in the media - sometimes critically - were addressed, such as the potential responsibility of certain generations, the wealthy (Tagesschau, 2023), or certain consumption behaviour, such as meat consumption (Dewitz, 2020), driving cars (Greenpeace, 2023), flying (Lieven, 2023), or length of internet use (Weber, 2022).

Various questionnaires have been developed in an effort to measure climate anxiety. Examples include scales for "eco-anxiety" (e.g. Hogg et al., 2021), "climate change anxiety" (CCAS, Clayton & Karazsia, 2020), and "global warming worry" (Verplanken et al., 2020). Additionally, there is a nominally scaled survey that asks about emotions regarding climate change, negative beliefs about climate change and its dismissal, as well as beliefs related to the government (Hickman et al., 2021). To measure eco related anxiety, this study used the *eco-anxiety scale* by Hogg et al. (2021 and translated by Heinzel et al. (2023)), for which an already validated version in German exists (ibid.). The validation study by Heinzel et al. (2023) concludes that it is a reliable and valid scale to assess eco-anxiety in German speaking populations. It also confirms the four factors of eco-anxiety: affective symptoms, rumination, behavioural symptoms, and anxiety about personal impact (see table 6, appendix).

In connection with climate anxiety or a need for punishment, other *emotions* are also relevant, as outlined above (Orrù & Mannarini, 2024; Valkengoed et al., 2023, Clayton & Karazsia, 2020; Whitmarsh et al., 2022; Hartnagel and Templeton (2012). Therefore, some emotional (and partly cognitive) reactions to observed environmentally harmful behaviour were included in the questionnaire (see table 7, appendix).

Since a *need for closure* might also be linked to climate anxiety, the NFC-15 scale by Roets and van Hiel (2011) was included (see table 8, appendix).

Another set of questions examined the *necessity for intervention*, focusing on demands and the desire for *punishment*. Some items addressed attitudes that prioritize climate protection above all else, including the implementation of measures even against existing laws and economic or individual interests (see table 9). Further questions explored authoritarian attitudes, though not using a standardized scale like the KSA-3 (Beierlein et al., 2014). Instead, they were shortened and specifically related to climate issues. Inspired by LWA measurements (Costello et al., 2022; Manson, 2020), two facets—authoritarian submission and aggression—were included (see table 10). The survey also probed demands for censorship (see table 11) and a social credit system rewarding climate-friendly behavior while punishing harmful actions (see table 12). Lastly, it assessed views on punishing environmentally harmful behaviours, such as excessive energy consumption, diets harmful to the climate, or environmentally damaging travel (see table 13).

Finally, some *sociodemographic variables* were considered: sex, age, and political orientation. All of them could be antecedents for climate anxiety (Wullenkord et al., 2021, Verplanken et al., 2020; Hickman et al., 2021). One item asked for political self-assessment (Soep, 2015, Q131)[2]. The self-placement on such a scale may be open to debate, because clear assignments seem to be becoming more difficult, as is evident, for example, in discussions about politicians or parties in Germany.[3] Therefore, a second item inquired about future voting intention.

The questionnaire was in German. To answer all questions took about 15 minutes

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[2] https://www.diw.de/documents/publikationen/73/diw_01.c.583776.de/diw_ssp0513.pdf.
[3] This is for example the case for the newly founded BSW party by Sahra Wagenknecht, specifically if it could be labelled as "left" or "right" (Wagner, without date).

2. Analysis:

Data were analysed with SPSS 27.

To address the first research question, frequencies related to eco-anxiety are initially presented. Subsequently, a regression analysis was performed to investigate how the dependent variable, eco-anxiety, is influenced by the following independent variables, selected based on prior study results: beliefs about the causes and severity of climate change, information sources, reassurance regarding the climate crisis, value dominance of climate protection, pro-climate behaviour, need for closure, political orientation, age, and gender..

Regarding the second research question—whether climate anxiety is associated with a need for punishment—a regression analysis was conducted with punitiveness as the dependent variable. The independent variables included beliefs, value dominance of climate protection, assumptions about the culprits, eco-anxiety, emotions, authoritarian attitudes, demand for censorship and a social credit system, pro-climate behaviour, age, gender, and political orientation.

In terms of the anxiety scale, calculations, unlike in Hogg et al. (2021), utilised an eco-anxiety index derived from all items instead of the four subdimensions (Cronbach's α = .94). Additionally, an overall score was created for the need for closure. This approach was primarily due to some subdimensions having low Cronbach's Alpha values (only the first factor, "order," showed a good value of .87, whereas the other four ranged between .51 and .66). The index value was .84. Consequently, both constructs are analysed in a generalised form.

3. Participants

Out of the 517 individuals who began the questionnaire, valuable insights were gathered, particularly from the 304 participants who completed the general questions on climate anxiety and the need for closure. It's worth noting that while some respondents—63 in total—chose not to proceed beyond the first page, which involved informed consent, this highlights the importance of clear and concise communication in survey design. Although there are some missing values for sociodemographic variables, this offers an opportunity for reflection and improvement in future research. The potential insights and growth from this experience will be addressed at the end of the article.

Of the respondents who provided information on some sociodemographic variables, the majority were female (81.4%). The birth years of the participants ranged from 1954 to 2007. About half of the respondents were born in 1987 or earlier, while the other half were born in 1988 or later. The average age of the respondents is 33 years. 36% of the respondents were students. Based on political orientation, many respondents would vote for the Greens (42%) and the Left (15%). Voters of conservative parties make up only a very small proportion (CDU/CSU 5%; FDP 1%). The left-wing orientation is confirmed in their self-assessment, because most respondents categorize themselves as "left-wing". Consequently, this sample exhibits several significant biases associated with various limitations, which will be addressed further on.

4. Results

In examining the four dimensions of the climate anxiety scale by Hogg et al. (2021), participants reported the highest values in the subscale measuring anxiety about personal impact (0: not at all, 3: nearly every day; M = 1.06, SD = .85). The other dimensions recorded lower levels: affective symptoms (M = .83, SD = .74), rumination (M = .64, SD = .74), and behavioural symptoms (M = .46, SD = .58). The overall index mean was .76 (SD = .62).

A stepwise regression analysis was performed to identify which of the 19 independent variables contribute to eco-anxiety. A G*Power calculation (Faul et al., 2007) determined a critical F value of 1.63, based on a sample size of 218, an effect size f2=.15 (moderate), a significance

level of .05, and a power of .95. Multicollinearity was examined using VIF values, which ranged from 1.13 to 2.29, indicating low multicollinearity (O'Brien, 2007).

Table 14: Linear regression analysis, dependent variable: eco-anxiety

	Unstandardized coefficients		standardized coefficients		
	Regression coefficient B	Standard error	Beta	T	p
Constant	-.768	.186		-4.126	.000
Belief: We are primarily dealing with human-induced climate change	-.129	.037	-.265	-3.508	.001
Information/statistics provided by scientists	.058	.022	.140	2.694	.008
Reassurance in statistics/comments of scientists	.078	.034	.175	2.307	.022
Value dominance of climate protection	.143	.037	.250	3.826	.000
Pro-climate behaviour	.238	.036	.447	6.570	.000
Need for closure (index)	.125	.041	.161	3.014	.003

The stepwise regression analysis ($F_{(6, 218)} = 30.86$, $p < .001$) reveals significant relationships between several factors and eco-anxiety. These include the value dominance of climate protection, pro-climate behaviour, information provided by scientists, and reassurance from statistics and statements by scientists, all of which are positively associated with eco-anxiety. Conversely, the belief that "we are primarily dealing with human-induced climate change" is negatively associated with climate anxiety. Additionally, a need for closure correlates with higher levels of eco-anxiety. The overall model accounts for approximately 45% of the variance ($R^2 = .47$, R^2 adj. = .45).

Concerning the need for punishment, respondents' statements provide some insight: Individuals should be punished for excessive energy consumption (1: strongly disagree; 6: strongly agree; M = 2.05, SD = 1.32), maintaining a climate-damaging diet (M = 1.85, SD = 1.25), or engaging in environmentally harmful travel (M = 2.17, SD = 1.41). There is even less support for ostracizing those who critically question the climate crisis (M = 1.81, SD = 1.19).

A regression analysis was conducted to determine which variables contribute to the need for punishment, including 24 dependent variables. A G*Power calculation (Faul et al., 2007) revealed a critical F value of 1.57, based on a sample size of 218, an $f^2 = .15$ (moderate effect size), a significance level of .05, and a power of .95. The VIF values ranged from 1.20 to 2.13, indicating that multicollinearity is not a significant concern (O'Brien, 2007).

able 15: Linear regression analysis, dependent variable: punitiveness

| | Unstandardized coefficients | | standardized coefficients | | |
	Regression coefficient B	Standard error	Beta	T	p
Constant	.177	.277		.639	.524
Belief: We are primarily dealing with a natural climate change	-.095	.048	-.110	-1.991	.048
Value dominance of climate protection	.274	.084	.239	3.250	.001
Emotion: hate	.238	.046	.306	5.167	.000
Emotion: powerlessness	-.106	.041	-.157	-2.592	.010
authoritarian aggression	.119	.050	.147	2.402	.017
call for censorship	.116	.054	.131	2.148	.033
social credit system	.128	.042	.167	3.004	.003

The stepwise regression analysis ($F(7, 216) = 25.69$, $p < .001$) reveals that the desire to punish individuals for climate-harming behaviour is linked to the disbelief in "natural climate change" as the primary cause. The prominence of climate protection values significantly contributes to this retributive urge. Emotional responses, particularly hatred, and to a lesser extent, a lack of powerlessness, also relate to this need. Additionally, authoritarian aggression, demands for censorship, and support for a social credit system are associated with this punitive inclination. The model accounts for about 45% of the variance ($R^2 = .45$, R^2 adj. = .44).

5. Limitations and Discussion

The results must be considered in light of certain limitations.

A significant limitation is the small sample size, as motivating participants proved unexpectedly difficult. Despite the climate crisis being prominent in the media, barriers to researching climate anxiety remain. The pervasive media coverage may actually reduce interest in further engaging with the topic through a survey, and some individuals might avoid the subject altogether.

In addition to sample size, potential biases related to age, gender, and political orientation must be acknowledged. The age bias likely stems from predominantly surveying students and their networks. The high proportion of female respondents may reflect greater engagement with the topic or a higher willingness to participate in surveys. The bias in political orientation could result from the large number of younger participants, as they tend to support the Green Party (John, 2021), which is perceived as left-leaning (Jankowski et al., 2022). This might be compounded by the sample effect, with Green and Left voters being particularly engaged with climate issues (Fisher et al., 2022). Under these circumstances, the study offers only a limited view of social reality but serves as a catalyst for further research efforts.

Another limitation concerns the questionnaire itself. The high dropout rate indicates that the detailed informed consent information at the beginning may have deterred participants. Additionally, the perceived length of the questionnaire might have contributed to dropouts during the sections on eco-anxiety and the need for closure. If length wasn't the issue, respondents might have been reluctant to disclose their levels of eco-anxiety or need for closure. Future studies should address these factors. Lastly, lower response and higher dropout rates could also be attributed to the topic's negative connotations, which may discourage engagement.

A third limitation involves the analyses. Due to the small dataset, the number of independent variables in the regressions was restricted. For the second regression, the sample size fell short of the 242 required by Green (1991), so results should be interpreted cautiously. Some question sets were consolidated, and reliability was checked. However, this meant that only aggregated factors were included in the analyses. Additionally, regression analyses do not establish causation. The relatively low R^2 values indicate that the variance in the dependent variables was only partially explained by the independent variables, suggesting that other significant factors affecting eco-anxiety or the need for punishment may be missing.

Despite these limitations, several valuable insights emerge that could inspire future research.

In the context of experienced eco-anxiety, comparing these findings with those from Hogg et al. (2021) - which surveyed 334 undergraduate students at the University of Canberra, Australia (M age = 22.23, SD = 6.65) - and the validation study by Heinzel et al. (2023) - involving 486 participants in Germany (M age = 29.43, SD = 10.63) - provides a useful framework for interpreting the observed outcomes (see table 16).

Table 16: Dimensions of eco-anxiety, a comparison of M, SD, and α

	M (1)	M (2)	M (3)	SD (1)	SD (2)	SD (3)	α (1)	α (2)	α (3)
Affective symptoms	.83	.66	.69	.74	.79	.60	.91	.92	.83
Rumination	.64	.33	.60	.74	.59	.67	.91	.90	.86
Behavioural symptoms	.46	.63	.33	.58	.80	.50	.80	.86	.71
Anxiety personal impact	1.06	.55	1.20	.85	.72	.70	.92	.88	.83

1) Results of the present study, (2) results by Hogg et al. (2021), (3) results by Heinzel et al. (2023) α: Cronbach's alpha.

Compared to Hogg et al. (2021) and Heinzel et al. (2023), participants in this study exhibit significantly stronger affective symptoms and slightly higher levels of rumination. The results for behavioural symptoms and anxiety related to personal impact are more in line with Heinzel et al. (2023) and differ markedly from Hogg et al. (2021). This indicates that the experience of eco-anxiety may be shaped by social and temporal contexts or specific dataset characteristics.

In analyzing the factors contributing to climate anxiety, it became clear that the predominance of climate protection values appears to play a significant role. This finding aligns with

Whitmarsh et al. (2022). Consistent with other research, this survey also revealed a strong correlation between eco-anxiety and pro-climate behaviour (Verplanken et al., 2020; Pihkala, 2020a, 2020b; Hogg et al., 2021; Wullenkord et al., 2021; Parmentier et al., 2024). Pro-climate intentions or behaviours may reflect heightened awareness, potentially exacerbating eco-anxiety. Previous studies have demonstrated this connection with concern (Whitmarsh et al., 2022), recognized as a distinct form (Parmentier et al., 2024). However, this survey did not include the construct of climate concern.

The analysis indicates that information from scientific sources is associated with climate anxiety, possibly reflecting a heightened desire for knowledge linked to such anxiety (Whitmarsh et al., 2022). This underscores the important of the scientific community, as information from these sources appears to amplify climate anxiety. This study did not explore the effects of media mediation, social representations, or individual processing (e.g., selective perception or subjective probability construction). Investigating these factors could be a valuable direction for future research.

There is a significant positive correlation between a need for closure and eco-anxiety, as demonstrated by Orr et al. (2020). The desire for predictability, certainty, and straightforward decisions can be especially challenging, or even unattainable, in the context of climate issues, which may explain its link to eco-anxiety. If the need for closure is indeed influential, a broader and more complex array of information from scientific sources, potentially mediated by the media, might not alleviate climate anxiety. These considerations present intriguing opportunities for future research.

Also noteworthy is the negative correlation between the belief that climate change is man-made and climate anxiety. This finding could result from a psychological defense mechanism. A deeper analysis of these psychological defenses would likely yield valuable insights.

As outlined, the regression analysis explained only about 40% of the variance. Additional variables, such as experiential factors, mental health, frequency of nature visits (Whitmarsh et al., 2022), or ideological beliefs (Feygina et al., 2010; Jylhä et al., 2020), could enhance the analysis's comprehensiveness. This study did not address the impacts of eco-anxiety, such as cognitive-emotional issues or impaired daily functioning, which are significant, particularly in the long term. Furthermore, the potential influence of political communication or activist groups was not examined. It is sometimes suggested that climate-related communication is driven by activists and politicians who believe instilling fear would be necessary to combat global warming (Klein, 2023). If true, this could involve propaganda or manipulation at the expense of individuals' mental well-being. This raises ethical concerns, as the negative effects of climate concerns are particularly prevalent among younger generations, necessitating therapeutic services that are currently available and being utilized (Heinz & Meyer-Lindenberg, 2023; Huneke, 2022, Peter et al., 2023).

Regarding the desire to punish individuals for climate-damaging behaviour, the dominance of climate protection values is significant, while belief in natural climate change negatively correlates with this desire. The results underscore the critical role of emotions, as discussed by Fehr and Gächter (2000). There's a negative correlation with feelings of powerlessness and a positive correlation with hatred, which can exert a strong influence due to its reassuring and

self-protective simplicity (Fisher et al., 2018). In the context of climate anxiety, hatred could function as a tool for simplification and may prompt relational punishment.

The link between items potentially reflecting authoritarian aggression presents an intriguing avenue for future research. Although this study did not include an established authoritarianism scale, exploring a left-wing authoritarianism (LWA) scale (e.g., Costello et al., 2022; Manson, 2020) could be valuable. Additionally, further investigation into measures related to the desire for punishment, such as the need for legal interventions like censorship or a social credit system, appears worthwhile.

IV. CONCLUSIÓN

Further research into the experience of climate change is essential for several reasons. Processing climate-related information presents numerous challenges, and emotional reactions to the perceived climate crisis can burden individuals. There is already a significant demand for clinical-therapeutic support for those affected, particularly among younger people. Moreover, in a social context, climate anxiety can have adverse effects, especially when linked with a desire for punishment, as suggested by this study despite its limitations..

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APPENDIX

Table 1: What do you think about the topic of "climate"?

Variable - I am of the opinion that…	N	M	SD
we are dealing with natural processes of climate change.	431	2.30	1.39
we are primarily dealing with human-induced climate change.	437	5.22	1.23
we are experiencing a climate crisis.	437	5.22	1.34
we are inevitably heading towards a climate catastrophe	436	4.92	1.46

1: strongly disagree; 6: strongly agree.

Table 2: Relevance of climate crisis to everyday behaviour

Variable	N	M	SD
The issue of the climate crisis plays a significant role in my life.	438	3.91	1.35

I try to behave in a way that does not harm the climate.	440	4.33	1.19
I participate in protests and demonstrations.	437	2.32	1.56
I am involved with groups and organisations that advocate for climate protection.	438	2.03	1.40
I follow a vegan/vegetarian diet, primarily to protect the climate.	429	3.25	1.82
I heat my home as little as possible, not because of the cost, but to protect the climate.	428	3.42	1.60
I save as much electricity as possible, not due to the costs, but to protect the climate.	428	3.33	1.59
I avoid flying, not because of the cost, but to protect the climate.	429	3.52	1.87

1: Does not apply at all, 6: applies completely, Cronbach's alpha of complete index = .87.

Table 3: Do you seek information about climate change/the climate crisis from the following sources?

Variable	N	M	SD	α / ρ
Factor 1: "political organisations"				.81
Federal Ministry for Economic Affairs and Climate Action	373	2.29	1.40	
Federal Environment Agency (Umweltbundesamt)	373	2.40	1.46	
Factor 2: "NGOs"				.55
National organizations (e.g. Potsdam Institute for Climate Impact Research, etc.)	374	2.99	1.67	
International organizations (e.g. IPCC, etc.)	372	3.70	1.70	
Factor 3: "Social groups"				.43
Climate activist groups, e.g. Fridays for Future, Last Generation	372	3.38	1.83	
Posts in social media	374	4.68	1.46	
Factor 4: "German news providers"				.74
Daily newspapers, e.g. Tagesspiegel, Süddeutsche Zeitung (SZ), Frankfurter Allgemeine Zeitung (FAZ)	371	3.89	1.69	
Weekly magazines, e.g. DIE ZEIT, Der Spiegel, Focus.	370	3.25	1.75	
News from public broadcasters	372	4.33	1.59	
News from private broadcasters	369	2.66	1.67	
Factor 5: "Scientific information providers"				.68
Articles in German scientific journals	373	2.82	1.63	
Articles in international scientific journals	375	2.37	1.57	

1: never; 6: regularly.

Table 4: What leads you to conclude that there is a climate crisis?

Variable	N	M	SD	α / ϱ
Factor: "social knowledge"				.85
I know this because it is now generally accepted that we are experiencing a climate crisis.	393	3.34	1.64	
I know this because my friends/acquaintances say so too.	394	3.15	1.62	
I know this because otherwise, initiatives like the "Last Generation" wouldn't have formed.	393	3.71	1.70	
I find confirmation in the social media I use.	394	3.95	1.67	
Factor: "Statistical/scientific confirmation"				.60
I deduce this from statistical data that leaves no room for doubt.	396	4.57	1.62	
Statements from scientists clearly confirm the climate crisis.	398	5.30	1.28	
Factor: "Confirmation provided by educational setting"				.48
I know this because I learned it in school.	394	3.03	1.73	
I know this because I learned it at the college/university.	392	2.76	1.87	
I deduce it from my own weather observations.	398	4.31	1.56	

Table 5: If you are referring exclusively to Germany: Are there groups that you think particularly contribute to climate change/the climate crisis?

Variable	N	M	SD	α
Factor: "younger/own generation & consume"				.77
My generation	347	3.99	1.09	
Generation(s) younger than me	345	3.71	1.20	
People who own a car	348	4.19	1.14	
People who travel by plane every year	348	4.41	1.27	
People who are constantly online	348	3.36	1.21	
Factor: "older generations/rich"				.69
People who are wealthy	346	5.31	1.11	
My parents' generation	347	4.71	1.15	
My grandparents' generation	346	3.93	1.38	
People who eat meat	348	4.49	1.27	

1: strongly disagree; 6: strongly agree.

Table 6: Eco-anxiety

Variable	N	M	SD	α / r
Factor: "affective symptoms"				.91
Feeling nervous, anxious or on edge	304	1.99	.82	
Not being able to stop or control worrying	303	1.68	.83	
Worrying too much	302	1.79	.84	
Feeling afraid	303	1.86	.86	
Factor: "rumination"				.91
Unable to stop thinking about future climate change and other global environmental problems	304	1.64	.82	

	N	M	SD	
Unable to stop thinking about past events related to climate change	303	1.52	.71	
Unable to stop thinking about losses to the environment	304	1.77	.87	
Factor: "behavioral symptoms"				.80
Difficulty sleeping	304	1.49	.77	
Difficulty enjoying social situations with family and friends	300	1.53	.68	
Difficulty working and/or studying	304	1.37	.61	
Factor: "anxiety concerning personal impact"				.92
Feeling anxious about the impact of your personal behaviours on the earth	304	2.04	.87	
Feeling anxious about your personal responsibility to help address environmental problems	302	1.99	.90	
Feeling anxious that your personal behaviours will do little to help fix the problem	302	2.16	.99	

Table 7: How do you feel when you observe behaviour in others that you consider to be harmful to the climate?

Variable	N	M	SD
Tolerance	343	2.93	1.28
Indifference	342	2.77	1.54
Anger	344	4.23	1.35
Hatred	343	2.48	1.47
Incomprehension	343	4.56	1.49
Powerlessness	343	4.06	1.75
Shame	341	3.29	1.63

1: not at all, 6: strongly agree.

Table 8: NFC-15

Variable	N	M	SD
I don't like situations that are uncertain.	295	4.65	1.28
I dislike questions which could be answered in many different ways.	295	2.66	1.44
I find that a well ordered life with regular hours suits my temperament.	295	3.67	1.34
I feel uncomfortable when I don't understand the reason why an event occurred in my life.	295	4.15	1.44
I feel irritated when one person disagrees with what everyone else in a group believes.	295	2.79	1.39
I don't like to go into a situation without knowing what I can expect from it.	295	4.39	1.45
When I have made a decision, I feel relieved.	295	4.42	1.20
When I am confronted with a problem, I'm dying to reach a solution very quickly.	294	4.58	1.21
I would quickly become impatient and irritated if I would not find a solution to a problem immediately.	292	3.58	1.44

I don't like to be with people who are capable of unexpected actions.	294	3.74	1.47
I dislike it when a person's statement could mean many different things.	293	3.77	1.45
I find that establishing a consistent routine enables me to enjoy life more.	294	3.93	1.41
I enjoy having a clear and structured mode of life.	294	3.95	1.39
I do not usually consult many different opinions before forming my own view.	294	2.30	1.31
I dislike unpredictable situations.	293	4.07	1.45

Table 9: Climate protection stands above all

Variable	N	M	SD
For reasons of climate protection, business-friendly parties should not be in government.	316	2.95	1.48
When it comes to higher goals, such as climate protection, legal violations at the state level are justified.	301	2.33	1,40
Climate protection measures should be implemented without regard for industry or the economy.	316	3.75	1.69
Climate protection measures should be implemented without regard for individuals.	314	2.55	1,52
Public organisations should collect all data from private individuals to measure their CO2 emissions.	315	2.16	1,38
Politics should determine the maximum carbon footprint allowed for an individual.	316	2.79	1,49
The federal government's climate protection measures should not be questioned, otherwise, the climate catastrophe will ensue.	316	3.35	1.65
For reasons of climate protection, new rules must be enforced, even if they worsen the lives of previously privileged people.	314	4.60	1.55

1: strongly disagree; 6: strongly agree, Cronbach's alpha = .81.

Table 10: Characteristics of authoritarian attitudes

Variable	N	M	SD	α
Factor: Authoritarian Submission				.83
We need leading minds in science to tell us how we can save the climate.	307	5.06	1.34	
We need strong leaders in politics to implement measures to save the climate.	308	4.81	1.52	
If anyone knows how to save the climate, I'll do exactly what that person recommends.	307	3.85	1.30	
Factor: Authoritarian Aggression				.85
Those responsible for the climate crisis should be punished.	308	3.46	1.65	
Those responsible for the climate crisis should be disempowered.	308	3.81	1.59	
Those responsible for the climate crisis should be expropriated/forced to surrender their assets.	307	3.21	1.60	

1: strongly disagree; 6: strongly agree, Cronbach's alpha = .88.

Table 11: Call for censorship

Variable	N	M	SD
We need control of the media so that they cannot question the climate crisis.	307	2.29	1.50
We need censorship on social media so that climate deniers cannot express themselves	306	1.97	1.30

1: strongly disagree; 6: strongly agree, correlation coefficient ϱ = .73.

Table 12: Call for social credit system

Variable	N	M	SD
A social credit system like in China should be introduced in Germany, where climate-friendly behaviour is rewarded.	308	3.65	1,92
A social credit system like in China should be introduced in Germany, where environmentally harmful behaviour is penalised.	306	2.19	1,38

1: strongly disagree; 6: strongly agree, correlation coefficient ϱ = .61.

Table 13: Punishment of Individuals

Variable	N	M	SD
Individuals should be punished if they consume too much energy	315	2.05	1.32
Individuals should be punished if they maintain a climate-damaging diet.	315	1.85	1.25
Individuals should be punished if they undertake climate-damaging travel.	314	2.17	1.41
People who question the impending climate catastrophe should be ostracised.	314	1.81	1.19

1: strongly disagree; 6: strongly agree, Cronbach's alpha = .88.