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Balancing Climate Change Mitigation and National Adaptation: Experimental Evidence on the Influence of Risk Perceptions and Information Construal Levels

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Abstract

Climate change can be addressed by mitigation and adaptation approaches at the national policy level. Since only limited resources are available for both strategies, it is key to unravel how ongoing climate developments and their communication influence the population's preferences regarding the question "adaptation or mitigation?" Based on construal level theory and the construal matching premise, we hypothesize that when individuals are faced with an abstract tradeoff between mitigation and national adaptation, a larger national short-term risk perception extends prioritization of national adaptation measures, whereas an amplified global long-term risk perception or a lifted construal level of presented climate risks increases mitigation emphasis. To explore these hypotheses, we conducted an online framed field information experiment with a German population sample of 2,182 participants and find evidence for the hypothesized causal effects by conducting OLS regressions and mediator analyses. We argue for reevaluating current climate communication's emphasis on psychologically close damages, as this approach may push people towards favoring adaptation strategies over essential mitigation measures and could thus entail undesirable side effects.

JEL-Codes: Q54, D81, Q58, D91, C93

Keywords: Climate change mitigation; climate change adaptation; national adaptation strategies; psychological distance; construal level theory; risk perception; climate communication; information experiment

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1 Introduction

Despite global climate change mitigation efforts, Earth is now heading for a more than two degrees Celsius temperature increase by the end of the century (UNEP, 2023b). Meanwhile, climate damages are rising globally due to intensifying and more frequent extreme weather events such as heatwaves (CRED, 2020; Gallagher Re, 2024). Against this backdrop, national climate adaptation measures are gaining prominence alongside climate change mitigation efforts across the globe (UNEP, 2023a; UNFCC, 2023).

Climate adaptation aims at reducing or circumventing negative climate change impacts that have already occurred or are expected to occur, or to exploit opportunities for positive effects (IPCC, 2007; Hisali et al., 2011). Unlike mitigation measures, adaptation strategies can reduce climate damages already in the short run (Füssel & Klein, 2006). Importantly, while mitigation is a global public good entailing the well-known incentive and information issues (e.g., Nordhaus, 2006), national adaptation can be considered a national club good, where these problems are less pronounced.

To bolster public support for mitigation efforts, climate communication research and practice have often focused on emphasizing climate damages in the here and now (e.g., Spence et al., 2011; Markowitz et al., 2014; Jones et al., 2017; Wilson & Orlove, 2019). Yet, correlational empirical evidence hints that the perception of psychologically close climate risks, meaning risks feeling immediate and personally relevant to the individual, may have a stronger impact on adaptation behavior and potentially policy support than on mitigation inclination (Haden et al., 2012). Recent opinion surveys generally reflect these observations and suggest a preference shift towards public adaptation measures amid growing psychologically close climate risks, even showing relatively stronger support for adaptation strategies in many instances (e.g., Steentjes et al., 2020, 2022; de Moor, 2022; NPR et al., 2022).

Recognizing this tendency is crucial, as the primary climate communication goal should remain to strengthen support for mitigation efforts. Also when considering limited climate policy resources, it is reasonable to advocate for national adaptation strategies to reduce immediate local climate damages. However, a disproportionate emphasis on adaptation likely yields considerable intertemporal inefficiencies and excessive levels of climate change for future generations in particular. Thus, societies must ensure that efforts to minimize today's and soon-to-come climate damages do not overshadow the global, long-term challenge of climate change mitigation, which will decisively shape future human living conditions.

In this light, our research sets out to examine how key psychological factors influence individual prioritization between climate change mitigation and national adaptation efforts. Specifically, we investigate the causal effects of three elements on the individual mitigation-national adaptation balancing: firstly, we study the effect of perceptions of psychologically close climate risks, thereby focusing on national short-term risks. Secondly, we study the impact of perceptions of psychologically distant climate risks, meaning risks that seem more remote and less personally relevant, thereby focusing on global long-term risks. Thirdly, we explore the effect of climate risk information construal levels, referring to how abstractly or concretely climate risks are presented to individuals.

The surveys by Haden et al. (2012) and Brügger et al. (2015) are central for our research as they explore how perceptions of climate risk related to psychologically near and distant threats correlate with individual separate preferences for climate change mitigation and adaptation. Haden et al. (2012) study how Californian farmers' concerns about local and global climate change are associated with their private mitigation and adaptation behaviors in agriculture. They report that local concerns rather motivate adaptation behavior while global concerns tend to support mitigation action. Brügger et al. (2015) use European convenience samples to research how risk perceptions correlate with willingness for personal climate action and climate policy acceptance. They find that proximal risk perceptions mainly promote individual actions, whereas distant concerns rather strengthen policy support. Importantly, they also report a stronger effect of distant risk perceptions on mitigation than on adaptation policy support and find that proximal risk perceptions rather motivate adaptation behavior. In sum, these studies support the idea of a construal matching effect, suggesting a stronger association between attitudes and climate-related behaviors or policy evaluations when the level of mental abstraction in the attitude matches the level of mental abstraction regarding the action or policy.

Further studies provide some support for the construal matching hypotheses. The survey of Rubio Juan & Revilla (2021) shows that increasing psychological distance to climate change, meaning perceiving climate change as a more distant and less immediate threat, only decreases adaptation policy support and not mitigation support. Moreover, Netzel et al.'s (2021) survey provides evidence that personal climate risk perception supports adaptation behavior, whereas global risk perception has no effect. Finally, Halperin & Walton's (2018) information experiment suggests that while local climate damage information strengthens personal adaptation inclination, global information rather promotes support for policy-scale adaptation measures.[1]

In summary, while there is some evidence on correlational relationships, the causal effects of perceptions regarding psychologically proximate and distant climate risks on the individual real-world tradeoff between climate change mitigation and national climate adaptation measures have not yet been explored. Additionally, prior research has not yet measured revealed real-world allocation preferences between mitigation and national adaptation. These research gaps are where our study aims to contribute as well.

To develop hypotheses on the causal effects of climate risk perceptions and climate information construal levels on the individual balancing between climate change mitigation and national adaptation, we build on psychological theory and concepts. Firstly, the concept of psychological distance (Spence et al., 2012), secondly, construal level theory (Liberman & Trope, 2008; Trope & Liberman, 2010), which indicates that people think more abstractly about psychologically distant events, and thirdly, the before introduced premise of construal matching.

On this basis, we develop our three hypotheses: firstly, we hypothesize that if the perception of national short-term climate risks increases, national adaptation WTP increases relative to mitigation WTP. Secondly, and conversely, we hypothesize that if the perception of global long-term climate risks increases, relative mitigation WTP increases. Thirdly, we hypothesize that if the construal level of presented climate risk information increases, relative mitigation WTP grows as well.

To test these hypotheses, we conducted an online framed field information experiment (Harrison & List, 2004) based on a German population sample, with 2,182 participants completing the survey. In this experiment, to elicit participants' relative WTP, we endowed participants with 10 Euros to be allocated between real-world climate change mitigation and national climate adaptation in Germany. Before making their decisions, the participants were either presented with information regarding national short-term or global long-term climate risks, depending on the experimental condition. Thus, we could measure the causal effects of evolving national short-term and global long-term climate risk perceptions, and an increased climate risk information construal level.

For our data analysis, we apply OLS regressions and mediator analyses. The results support our hypotheses: increased perception of global long-term climate risks, along with a

[1] Beyond that, Maiella et al. (2020) provide a literature overview on psychological distance effects on mitigation and adaptation preferences. Besides, various lab experiments analyze the mitigation-adaptation dilemma under varying conditions (e.g., Hasson et al., 2010, 2012; Blanco et al., 2020; Böhm et al., 2020; McEvoy et al., 2022).

higher construal level of presented climate risks, leads to greater mitigation prioritization. In contrast, a higher national short-term risk perception yields greater prioritization of national adaptation strategies, particularly, when focusing on participants conceding the major human climate change impact. Moreover, heterogeneity analyses reveal intriguing age patterns as the effect of increasing national short-term risk perceptions is driven by older participants, while the global long-term risk perception effect hinges on the younger generations.

In sum, our study provides insights into climate policy mix preference formation, highlighting the effects of risk perceptions on different spatiotemporal levels and information construal levels. Our findings are helpful for climate communicators aiming to increase public climate policy support when balancing between the global long-term challenge of climate change mitigation and the more localized and often short-term oriented adaptation task. Specifically, highlighting local short-term climate damages may be inadequate for increasing mitigation focus but may rather push people towards emphasizing adaptation, while boosting mitigation focus requires stressing global and long-term impacts.

The remainder of this paper is structured as follows: Section 2 provides the theoretical background and develops the hypotheses based thereon, while Section 3 presents the experimental approach and procedure. In Section 4, we outline our empirical strategy for analyzing the experimental data, and in Section 5, we provide the results. Section 6 discusses limitations of our study and potential future research avenues, while Section 7 concludes.

2 Theory and Hypotheses

2.1 Climate change mitigation and national climate adaptation

Climate change mitigation and national climate adaptation are substitutes as both reduce the negative effects of climate change (Tol, 2005). Classic mitigation examples are investments in energy efficiency or alternative energy sources to reduce greenhouse gas emissions. National adaptation can be anticipatory or reactive and typically involves measures shielding society against extreme weather events, such as the construction of dams to protect against flooding or heatwave protection plans (Biesbroek et al., 2010).

While climate change mitigation is a global public good entailing the typical incentive and information problems (e.g., Nordhaus, 2006), national climate adaptation can be considered a national club good where these issues are less severe.[2] There are also differences among the

[2] Note that public climate adaptation is multifaceted and occurs at various levels beyond the national, including local, regional, and international (IPCC, 2022a). In this study, we focus on national adaptation.

two options' lead-times (Füssel & Klein, 2006). Due to the inertia of the climate system, mitigation measures only influence the global climate several decades later in the form of a lower temperature rise. In contrast, as climate adaptation approaches can offer immediate relief from climate damages, they are generally perceived as short-term oriented, particularly when compared to climate change mitigation strategies.[3]

2.2 Psychological distance, construal level theory, and construal matching

We use the concept of psychological distance, construal level theory, and the construal matching premise to better understand the impact of personal climate risk perceptions and climate risk information construal levels on the individual tradeoff between climate change mitigation and national climate adaptation. Psychological distance describes the fact that people can only experience the here and now (Liberman & Trope, 2008; Trope & Liberman, 2010). All experiences that go beyond this take place within a mental distance. There are four dimensions of psychological distance: temporal distance (when something happens), spatial distance (where something happens), social distance (to whom something happens), and hypothetical distance (how likely it is that something will happen). The dimensions of psychological distance are interlinked, meaning that objects are often close or far away on several dimensions at the same time.

Construal level theory is based on the concept of psychological distance, providing a framework to examine how different aspects of this distance influence the way individuals mentally process and react to various events, including those related to climate change. When objects are perceived as psychologically near, they are seen as concrete and context-specific. This is referred to as low-level construal. When individuals perceive objects as psychologically distant, their representation requires a higher degree of cognitive abstraction and is accompanied by a schematic and decontextualized mental representation. In this case, we speak of high-level construal.[4]

Individual risk perceptions regarding climate change can exhibit different degrees of psychological distance and be located at different construal levels (Spence et al., 2012; van der

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[3] We acknowledge that, for instance, Tol (2005) has discussed the actual existence of a public mitigation-adaptation tradeoff, highlighting the multidimensional differences between the two options. However, we follow Hasson et al. (2010) in arguing that, due to escalating national and local climate damages, countries will increasingly have to make difficult balancing decisions between mitigation and national adaptation investments (Gallagher Re, 2024). This evolving scenario underscores the need to further investigate individual mitigation-national adaptation tradeoff preference formation, which will be vital for formulating publicly accepted climate policy mixes and designing effective climate communication strategies.

[4] Brügger (2020) provides a critical discussion on the application of construal level theory on psychological distance.

Linden, 2015). On the one hand, climate risk perceptions can relate to personal and near-term negative effects that are almost certain to occur. For example, the idea that one's own family will suffer from very high temperatures tomorrow due to a heatwave. Here, we speak of a low psychological distance and low-level construal. On the other hand, risk perceptions can also refer to global and long-term effects that could occur with a low probability for humanity. In this case, one example is the idea that mankind could suffer from extreme heat in the next century.

There are differences in the psychological distances between climate change mitigation and national climate adaptation effects. Specifically, the effects of climate change mitigation are generally more distant in terms of spatial, temporal, and social distance than the effects of national climate adaptation in Germany. While climate change mitigation measures affect everyone in the world and take decades to materialize, national adaptation measures focus on the German society and can decrease climate damages already in the short-term. Based on the construal level theory, the mental representation of the effects of climate change mitigation measures, thus, requires rather high-level construal and the representation of the effects of national climate adaptation measures requires rather low-level construal.

The premise of construal matching can be derived based on the findings of Haden et al. (2012) and Brügger et al. (2015). They find that perception of local, psychologically proximate climate risks primarily drives adaptation behaviors, while global, distant risks rather encourage mitigation actions and policy support. On this basis, they suggest that there is a construal matching effect entailing that the association between attitudes and climate-related behavior or the evaluation of a climate policy option is stronger when a construal matching between attitudes and behavior, or policy option, prevails. Psychologically proximate concerns about climate change, which require low-level construal, thus have a greater impact on the evaluation of more local responses to climate change with more immediate effects, such as climate adaptation measures. In contrast, psychologically distant concerns about climate change, which require high-level construal, have a greater impact on the evaluation of more global responses to climate change with less immediate effects, such as climate change mitigation measures.[5]

[5] Note that the theory of social distance from economic science, as described by Akerlof (1997), aligns well with the psychological concepts and line of argumentation that we just put forward. Social distance focuses on the perceived closeness or remoteness between individuals and groups, affecting their interactions and exchanges. Like the different dimensions of psychological distance, social distance influences how people perceive and evaluate risks and policies. For example, individuals may support public climate adaptation measures more strongly if they feel a close social connection to those protected by these measures. However, for our hypotheses building, we build on the before-introduced psychological concepts and the construal matching approach, in particular, for which there exists no direct counterpart in economics.

2.3 National short-term and global long-term climate risk perceptions

In our study, we seek to investigate the causal effects of climate risk perceptions on the individual mitigation-national adaptation tradeoff.[6] We introduce two conceptually distinct climate risk perceptions pertaining to climate change-induced extreme weather occurrences on contrasting temporal, spatial and social dimensions. By doing so, we build on and extend van der Linden's (2015) prominent differentiation between personal and societal/global risk perceptions.

Firstly, we introduce the national short-term climate risk perception, which refers to the imminent and nationally relevant risks to the domestic society throughout this decade. Secondly, we introduce the global long-term risk perception, which pertains to global climate risks until the end of the century, thus, addressing the broader, existential threats transcending temporal and geographical boundaries.[7] By employing these two specific risk perception types, we aim at reflecting the complex and multi-layered nature of climate change risk perceptions' effects within climate change policy mix preference formation.

2.4 Hypotheses

Employing the concept of psychological distance, construal level theory, the premise of construal matching, and the introduced distinct climate risk perceptions, we can derive our three hypotheses.

H1: *if the individual national short-term climate risk perception increases, the individual WTP for climate change mitigation decreases relative to the individual WTP for national climate adaptation in Germany.* This hypothesis can be derived as follows: national-short-term climate risks have a relatively low spatial, temporal, and social psychological distance and their mental representation, therefore, requires only low-level construal. National climate adaptation in Germany is perceived as a short-term and national response to climate change.[8] The mental representation of the effects of national climate adaptation also requires low-level construal. There is, therefore, a construal match between the national short-term climate risk perception and national climate adaptation in Germany. However, there is no

[6] Generally, risk perceptions were identified as key factors for individual mitigation and adaptation preferences (e.g., O'connor et al. 1999; Leiserowitz 2006; Zaalberg et al. 2009).

[7] Relating the two concepts to van der Linden's (2015) empirically established personal and societal/global domains, we find that national short-term risk perception rather resembles personal risk perception as it also includes possible climate change threats to one's personal well-being, whereas global long-term risk perception rather resembles the societal/global climate risk dimension.

[8] Whereas the focus of adaptation is mostly short-term, it can also be long-term in principle (Füssel & Klein, 2006). However, in this experiment, we focus on short-term adaptation measures and presented national climate adaptation accordingly to the participants (see Table A.1 in Appendix A).

construal match with climate change mitigation because this measure is perceived as a global and long-term response to climate change. The mental representation of the effects of climate change mitigation requires a rather high construal level. Based on the premise of construal matching, increasing the national short-term risk perception should, therefore, have a greater positive effect on national adaptation WTP than on mitigation WTP.

H2*: if the individual global long-term climate risk perception increases, the individual WTP for climate change mitigation increases relative to the individual WTP for national climate adaptation in Germany.* This hypothesis can be derived as follows: global long-term climate risks have a relatively high spatial, temporal, and social psychological distance, so that their mental representation requires high-level construal. Climate change mitigation is perceived as a global and long-term response to climate change. The mental representation of the effects of climate change mitigation also requires high-level construal. There is, thus, a construal match between the global long-term climate risk perception and climate change mitigation, whereas there is a construal mismatch between the global long-term risk perception and national climate adaptation in Germany. Based on the premise of construal matching, increasing the global long-term risk perception should, therefore, have a greater positive effect on individual mitigation WTP than on national climate adaptation WTP.

H3*: if the construal level of the presented high-risk climate change scenarios increases from low to high, mitigation WTP increases relative to national adaptation WTP.* This hypothesis can be derived as follows: psychologically distant climate risks are rather positioned on the same construal level as climate change mitigation than as national climate adaptation which is positioned on a relatively low construal level. There is a construal match between climate risks on a high construal level and climate change mitigation, while there is a construal match between climate risks on a low construal level and national climate adaptation.

3 Framed field information experiment

3.1 General approach and procedure

In November 2023, we conducted an online framed field information experiment[9] (Harrison & List, 2004) based on a German population sample, including 2,182 participants, to test the three hypotheses. Participants were recruited via the panel provider Norstat for the around 10-minute-long survey. In the experiment, we endowed participants with 10 Euros which they could freely allocate in increments of 1 Euro between climate change mitigation and national climate adaptation in Germany (i.e., they could spend all 10 Euros on one option, or one part for one option and another for the other, for instance, 7 Euros for climate change mitigation and 3 Euros for national climate adaptation in Germany). As we were only interested in their relative WTP, participants were required to distribute all the provided 10 Euro among the two options and could not keep any money for themselves. Figure A.1 in Appendix A provides a graphical overview of the experimental procedure, including the different steps, which will be explained in detail in the following.

At the beginning of the experiment, participants answered sociodemographic questions as well as questions on their fundamental and climate change-related beliefs and personal extreme weather experiences. Particularly, we asked participants for their national short-term and global long-term climate risk perceptions, using 11-point Likert scales, both before and after the treatments, thus collecting prior and posterior beliefs. However, note that we only collected posterior data on risk perceptions explicitly altered within experimental conditions.[10] Likewise, participants' psychological distance to climate change was measured both before and after the treatment for all treated participants to be able to investigate additional treatment effects in this regard.[11] After completing the pre-treatment questionnaire, all participants received short general information introducing the climate change issue.

Subsequently and before being randomly allocated to one of the five experimental conditions, which we will introduce in the next section, participants received comprehensive

[9] We combine elements of both information and framed field experiments. Therefore, our approach is described best as a framed field information experiment. Note that, for instance, Deryugina & Shurchkov (2016), Howell et al. (2016), Halperin & Walton (2018), and Findlater et al. (2020) conducted climate change information experiments already. Löschel et al. (2013, 2017) realized framed field experiments investigating real climate change mitigation WTP. Also, note that Haaland et al. (2023) provide comprehensive guidelines on information experimental design, which we considered in the designing stage of our experiment.

[10] Thus, in conditions 1 and 2, which were designed to alter the national short-term risk perception, we gathered data on national short-term risk perceptions after the treatment. In conditions 3 and 4, which aim to alter the global long-term risk perception, we collected data on global long-term risk perceptions after the treatment.

[11] Psychological distance to climate change is measured via a composite score based on the average value of the temporal, spatial, and social psychological distance (see Appendix B for more details).

information about climate change mitigation and national climate adaptation in Germany, as well as relevant examples to each strategy (see Appendix A for the information provided to the participants). Also, we informed participants that their contributions would, depending on their allocation decision, support projects aligned with either climate change mitigation or national climate adaptation in Germany.[12] However, the specific projects benefiting from these donations were not disclosed to the participants to maintain the abstract tradeoff in their decision-making process. Donations were transferred to different NGOs. Money donated to climate change mitigation was transferred to *atmosfair*, which distributes donations among different projects mitigating climate change situated in various countries. Donations for national climate adaptation in Germany were distributed evenly towards German adaptation projects of the *German Federation for the Environment and Nature Conservation*, the *Lake Constance Foundation,* and the *Greensurance Foundation.*

3.2 Information treatments

Participants were randomly allocated to one of the five experimental conditions. Within experimental conditions 1 and 2, participants received qualitative information on national short-term climate risk development in Germany, focusing on the increase of climate change-induced extreme weather events (heatwaves, heavy rain events and related flooding, and droughts) and consequential potential damages for the German society (see Appendix A for full texts). Within these conditions, the experimental variable, national short-term climate risk perception, was varied. In condition 1, participants were presented information suggesting only mild increases in the climate change-induced extreme weather events in Germany in the current decade (low-risk variation), while in condition 2, participants were presented information suggesting drastic increases in the climate change-induced extreme weather events in Germany within the current decade (high-risk variation). Put differently, condition 1 serves as an active control condition for condition 2. Participants in condition 2 could, thus, be assumed to have a higher national short-term climate risk perception than participants within condition 1 post-treatment. Treatment texts between the two groups were identical except that within the low-risk condition, adjectives as “small” and “slight” were used to describe extreme weather events and possible societal damage increase, whereas in the high-risk variation, adjectives like “significant” and “drastic” were employed.

[12] To keep the costs of the experiment manageable, only 10% of the participants' distribution decisions were realized as financial contributions to projects. At the beginning of the experiment, we informed participants about this limited random realization of their allocation choices.

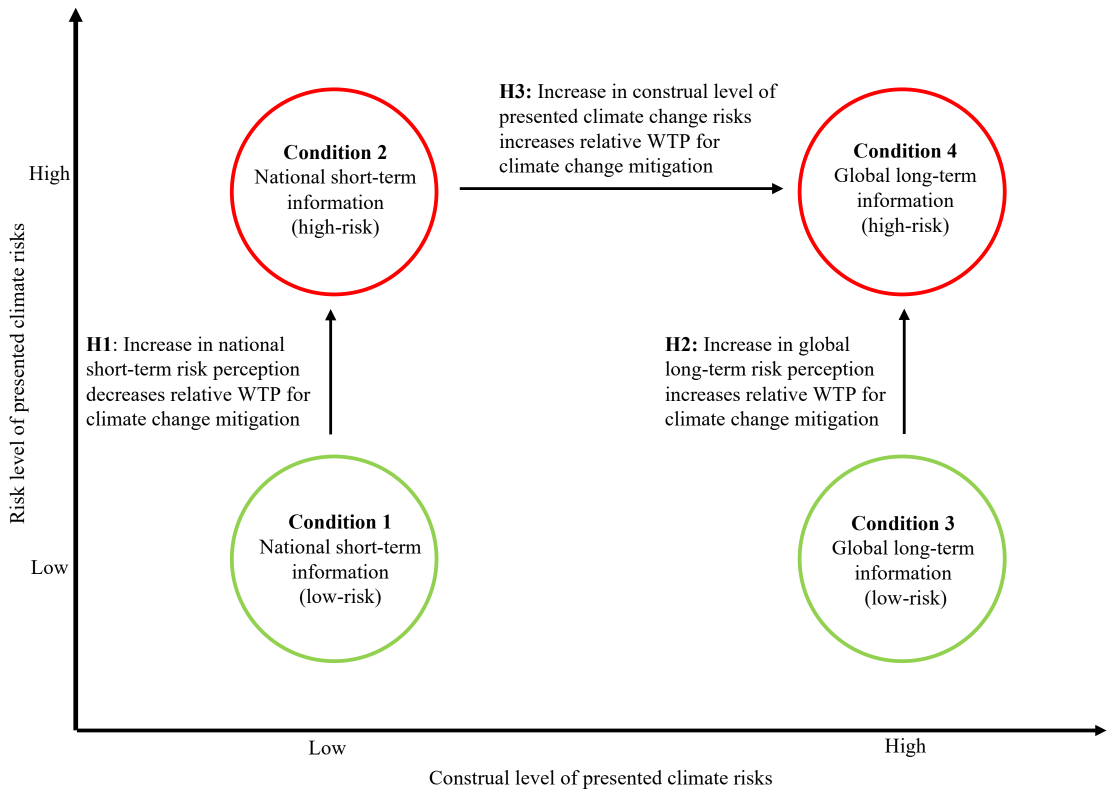
Within experimental conditions 3 and 4, participants again received information on climate change-induced increases of heatwaves, heavy rain events and related flooding, and droughts. However, here the information referred to the global population and the year 2100. Thus, within these conditions, the global long-term climate risk perception was varied. In condition 3, participants were presented information suggesting only mild global increases in the climate change-induced extreme weather events until the end of the century (low-risk variation), while within condition 4, participants were presented information suggesting drastic global increases in climate change-induced extreme weather events in this period (high-risk variation). Thus, here, condition 3 serves as an active control condition for condition 4.

On this basis, participants in condition 4 could be assumed to have a higher global long-term climate risk perception than participants within condition 3 post-treatment. Treatment texts were again identical between the two conditions except for the adjectives used to describe extreme weather events and potential societal damage increases.

Beyond that, between experimental conditions 2 (national high-risk) and 4 (global high-risk), the construal level of presented climate risks varied. In condition 2, risks focus on the national short-term dimension, specifically referring to Germany, the German society, and this decade. In condition 4, risks focus on the global long-term dimension, explicitly referring to worldwide risks pertaining to the global population until the year 2100. Thus, presented risks within condition 4 can be assumed to be on a relatively higher construal level, with condition 3 serving as an active control group for condition 4. Except for the varying spatial, temporal, and social dimensions of climate risks, treatment texts were identical between the two conditions.

Figure 1 provides an overview of the resulting 2x2 design. The risk level of presented climate risks is on the y-axis, and the construal level of presented risks is on the x-axis. The Figure includes the four treatment conditions and the three hypotheses derived in Section 2.4. along the arrows.

Figure 1 Information treatment conditions and hypotheses



The information treatments were based on different climate change scenarios: while information for the low-risk scenarios was based on RCP2.6 scenario data, information for high-risk scenarios was based on RCP8.5 scenario data. The data for the national short-term dimension was provided by the German Weather Service (Brienen et al., 2020), while for the global long-term dimension, we relied on IPCC (2021) data. Basing information treatments on varying scenarios ensured that participants were exposed to truthful information representing different possibilities in future climate risk development, with all presented developments framed in conjunctive terms to emphasize them as possibilities rather than certainties. Moreover, note that our experimental design minimizes priming effects by maintaining consistent information across all treatments, only varying risk levels or spatiotemporal dimensions between contrasted conditions.

In experimental condition 5, participants received no information treatment (i.e., no information on extreme weather and societal risk development) but still received the general information on climate change, climate change mitigation, and national adaptation (see Appendix A). On this basis, pure preferences regarding the relative WTP could be measured, serving as a benchmark for the treatment conditions. Beyond that, experimental condition 5 served as a passive control condition for the information treatment conditions to analyze the effects of information provision further. Note that experimental condition 5 is not included in Figure 1. We do not employ condition 5 to manipulate climate risk perceptions and construal levels of presented climate risks and, hence, also not for our hypotheses testing.

After receiving the information treatment, participants were directly forwarded to the decision to allocate their endowment of 10 Euros between climate change mitigation and national climate adaptation in Germany. Finally, after collecting data on post-treatment perceptions, as described in Section 3.1, we asked participants how credible they perceived the treatment information, employing a 5-point Likert scale.

4 Empirical Strategy

Our empirical strategy employs regression analyses to assess allocation decisions between climate change mitigation and national climate adaptation strategies in Germany under various treatment conditions. Specifically, we investigate how differences in risk levels within the same construal level (condition 1 vs. 2; condition 3 vs. 4), as well as differences in the construal level of presented climate risks at the same (high) risk level (condition 2 vs. 4), influence these decisions. To improve our estimates' precision, we also include a range of control variables. On this basis, we estimate the following regression model:

$$MitigationWTP_i = \alpha + Treatment_i\,(\delta InfoConstrualLevel_i + \gamma InfoRiskLevel_i) + \mathbf{X}_\mathbf{i}\,\beta + \varepsilon_i. \qquad (1)$$

$MitigationWTP_i$ is quantified on a scale from 0 to 10 Euros. When $MitigationWTP_i$ takes the value of 10, all money is allocated to climate change mitigation, while when the value equals 0, all money is allocated to climate adaptation in Germany. Hence, $MitigationWTP_i$ effectively serves as an allocation indicator based on the following formula: $MitigationWTP_i = 10 - AdaptationWTP_i$. Also, $MitigationWTP_i$ can be understood as the percentage share allocated to mitigation. For instance, if $MitigationWTP_i$ equals 4 Euros, the participant allocated 40% of funds to mitigation and 60% to national adaptation.

$Treatment_i$ indicates whether the participant received an information treatment on climate change-induced extreme weather event development. A value of 0 denotes that no treatment was received (this only applies to experimental condition 5). A value of 1 denotes that a treatment was received, which applies to experimental conditions 1-4. We use the indicator $InfoConstrualLevel_i$ to denote the construal level of the received treatment information (indicator value 0 = low-level construal; indicator value 1 = high-level construal). The indicator

$InfoRiskLevel_i$ measures the communicated climate risk level of the treatment information (value 0 = low risk-level; value 1 = high risk-level). When manipulating risk perceptions on the same climate risks' constual level as between conditions 1 and 2 and between conditions 3 and 4, $InfoConstrualLevel_i$ stays constant and $InfoRiskLevel_i$ is varied. When manipulating climate risks construal levels as between conditions 2 and 4, $InfoRiskLevel_i$ stays constant and $InfoConstrualLevel_i$ is varied instead.

We include $\boldsymbol{X}_i$, which is a vector of participants' characteristics. It includes participants' sociodemographic characteristics, fundamental values, and attitudes as well as climate change-related attitudes. It also contains subjective and objective indicators for personal heatwave and flooding experiences.[13] When analyzing overall treatment effects, we provide one model specification without control variables and a specification including all control variables. For the rest of the analyses, we focus on the results including all controls. ε_i is an error term.

γ measures the difference in mean mitigation WTP between participants receiving low or high-risk information holding $InfoConstrualLevel_i$ constant (i.e., the difference between national short-term low or high-risk information or the difference between global long-term low or high-risk information). δ measures the difference in mean mitigation WTP between participants receiving national short-term high-risk information and participants receiving global long-term high-risk information holding $InfoRiskLevel_i$ constant. Thus, the respective null hypotheses corresponding to the three hypotheses introduced in Section 2.4 read as follows: **$H0_1$**: $\gamma = 0$ if $InfoConstrualLevel_i = 0$; **$H0_2$**: $\gamma = 0$ if $InfoConstrualLevel_i = 1$; **$H0_3$**: $\delta = 0$ if $InfoRiskLevel_i = 1$.

For our main regression calculations, we use OLS because our ordinal dependent variable, $MitigationWTP_i$, contains values from 0 to 10 in equal increments and, thus, resembles an interval scale.[14] Natural alternatives when considering ordinal dependent variables are ordinal logistic regression models, or probit regression models, which we also apply to our data to explore the results' model choice robustness.

To test our three hypotheses, we firstly conduct OLS regression to estimate overall treatment effects (Section 5.2.1). We run regressions both based on the full sample and the

[13] For the objective flooding indicator, we included data by Mohr et al. (2021) on the postal code areas affected by the historic heavy rain event in Western Germany during the summer of 2021. Having collected participants' postal code data, we could precisely identify those living within areas affected by this event (i.e., where 100mm or more rain fell in 48 hours). For the objective heatwave indicator, we employed Thom et al.'s (2023) calculations based on German Weather Service (2024) data. These calculations provide the average annual number of hot days (i.e., days with a maximum temperature above 30 degrees Celsius) within Germany's 400 regions based on the period from 1992 to 2022. Again, using participants' postal codes, we identified participants living within one of the 25 hottest regions as "heat region" inhabitants. Note that we used ChatGPT as support within the creation of the respective dummy variables.

[14] Further, note that we use robust standard errors throughout.

subsample only including participants conceding the major human impact on climate change. Participants denying the major human impact on climate change constitute a special group to which the regular decision mechanisms may not apply.

Secondly, we conduct mediator analyses to extend our evidence and research the underlying dynamics (Section 5.2.2). Specifically, mediator analyses allow us to investigate three aspects. Firstly, we can test whether the independent variable, national short-term or global long-term high-risk information with respective low-risk information as baselines, manipulates the mediator, national short-term or global long-term risk perception. Secondly, and centrally to our hypotheses testing, we can test whether the mediator, national short-term or global long-term risk perception, affects the dependent variable, WTP for climate change mitigation. Thirdly, we can analyze if our independent variables significantly affect mitigation WTP on their own.

Thirdly, we run OLS regressions based on various sample splits to investigate heterogeneous treatment effects or, put differently, to analyze how different respondents' characteristics influence treatment responsiveness (Section 5.3). We split the sample across age, experimental priors (national short-term or global long-term risk perceptions), and personal self-assessed extreme weather event experiences.[15]

5 Results

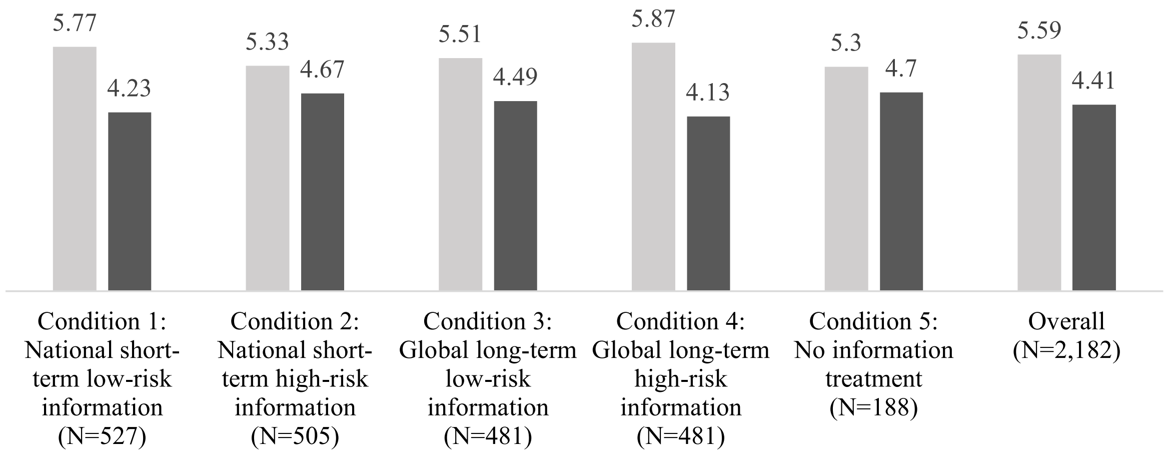
5.1 Descriptive statistics

Our experiment only allowed participants aged 18 to 74 years and was completed by 2,182 participants. Our sample is mostly representative of the German population in terms of age and gender (see Appendix B for comprehensive descriptive statistics). The sample mean age of 45.6 years is only slightly above the German mean age, and the 1-to-1 ratio of our gender distribution resembles the German general populations closely (DESTATIS, 2023a, b). Generally, we find that the five experimental conditions are well-balanced in terms of age, gender, education level, and when focusing on fundamental and climate change-related attitudes. Only experimental condition 5, which we do not employ for the calculation of our main results, deviates in terms of age and gender more explicitly.

[15] Beyond that, we conduct further OLS regression analyses, calculating a small model including only the information treatment variables and the sociodemographic variables, a large model including all explanatory variables, and a medium model including only variables significant at the 5% level (see Appendix C). On this basis, we investigate the causal information treatment effects with the "no-information" condition as the baseline. Also, we study the correlative influences of risk perceptions (pre-treatment) and additional explanatory variables on WTP for mitigation.

As Figure 2 illustrates, overall participants allocated 56% of the funds to mitigation and 44% towards national adaptation in Germany, whereas, when focusing on the 188 participants in the "no-information" condition, it is 53% and 47%, respectively. Participants prioritized mitigation over adaptation throughout all conditions, while the global long-term high-risk treatment yields the greatest mitigation focus and the national short-term high-risk treatment the lowest.[16]

Figure 2 WTP for climate change mitigation (grey) versus WTP for national climate adaptation in Germany (black) across the five experimental conditions (WTP values can be interpreted as either Euros or percentage shares)



As expected, mitigation focus generally decreases when going from left to right within the German political spectrum (Appendix D illustrates these results in more detail). Green Party voters put the greatest focus on mitigation, with 65% of the funds allocated towards it, while voters of the far-right AfD are the only ones prioritizing national adaptation over climate change mitigation measures, directing 54% to adaptation.

Based on the full sample, pre-treatment global long-term risk perception, which focuses on worldwide climate risks until the year 2100, shows a higher overall average of 7.76 relative to the 6.57 average value of the national short-term risk perception, referring to climate risks in Germany during this decade (see Appendix B for more details).[17] Relatively more pronounced global long-term risk perceptions suggest that people expect larger climate risks as the temporal and spatial scope of consideration are expanded.

[16] This almost equal emphasis is consistent with recent survey results, suggesting a shift towards more equal weighting of climate change mitigation and public adaptation policies within developed countries, and even finding adaptation prioritization in many instances (Steentjes et al., 2020, 2022; de Moor, 2022; NPR et al., 2022).
[17] We also regress the two types of risk perceptions on our explanatory variables to analyze their determinants. See Appendix E for the results.

Participants generally trusted the high-risk scenario information more than the low-risk scenario information. Specifically, 14.6% did not find the national low-risk information credible (answered “no“ or “rather no“ to the question if they found the treatment information credible), while it was 13.5% for the national high-risk information treatment. Within the global long-term dimension, the contrast was stronger, with 20% not finding the information credible in the low-risk condition, while it was 11.6% for the high-risk condition. These results align with expectations, given the public media's focus on severe long-term climate damages, which reflects the growing scientific literature on potentially catastrophic climate impacts (e.g., IPCC, 2021).

5.2 Causal overall risk perception and construal level effects

5.2.1 Linear regression models

Table 1 shows the causal effects of increased national short-term risk perception, global long-term risk perception, and lifted construal level of presented climate risks on WTP for climate change mitigation based on the OLS regression model.[18] Specifically, Table 1 shows two distinct model specifications: a model without control variables and a model integrating all control variables. Moreover, both models are applied to the full sample and the sample only including participants conceding the major human impact on climate change.

The analysis robustly demonstrates the hypothesized negative causal effect of national short-term risk perception on mitigation prioritization across all models for the full sample. This effect has a significance level of 5%, with effect sizes of -0.43 and -0.36 in the models without and with controls, respectively. As one might anticipate, when focusing on those who recognize the major human impact on climate change, the effect is more pronounced.

In contrast, a more evolved global long-term climate risk perception causally increases relative mitigation WTP, as hypothesized. This positive relationship is significant at the 5% level for both models with slightly smaller absolute effect sizes of 0.36 and 0.34, respectively. Again, effect sizes are larger for participants acknowledging the major human impacts on climate change. On this basis, we can reject **$H0_1$** and **$H0_2$**. To investigate the mechanisms more closely and gather more evidence for **H1** and **H2**, we conducted mediator analyses, which we will provide in the next section.

[18] Note that we only used the 2,182 completed surveys for our analysis. Also, note that to avoid substantial data loss within our analysis, we imputed all missing values of the 11-point scale pre-treatment variables based on multivariate regressions on our categorical variables and the age variable. When not imputing missing values, the significance level for the global long-term risk perception effect drops in the model including all controls to p=0.103, with 125 observations being lost. The other results in Table 1 remain (highly) significant.

Moreover, Table 1 shows the significant causal impact of an elevated construal level of high-risk climate change scenario information (i.e., here, we are comparing the global long-term high-risk information effect against the national short-term high-risk information effect). As hypothesized, this factor also positively affects mitigation WTP, yielding highly significant and relatively large effects. On this basis, we can confidently reject **$H0_3$** or, put differently, can confirm **H3**. We did not conduct a mediator analysis for this relationship as this variation was not about manipulating a specific belief, as it was done to test **H1** and **H2**. Instead, this variation aimed at investigating the effect of higher construal level climate risk communication on the mitigation-national adaptation tradeoff.

Table 1 Effect of risk perceptions and construal level of presented climate risks based on OLS regressions (dependent variable: WTP for mitigation)

Experimental Variable	Full sample		Conceding major human CC† impact	
	controls: no	controls: all	controls: no	controls: all
Effect of increasing nat. short-term risk perception				
Nat. short-term high-risk info (base: nat. short-term low-risk)	-0.43** (0.17)	-0.36** (0.17)	-0.53*** (0.18)	-0.53*** (0.19)
Observations	1,032	1,032	787	787
Effect of increasing global long-term risk perception				
Global long-term high-risk info (base: global long-term low-risk)	0.36** (0.17)	0.34** (0.17)	0.58*** (0.19)	0.58*** (0.20)
Observations	962	962	735	735
Effect of increasing construal level of presented climate risks				
Global long-term high-risk info (base: nat. short-term high-risk)	0.53*** (0.17)	0.46*** (0.17)	0.59*** (0.19)	0.53*** (0.19)
Observations	986	986	749	749

Significance levels: * p<0.1, ** p<0.05, *** p<0.01; robust standard errors in parentheses;
†CC = climate change

We check the robustness of the Table 1 results by applying an attention filter (see Appendix F for full results).[19] [20] The attention filter excluded those participants who failed the attention check, constituting 22.4% of the total sample. While the national short-term risk perception effect and the information construal level impact are highly stable in this regard, the significance levels of the global long-term risk perception effect decrease. Specifically, the respective p-values increase to 0.106 for the specification without controls and to 0.089 for the controlled specification, while the effect remains highly significant for the subsample of participants acknowledging the major human impact on climate change.[21]

5.2.2 Mediator analyses

We conducted mediator analyses to further investigate and validate the mechanism at hand when increasing national short-term and global long-term risk perceptions. Within the mediator models, national or global high-risk information are the independent variables (base: national short-term or global long-term low-risk information), national short-term or global long-term risk perception is the mediator, and mitigation WTP is the dependent variable. Since the independent variables are exogenously varied, our mediator analyses' results can be interpreted as causal as well. Again, we conduct our analyses for the full sample and only for the participants conceding the major human impact on climate change.

Table 2 provides the mediator analyses' results for the national short-term variation within the left columns and for the global long-term variation within the right columns. It shows that the a-path effect, the impact of the information treatment on the experimental variable (national short-term risk perception or global long-term risk perception), is highly significant across all versions. This indicates that the manipulation of national short-term and global long-term risk perceptions via the information texts on climate change-induced extreme weather development was successful.

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[19] The decision not to apply the attention check filter for our main analysis was based on the observation that, amongst others, participants' age and gender significantly influenced the likelihood of passing the attention check when controlling for other socio-demographic characteristics. Consequently, restricting our analysis to those having passed the attention check could have yielded a biased estimate and, therefore, reduced external validity. Beyond that, we made our treatment variations obvious so inattentive participants could also be expected to grasp the respective message. Also, we included a timer on the treatment page so that participants could not skip it.

[20] Further, we check Table 1's results robustness over regression model choice by employing ordinal logistic regression, which is a suitable alternative to OLS considering that our dependent variable is ordinal (see Appendix F for full results). Overall, we receive very similar significance levels to those based on OLS regressions. This consistency underscores the robustness of our results across different regression models.

[21] However, the observed significance decline of the global long-term risk perception effect may not solely result from the attention impact but is most likely also influenced by mean age differences between the full sample and the attentive subsample. Our heterogeneity analyses reveal that the global long-term risk perception effect is highly significant for the younger ones, while being statistically indistinguishable from zero for the older participants, suggesting a high degree of age sensitivity (see Section 5.3 for more details).

While the b-path effect, the mediator's effect on mitigation WTP, is highly significant for the global variation, it is somewhat less pronounced for the national variation. For the full sample, this effect is significant at the 10 % level, while when focusing on participants conceding the major human impact on climate change, the effect reaches the 5% significance level. For the national variation, the total indirect effects (ab effects) have p-values of 0.106 and 0.059, respectively, while for the global variation, they are highly significant. Interestingly, for the global variation, a substantially larger proportion of the total effect is mediated (i.e., 38% for the full sample and 31% for the subsample) than within the national variation, where only 15% and 16% of the total effects are mediated, respectively.

Table 2 Mediator analyses based on OLS regressions (independent variable (IV): national or global high-risk information; mediator variable (MV): national short-term or global long-term risk perception; dependent variable (DV): WTP for mitigation)

	Variables IV: nat. high-risk info (base: nat. low-risk info) MV: nat. short-term risk perception		Variables IV: glo. high-risk info (base: glo. low-risk info) MV: glo. long-term risk perception	
	Full sample	Conceding major human CC[†] impact	Full sample	Conceding major human CC impact
	Controls: all	Controls: all	Controls: all	Controls: all
Direct effect				
High-risk info (base: low-risk) → WTP mitigation	-0.36** (0.18)	-0.48** (0.20)	0.24 (0.18)	0.40** (0.20)
Indirect effects				
a: High-risk info (base: low-risk) → Risk perception	0.69*** (0.1)	0.71*** (0.12)	0.54*** (0.1)	0.60*** (0.11)
b: Risk perception → WTP mitigation	-0.09* (0.06)	-0.12** (0.06)	0.28*** (0.06)	0.30*** (0.07)
ab (indirect effect of IV on DV via MV)	-0.06 (0.04)	-0.09* (0.05)	0.15*** (0.04)	0.18*** (0.06)
Total effect				
High-risk info (base: low-risk) → WTP mitigation	-0.43** (0.18)	-0.57*** (0.19)	0.39** (0.18)	0.58*** (0.20)
Observations	1009	775	935	729

Significance levels: * p<0.1, ** p<0.05, *** p<0.01; robust standard errors in parentheses;
[†]CC = climate change

Again, we check the results' robustness by applying the attention check filter (see Appendix G for full results). a-path effects stay at 1% significance throughout for both the national and global variation. For the national variation, the p-values of the b-path effects slightly increase to 0.074 on average for the two samples.[22] For the global variation, the b-path significance level remains at 1% throughout.[23]

Based on the regression analysis (Table 1) as well as the mediator analysis (Table 2), we find substantive support for **H1**. There is substantial evidence for a negative national short-term risk perception effect, while our mediator analyses particularly underscore the effect for participants acknowledging the major human impact on climate change. This particular outcome is not surprising as, theoretically, risk perceptions should have only minimal impact on the allocation decision of participants denying the major human impact on climate change, as any funds allocated to mitigation are likely perceived as an ineffective resource use. Also, both the regression and mediator analyses provide substantial support for a positive global long-term risk perception effect on climate change mitigation prioritization, as outlined within **H2**.

In addition, and beyond our hypotheses testing, we explored the role of psychological distance to climate change (post-treatment) as a mediator variable within two different frameworks (see Appendix H for full results). Firstly, we define national or global high-risk information as the independent variable, with respective low-risk information as baselines. Secondly, we calculate the model using global long-term high-risk information as the independent variable with national short-term high-risk information as the baseline.[24] Generally, while these analyses reveal that our information variations effectively manipulated psychological distance to climate change, the b-path effects are mainly insignificant, indicating no substantial psychological distance impact on the mitigation-national adaptation tradeoff. This suggests that influencing the perceived proximity of climate impacts may not be an effective strategy for shifting public support between the two climate policy approaches.

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[22] Beyond that, we also calculate the model adding psychological distance (post-treatment) to the list of control variables. In this case, for the national variation, the b-path effect turns 5% significant for the full sample, adding further evidence to a significant national short-term risk perception effect (see Appendix G for the full results and more details).

[23] To further check the robustness of our mediator analyses' results, we employed ordinal logistic regression replacing OLS regression to estimate the effects along the a-path and b-path. For the national variation, we mostly attain a 5% significance level for b-path effects under this model, while the a-path effect stays 1% significant. For the global variation, the significance levels remain at 1% throughout.

[24] Note that between global long-term and national short-term high-risk information, there is a ceteris paribus variation regarding the construal level of presented climate risks (see Figure 1).

5.3 Heterogeneous causal risk perception and construal level effects

In this section, we investigate heterogeneous treatment effects. In particular, understanding information responsiveness on a more individual level is helpful for improving targeted climate communication strategies. Based on sample splits, we study treatment effects along the lines of age, pre-treatment risk perceptions (priors), and self-assessed extreme weather event experiences. As the following analysis shows, these characteristics decisively influence how individuals update their tradeoff preferences in response to climate risk information. While Table 3 provides the heterogeneous effects for the national short-term and global long-term climate risk perception effects, Table 4 presents the heterogeneous effects based on the increased construal level of climate risk information.

Firstly, we find an intriguing age pattern in responses to information treatments. Older individuals, with age above the mean, drive the significant overall negative national short-term risk perception effect on mitigation WTP. Conversely, the younger generations are mainly responsible for the significant positive global long-term risk perception and information construal level effect. This suggests that younger individuals are more responsive to long-term climate risks compared to older individuals, which is intuitive since younger people are more likely to personally experience these climate change impacts in the future.

Secondly, the data reveals that individuals with a high, above the mean, risk perception initially (national short-term risk perception for the national variation and global long-term risk perception for the global variation) respond with a significant behavior change when presented with high-risk information as compared to when presented with low-risk information. These findings indicate that those already concerned about climate change are more open to scientific data highlighting severe climate risks.[25] Conversely, individuals with lower initial perceptions of risk may be less responsive to high-risk information, possibly because they reject evidence that strongly contradicts their existing beliefs (Rains, 2013).

Thirdly, individuals having experienced heatwaves are more responsive towards national short-term or global long-term high-risk information and a heightened construal level of climate risks, suggesting that direct extreme heat experience can make individuals more attuned to the realities of climate change. However, the effect of flooding experience remains ambiguous.[26]

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[25] We also investigated heterogeneous treatment effects including interaction terms for the continuous variables age and national short-term or global long-term risk perception into the model with all control variables. However, we only received insignificant interaction term results. This highlights the complexity of these relationships, suggesting the need for further research to better grasp the dynamics at play.

[26] Note that the here employed extreme weather experience data is subjective and, as such, can be influenced by, for instance, individual climate change attitudes.

Table 3 Heterogeneous treatment effects based on increased risk perceptions and OLS regressions (dependent variable: WTP for mitigation)

	Experimental variable: Nat. short-term high-risk info (base nat. low-risk)		Experimental variable: Glo. long-term high-risk info (base glo. low-risk)	
	controls: all		controls: all	
Split based on age	Young	Old	Young	Old
Coefficient	-0.20 (0.24)	-0.69*** (0.25)	0.84*** (0.25)	-0.06 (0.25)
Observations	524	508	484	478
Split based on risk perception (priors)	Low nat. risk perception	High nat. risk perception	Low glo. risk perception	High glo. risk perception
Coefficient	-0.39 (0.31)	-0.43** (0.21)	0.21 (0.32)	0.45** (0.22)
Observations	448	584	345	617
Split based on self-assessed heatwave experience	Experienced	Not experienced	Experienced	Not experienced
Coefficient	-0.38* (0.20)	-0.47 (0.32)	0.61*** (0.22)	-0.06 (0.30)
Observations	662	370	599	363
Split based on self-assessed flooding experience	Experienced	Not experienced	Experienced	Not experienced
Coefficient	-0.28 (0.27)	-0.43* (0.22)	0.82*** (0.31)	0.11 (0.21)
Observations	398	634	337	625

Significance levels: * p<0.1, ** p<0.05, *** p<0.01; robust standard errors in parentheses

Table 4 Heterogeneous treatment effects based on increased construal level of presented climate risks and OLS regressions (dependent variable: WTP for mitigation)

	Experimental variable: Glo. long-term high-risk info (base: nat. short-term high-risk)					
	controls: all		controls: all		controls: all	
	Split based on age		**Split based on self-assessed heatwave experience**		**Split based on self-assessed flooding experience**	
	Young	Old	Experienced	Not experienced	Experienced	Not experienced
Coefficient	0.52** (0.23)	0.38 (0.26)	0.62** (0.21)	0.29 (0.29)	0.57** (0.28)	0.42** (0.21)
Observations	501	485	615	371	361	625

Significance levels: * p<0.1, ** p<0.05, *** p<0.01; robust standard errors in parentheses

6 Discussion

6.1 Heterogeneities

We investigate the effect of general qualitative information regarding extreme weather event intensification and consequential societal risks on the abstract tradeoff between general climate change mitigation and national climate adaptation in Germany. However, there are heterogeneities within climate change mitigation, national climate adaptation, and extreme weather events. These heterogeneities were not captured in our study but could, if incorporated, influence tradeoff preference formation significantly.

Climate change mitigation involves domestic and international actions across various sectors like energy or transportation, employs different financial tools, such as carbon pricing, can include carbon capture and storage (CCS) approaches, and sometimes provides immediate local co-benefits (IPCC, 2022b). Adaptation includes, for instance, constructing infrastructure like dams or implementing educational programs. Furthermore, adaptation can also be long-term and can be classified into strategy types such as "no regret" or "win-win" (IPCC, 2022a).

While there is plenty of evidence on preferences for specific mitigation or adaptation measures (Alló and Loureiro, 2014), there is little knowledge on the individual balancing between specific mitigation and adaptation measures and the respective influences of risk perceptions on different spatial and temporal levels. Future research could address this gap by investigating the tradeoff and respective preference formation when contrasting particular kinds of mitigation and/or (national) adaptation approaches.

Specifically, we inform participants about increasing frequency and intensity of three kinds of extreme weather events: heatwaves, heavy rain and related flooding, as well as droughts. We have chosen these as they are among the most prominent in terms of damage both globally and for the German population (IPCC, 2021; Prognos et al., 2022). Also, when collecting data on national short-term and global long-term risk perceptions, we specifically mention these three types of events as possible climate change damages.

Yet, it is intuitive that participants' perceptions of risk and damage may vary markedly across different extreme weather types, with some events being perceived as more threatening than others. Further, it is possible that while high risk perception of some types of events increases focus on mitigation, high risk perception regarding others types of events steers towards adaptation, possibly, as a function of perceived adaptive capacities towards certain extreme weather types.[27] Generally, the body of literature addressing how specific extreme weather experiences impact the balance between mitigation and adaptation preferences is limited, so studies focusing on this aspect remain a worthwhile research endeavor as well.[28]

6.2 Timing impacts

We conducted our experiment in November 2023, when extreme weather events, as typical for this time of the year in Germany, receded from public consciousness due to their relatively lower occurrence (Google Trends, 2024; NCEI, 2024a, b). Study timing likely influences climate risk perceptions and high-risk information responsiveness because when individuals are more attuned to and affected by climate change-induced extreme weather events, predicted severe increases in these events may have a greater effect on their preferences. Beyond that, when data is collected could impact the perceived urgency of climate adaptation measures, in particular. For instance, the devastating flooding in Western Germany in July 2021 heightened public and political focus on climate adaptation measures within the country, culminating in the first country-wide climate adaptation act (Lehmkuhl et al., 2022; BMU, 2024).

Measuring mitigation-adaptation tradeoff preferences in the immediate aftermath or even during such extreme weather events could yield further interesting insights, particularly

[27] There is some evidence in this regard. For instance, Demski et al. (2017) study the effect of flooding experience on mitigation preferences and heatwave preparation intention, and Halperin & Walton (2018) investigate the impact of information on climate change-induced droughts on mitigation and adaptation preferences.

[28] Another interesting and related aspect that we could not include in our study is whether people believe that presented extreme weather event increases are indeed induced by climate change. The link between specific extreme weather events and climate change remains complex and is debated continuously throughout science and viewed heterogeneously within the public (e.g., NASEM, 2016; AMS, 2023; Pasquini et al., 2023). Like those who accept the major impact of humans on climate change, people who believe the increasing amount of extreme weather events is caused by climate change might be more inclined to support mitigation strategies.

when comparing the results to a baseline scenario without immediate extreme weather exposition.[29] Based on the construal matching approach, which states that the association between attitudes and behavior is stronger when there is construal matching between attitudes and behavior, it could be assumed that as climate risks and damages are becoming psychologically closer via extreme weather experience, the general focus may shift more towards adaptation measures.

7 Conclusion

Given the increasing climate damages in numerous countries, which necessitate more extensive public adaptation strategies, our research aimed to explore the psychological factors that shape public preferences for balancing climate change mitigation with national adaptation policies. Specifically, our study examines the causal effects of national short-term climate risk perceptions, global long-term climate risk perceptions, and climate risk information construal levels on preferences regarding the mitigation-national adaptation tradeoff.

Central to our investigation were hypotheses derived based on the construal level theory, the concept of psychological distance, and the premise of construal matching (Liberman & Trope, 2008; Trope & Liberman, 2010; Haden et al., 2012; Spence et al., 2012). Based on an online framed field information experiment employing a German population sample of 2,182 participants completing the survey, we find substantial evidence for our hypotheses: an increase in the perception of global long-term climate risks and the construal level of presented climate risks extends prioritization of mitigation measures. Conversely, an amplified perception of national short-term risks increases participants' emphasis on national adaptation strategies. While the results for the information construal level effects are highly robust throughout, the risk perception effects are more pronounced and robust among individuals who acknowledge the major human impact on climate change. Beyond that, our heterogeneity analyses offer interesting perspectives for tailoring climate policy communication to different age groups. Older participants strengthen their adaptation focus more substantially in response to larger national short-term risks, while younger generations markedly increase their emphasis on mitigation when faced with grave global long-term threats.

Overall, our research enhances the understanding of public preferences in the climate policy arena and underscores the intricate and crucial relationships between information

[29] Generally, incorporating longitudinal components, like Osberghaus (2015), who examines the causal impact of flooding experiences on private adaptation actions, could help assess changes in public preferences for mitigation-adaptation tradeoffs over time, particularly before, during, and after extreme weather events.

presentation, climate risk perceptions on varying construal levels, and climate policy mix preference formation. Also, the observed preference delineation, causally influenced by the perception of climate risks on different temporal and spatial dimensions, confirms the principle of construal matching effects within climate policy preference formation previously suggested in the literature based on correlative findings (Haden et al., 2012; Brügger et al., 2015). Our findings could be verified and extended through incentive-compatible laboratory experiments and survey studies using stated-preference approaches to study the effect of climate risk perceptions on the mitigation-national adaptation tradeoff in controlled environments and with larger, more diverse samples.

Notably, our results hold considerable implications for climate communication strategies designed to enhance support for climate change mitigation efforts. In particular, our results suggest that highlighting immediate, localized climate impacts may not effectively increase support for mitigation but could instead increase individuals' focus on adaptation. A more suitable approach might involve presenting climate risks in a more abstract and global context. However, our study does not provide direct evidence on absolute WTP shifts. Even if mitigation prioritization decreases due to increasing national short-term risk perceptions, absolute mitigation WTP could still rise if there is a sufficiently growing overall commitment to climate policy measures on this basis. Conversely, rising geopolitical risks coupled with economic issues such as high inflation and slow growth, as observed across many developed countries today, could exert downward pressure on overall WTP for climate policy measures, specifically, as their benefits are often harder to grasp for individuals (Gifford, 2011; IMF, 2024). In such a scenario, amplifying perceptions of psychologically close climate risks could also yield an absolute decline in public climate change mitigation support.

In this light, we call for a reevaluation of climate communication strategies, which have often focused on highlighting psychologically close climate risks requiring low-level construal. We view reevaluation and potentially refinement as necessary to ensure that people are not unintentionally pushed towards adaptation strategies at the cost of the support of essential mitigation measures. Even amid intensifying local climate damages, humanity must not lose sight of the psychologically distant climate change dimension, which appears critical for mitigation efforts that will decisively shape future human living conditions and constitute the key element within intergenerational climate justice.

8 Appendices

Appendix A: Supplementary material on the experiment

In this Appendix we provide supplementary material for the framed field information experiment. In the first section, we provide the information shown to the participants regarding the two policy options climate change mitigation and national climate adaptation in Germany. In the second section, we provide the treatment texts which were shown to the participants before their allocation decision. In the third section, we provide an overview of the experimental procedure.

A.1 Information on climate change mitigation and national adaptation

Table A.1 Provided information on climate change mitigation and climate adaptation in Germany

	Climate change mitigation	National climate adaptation in Germany
Objective	These measures focus on the reduction of global greenhouse gas emissions, in particular CO_2, in order to mitigate climate change in the long-term. In this way, the negative effects of climate change, such as climate change-related extreme weather events (e.g. heatwaves, heavy rainfall events, and droughts) and the associated damage, are to be reduced worldwide and in the long term.	These measures focus on reducing the negative effects of climate change that have already occurred or are expected in Germany. In particular, they aim to increase the ability of the German society in the short-term to cope with extreme weather events caused by climate change, such as increased heat waves, heavy rainfall events or droughts, and thus reduce damage.
Impact focus	Global and long-term	National and short-term
Examples	Investments in energy savings or alternative energy generation technologies that cause less greenhouse gas emissions.	Investments in the area of climate-adapted building and spatial planning, in the area of flood protection or in the area of forestry and agriculture.
Donation	If you donate to climate change mitigation, your donation will be distributed to various projects that focus on climate change mitigation.	If you donate to climate change adaptation in Germany, your donation will be distributed to various projects that focus on climate change adaptation in Germany.

A.2 Treatment texts

In the following, we provide the full national short-term low-risk information treatment text (in round brackets: high-risk variation; in square brackets: global long-term variation). Note that the original texts were in German and the following text is a translation:

Slight (Severe) *increase in climate change-induced extreme weather* ***in Germany [worldwide] in this decade [until the end of the century]****.*

The effects of climate change could increase ***slightly (severely) [globally] in Germany in this decade [until the end of the century]****. A* ***small (significant)*** *increase in extreme weather events is expected. These could, in turn, lead to a* ***slight (severe)*** *increase in risks for the* ***German [global]*** *population.*

Slight (Severe) *increase in heatwaves*
Heatwaves could increase ***slightly (significantly)*** *in frequency and intensity. The* ***[worldwide]*** *number of heat-related deaths and illnesses across* ***Germany*** *could, therefore, increase* ***slightly (drastically)****.*

Slight (Severe) *increase in heavy rainfall events and flooding*
The frequency of heavy rainfall events and the associated amount of precipitation could also increase ***subtly (severely)****. Heavy rainfall events and the resulting flooding could, therefore, lead to a* ***slightly (significantly)*** *higher number of deaths and injured as well as property damage, e.g., to houses.*

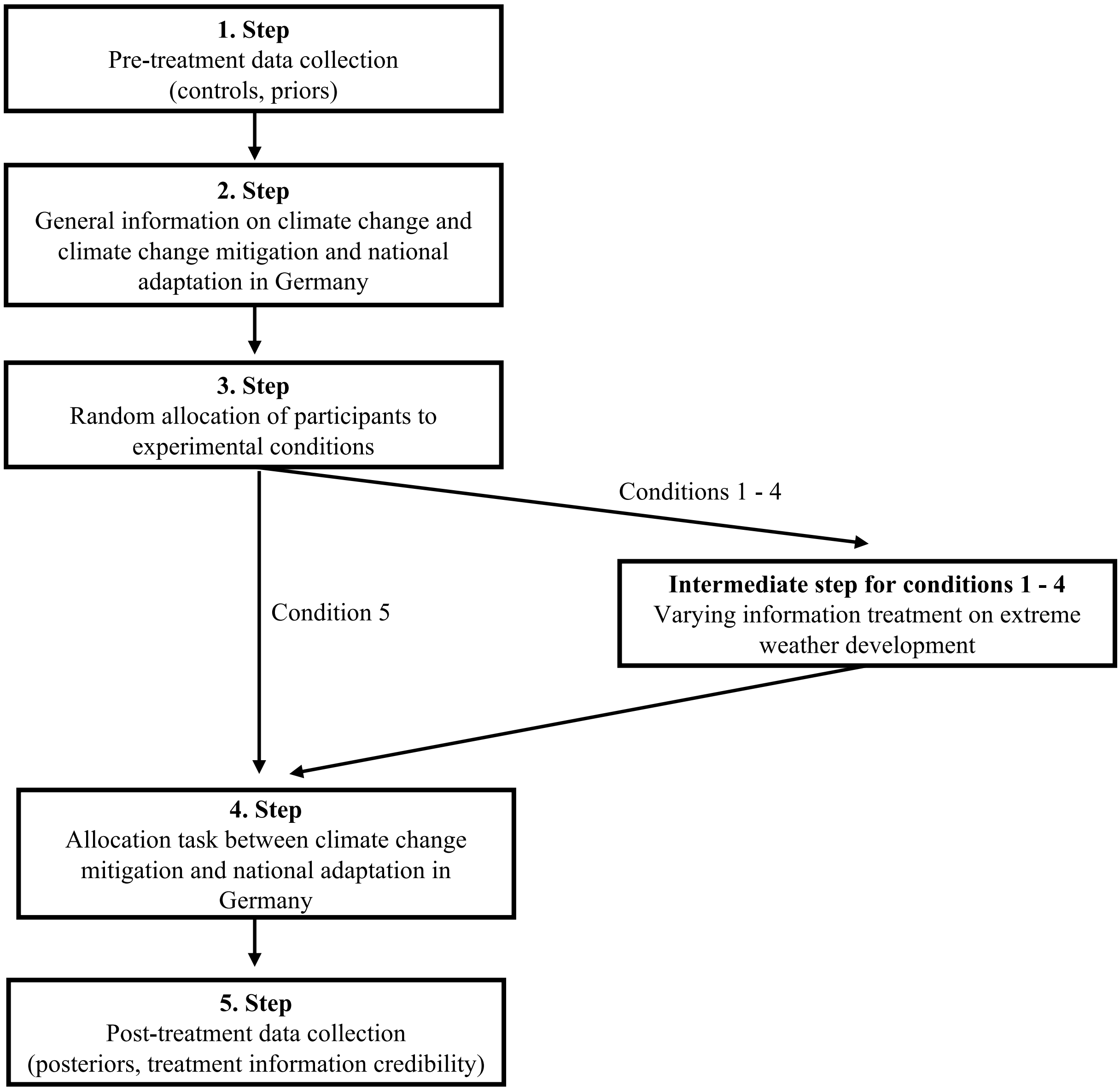
Slight (Severe) *increase in droughts*
The probability and intensity of droughts could also increase ***slightly (significantly)****. The water shortage for the* ***German [global]*** *society, economy, and agriculture could, therefore, increase* ***slightly (drastically)****.*

Overall, extreme weather events and the associated damage and risks for the ***German [global]*** *society could, therefore, increase* ***slightly (significantly)*** *in this* ***decade [until the end of the century]****.*

A.3 Overview on experimental procedure

Figure A.1 provides an overview of the different steps in the experiment. Note that Section 3 in the main text outlines the basic characteristics of the experiment and the different steps in more detail.

Figure A.1 Different steps of the experiment



Appendix B: Descriptive statistics and variable description

Table B.1 provides overall descriptive statistics as well as for the five different experiment conditions. Note that to avoid substantial data loss, we imputed all missing values of the 11-point scale pre-treatment variables based on multivariate regressions on our pre-treatment categorical variables.

For measuring the psychological distance to climate change, we largely followed Rubio Juan & Revilla (2021): psychological distance is a composite score ranging from 0 to 4.67 based on the unweighted average of the temporal, spatial, and social psychological distance to climate change values. Note that while spatial and social psychological distance are both measured within 5-point-Likert scales, temporal distance was measured using a 7-point-Likert scale to be able to include a wider range of distances here. We perceive the temporal dimension's maximum distance answer, namely “severe consequences of climate change will never appear”, as conveying a larger overall psychological distance as the maximum values for the two other scales. In contrast to Rubio Juan & Revilla (2021), we did not count our “I don’t know/no answer” answers as large psychological distances because we do not think that uncertainty necessarily means large psychological distance. Instead, we also imputed the missing observations for the three dimensions based on the already mentioned multivariate regression approach.

Finally, note that we only collected data on “mitigation fatalism“ (the belief that humanity cannot effectively limit climate change anymore) for those conceding the major human impact on climate change, as those not conceding the major human climate change impact cannot reasonably expect humanity to be able to effectively limit climate change. Therefore, we also excluded “mitigation fatalism“ when imputing missing observations of the 11-point scales.

Table B.1 Descriptive statistics

Variable	Mean values					
	Con. 1 (nat. low)	Con. 2 (nat. high)	Con. 3 (glo. low)	Con. 4 (glo. high)	Con. 5 (no info)	Total
Numerical						
Age	45.61	45.02	45.60	45.3	47.85	45.60
Categorical						
Proportion of females	0.48	0.49	0.49	0.51	0.55	0.50
Education level	4.45	4.36	4.45	4.37	4.44	4.41
Political party	3.04	3.11	3.04	3.08	3.03	3.07
Proportion of East Germans	0.23	0.20	0.24	0.23	0.23	0.23
Proportion acknowledging major human impact on climate change	0.77	0.75	0.76	0.77	0.75	0.76
Proportion living in 2021 heavy rain area	0.02	0.02	0.03	0.02	0.01	0.02
Proportion living in heat region	0.11	0.06	0.08	0.06	0.10	0.08
Mitigation fatalism	3.56	3.49	3.54	3.56	3.30	3.52
Credibility of treatment information	3.46	3.51	3.27	3.75	.	3.5
11-point scales						
Altruism	6.79	6.76	6.77	6.89	6.65	6.79
Anti-anthropocentrism	7.65	7.65	7.66	7.92	7.82	7.73
Risk aversion	4.60	4.43	4.62	4.38	4.34	4.49
Present bias	4.10	4.05	4.14	4.02	3.99	4.07
Self-assessed informational status on climate change	6.65	6.50	6.64	6.58	6.38	6.57
Nat. short-term risk perception (pre-treatment)	6.73	6.44	6.50	6.62	6.54	6.57
Glo. long-term risk perception (pre-treatment)	7.78	7.67	7.70	7.85	7.83	7.76
Nat. short-term risk perception (post-treatment)	5.74	6.27	.	.	.	6
Glo. long-term risk perception (post-treatment)	.	.	7.17	7.80	.	7.48
WTP for mitigation	5.77	5.33	5.51	5.87	5.3	5.59
WTP for national adaptation	4.23	4.67	4.49	4.13	4.7	4.41
Composite scores						
Psych. distance to climate change (pre-treatment)	1.86	1.93	1.92	1.91	1.91	1.90
Psych. distance to climate change (post-treatment)	1.88	1.82	1.87	1.74	.	1.83
Observations	527	505	481	481	188	2,182

Appendix C: Small, medium, and large OLS regression models

In this Appendix, we provide Table C.1. Table C.1 shows OLS regression analyses investigating the influence of the information treatments (with “no-info” condition as baseline), socio-demographic characteristics, fundamental values, climate change-related attitudes, and extreme weather event experience on the balancing of climate change mitigation and national climate adaptation. We present a small model including only socio-demographic and treatment variables, a large model including all explanatory variables, and a medium including only variables with a 5% significance level in the large model.

We provide two general remarks regarding the Table. Firstly, note that the information treatment effects are causal, while the effects of the other explanatory variables are merely correlational (we are aware that also the objective flooding experience indicator, “living in 2021 heavy rain area“, and the objective heatwave experience indicator, “living in heat region”, could potentially be interpreted as causal determinants but since the effects of these two variables are clearly insignificant, we did not delve into this issue further). Secondly, note that the explanatory variable “mitigation fatalism“ is missing in the large model, as it was only collected for participants conceding the major human climate change impact and we focus on the full sample here.

We provide three remarks regarding the medium model results. Firstly, when using the no information condition as the baseline, the national short-term low-risk information and the global long-term high-risk information have a significant positive causal effect on mitigation WTP. In contrast, the national short-term high-risk and global long-term low-risk information effects are statistically indistinguishable from zero. The significant positive effect of global long-term high-risk information on mitigation WTP aligns with our observations that increased perception of global long-term climate risks and a higher construal level of climate change risks leads to greater mitigation prioritization.

Secondly, our examination of the correlative risk perception effects reveals that the perception of global long-term risks is highly significant and positively correlated with mitigation WTP, thus reinforcing the findings from our causal analysis. The national short-term risk perception effect is around half the size and statistically insignificant within the large model (coefficient: -0.07; p = 0.15). However, note that the effect is directionally consistent with our causal analyses’ results. This suggests a more subtle interaction in this instance, which is in line with the outcomes of our full sample mediator analyses, as detailed in Table 2.

Thirdly, we find various additional correlative relationships with mitigation WTP that align with our expectations. Being a Green Party voter and acknowledging the major human impact on climate change show a highly significant positive relationship with mitigation focus. Also, anti-anthropocentric values (the belief that nature and animals have the same existence rights as humans) correlate significantly and positively with mitigation WTP. This association could be explained by mitigation being perceived as benefiting both animals and nature, while adaptation is rather viewed as human focused. In contrast, present bias correlates with stronger adaptation emphasis, which is intuitive as adaptation benefits can materialize sooner than positive effects of climate change mitigation.

Table C.1 Small, large, and medium OLS regression models (dependent variable: WTP for mitigation)

Variable	Small model: Only sociodemographic variables	Large model: All variables	Medium model: Only variables significant at 5% level
Nat. low-risk info (base: no info)	0.44* (0.24)	0.47** (0.23)	0.34** (0.14)
Nat. high-risk info (base: no info)	0.06 (0.24)	0.11 (0.24)	
Glo. low-risk info (base: no info)	0.20 (0.24)	0.24 (0.24)	
Glo. high-risk info (base: no info)	0.56** (0.24)	0.54** (0.23)	0.40*** (0.14)
Age	-0.00 (0)	-0.01* (0)	
Female	0.35*** (0.12)	0.15 (0.12)	
Diverse	0.77 (1.13)	0.67 (0.93)	
Not specified gender	-0.10 (0.59)	0.07 (0.90)	
Elementary school graduation	-0.18 (0.93)	-0.34 (0.90)	
Primary school graduation	0.82 (0.78)	0.57 (0.72)	
Secondary school certificate etc.	0.54 (0.76)	0.27 (0.71)	
Not specified education level	-1.54 (1.17)	-0.77 (0.85)	
Abitur etc.	0.73 (0.77)	0.40 (0.71)	
University degree	0.66 (0.77)	0.38 (0.71)	
Doctorate	1.12 (0.85)	0.86 (0.80)	
CDU / CSU voter	0.00 (0.21)	-0.03 (0.20)	
AfD voter	-0.85*** (0.23)	-0.33 (0.23)	
SPD voter	0.38 (0.23)	0.25 (0.21)	
Green party voter	0.97*** (0.22)	0.64*** (0.21)	0.64*** (0.16)
FDP voter	0.21 (0.31)	0.31 (0.31)	
Left party voter	0.69** (0.30)	0.55* (0.29)	
Voting for a different party	0.14 (0.26)	0.08 (0.26)	
Does not vote	-0.00 (0.25)	0.30 (0.26)	
Living in eastern Germany	0.15 (0.17)	0.13 (0.17)	
Not specified living region	0.32 (0.30)	0.35 (0.31)	
Altruism		0.04 (0.03)	
Anti-anthropocentric values		0.08*** (0.03)	0.08*** (0.03)
Risk aversion		-0.00 (0.03)	
Present bias		-0.05** (0.02)	-0.05** (0.02)
Climate change information level		-0.01 (0.03)	
Nat. short-term risk perception		-0.07 (0.05)	
Global long-term risk perception		0.14*** (0.05)	0.14*** (0.03)
Psy. distance to climate change		-0.12 (0.09)	
Not specified if experienced heatwave		-0.23 (0.32)	
Yes - experienced heatwave		0.01 (0.14)	
Yes – experienced; not specified if induced damage		0.60 (0.48)	
Yes - induced damage		-0.10 (0.21)	
Not specified if experienced flooding		0.74* (0.38)	
Yes - experienced flooding		0.00 (0.13)	
Yes – experienced; not specified if induced damage		-0.16 (0.43)	

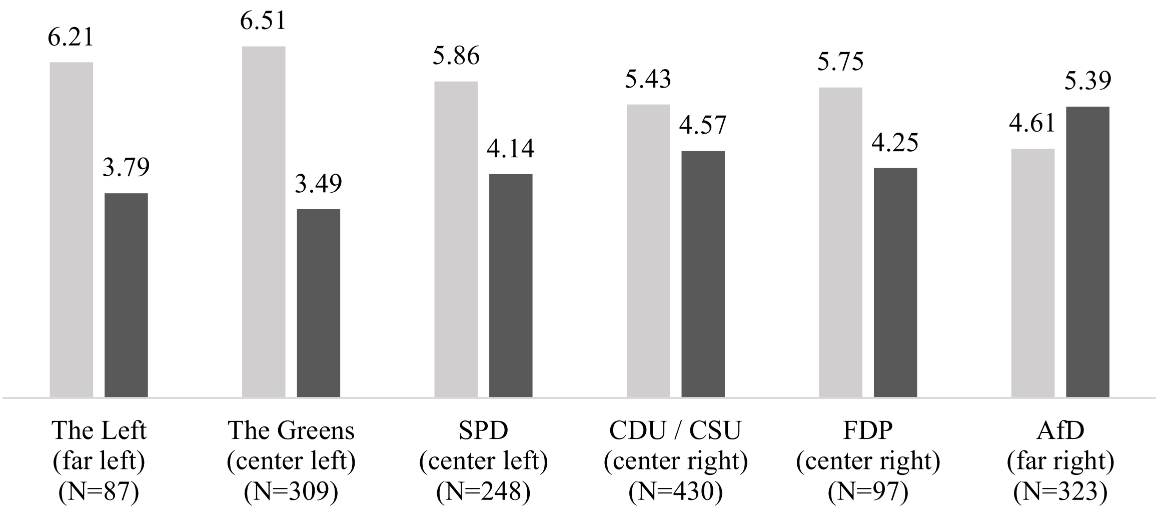
Yes - induced damage		-0.25 (0.22)	
Not specified if conceding major human CC† impact		0.11 (0.27)	
Conceding major human CC impact		0.63*** (0.21)	0.69***(0.16)
Living in 2021 heavy rain area		-0.10 (0.38)	
Living in heat region		-0.02 (0.22)	
Constant	4.54*** (0.82)	3.49*** (0.91)	3.27*** (0.31)
R-squared	0.05	0.10	0.08
Observations	2,182	2,182	2,182

Significance levels: * p<0.1, ** p<0.05, *** p<0.01; robust standard errors in parentheses;
†CC = climate change

Appendix D: Mitigation-adaptation balancing across political affiliations

As Figure D.1 shows, mitigation focus generally decreases when going within the German political spectrum from politically left to right. Green party voters have the largest mitigation focus, whereas AFD voters even prioritize national adaptation over climate change mitigation. Also, note that observation numbers do not add up to 2,182 here because “I don’t know” answers, “a different party” answers, and “ I don’t vote” answers are excluded from this figure.

Figure D.1 WTP for climate change mitigation (grey) versus WTP for national climate adaptation in Germany (black) across German political parties (from politically left to right) (WTP values can be interpreted as either Euros or respective percentage shares)



Appendix E: Determinants of risk perceptions

In this Appendix, we regress national short-term and global long-term risk perception on our explanatory variables. Note that for these regressions, we excluded imputed risk perceptions as dependent variables and removed the respective risk perception pertaining to the other dimension as explanatory variable.

On this basis, we find only minor differences regarding respective risk perception determinants. National short-term risk perception significantly and positively correlates with altruism, anti-anthropocentric values, risk aversion, self-assessed informational status on climate change, self-assessed heatwave experience, and conceding the major human climate change impact. Also, it correlates significantly and negatively with psychological distance to climate change and weakly significantly with self-assessed flooding experience. Beyond that, it correlates with education and political party affiliation. The global long-term risk perception correlates with all these determinants as well, and in the same way, except for risk aversion and self-assessed flooding experience, where no significant association persists. Additionally, global long-term risk perception correlates significantly and negatively with age and present bias.

Finally, our analysis reveals an intuitive connection between national short-term and global long-term risk perceptions. Specifically, when conducting univariate regressions, a one-point increase in national short-term risk perception yields a 0.79-point increase in global long-term risk perception ($p < 0.01$). Conversely, for the global long-term risk perception impact on national short-term risk perception, we identified a coefficient of 0.76 ($p < 0.01$).

Appendix F: Robustness checks of linear regression results

In this Appendix, we apply robustness checks to the regression results provided within Section 5.2.1. Specifically, we provide three tables. Table F.1 shows the overall causal risk perception and construal level effects based on the sample including only participants who passed the attention check. Table F.2 presents the overall causal effects based on the full sample and applying ordinal logistic regressions instead of OLS. Table F.3 shows the overall causal effects based on the sample including only participants who passed the attention check and applying ordinal logistic regressions instead of OLS.

Table F.1 Effect of risk perceptions and construal level of presented climate risks based on attentive respondents only and OLS regressions (dependent variable: WTP for mitigation)

Experimental Variable	Full sample (only attentive respondents)		Conceding major human CC† impact (only attentive respondents)	
	controls: no	controls: all	controls: no	controls: all
Effect of increasing nat. short-term risk perception				
Nat. short-term high-risk info (base: nat. short-term low-risk)	-0.52** (0.21)	-0.45** (0.21)	-0.73*** (0.21)	-0.73*** (0.22)
Observations	783	783	617	617
Effect of increasing global long-term risk perception				
Global long-term high-risk info (base: global long-term low-risk)	0.34 (0.21)	0.34* (0.20)	0.57*** (0.22)	0.58*** (0.22)
Observations	752	752	593	593
Effect of increasing construal level of presented climate risks				
Global long-term high-risk info (base: nat. short-term high-risk)	0.62*** (0.21)	0.54*** (0.20)	0.70*** (0.22)	0.61*** (0.22)
Observations	761	761	597	597

Significance levels: * p<0.1, ** p<0.05, *** p<0.01; robust standard errors in parentheses;
†CC = climate change

Table F.2 Effect of risk perceptions and construal level of presented climate risks based on ordinal logistic regressions (dependent variable: WTP for mitigation)

Experimental Variable	Full sample		Conceding major human CC† impact	
	controls: no	controls: all	controls: no	controls: all
Effect of increasing nat. short-term risk perception				
Nat. short-term high-risk info	-0.28**	-0.21**	-0.34***	-0.33**
(base: nat. short-term low-risk)	(0.11)	(0.12)	(0.13)	(0.14)
Observations	1032	1032	787	787
Effect of increasing global long-term risk perception				
Global long-term high-risk info	0.24**	0.24**	0.37***	0.36***
(base: global long-term low-risk)	(0.12)	(0.12)	(0.13)	(0.14)
Observations	962	962	735	735
Effect of increasing construal level of presented climate risks				
Global long-term high-risk info	0.35***	0.33***	0.40***	0.41***
(base: nat. short-term high-risk)	(0.11)	(0.12)	(0.13)	(0.14)
Observations	986	986	749	749

Significance levels: * $p<0.1$, ** $p<0.05$, *** $p<0.01$; robust standard errors in parentheses;
†CC = climate change

Table F.3 Effect of risk perceptions and construal level of presented climate risks based on attentive respondents only and ordinal logistic regressions (dependent variable: WTP for mitigation)

Experimental Variable	Full sample (only attentive respondents)		Conceding major human CC† impact (only attentive respondents)	
	controls: no	controls: all	controls: no	controls: all
Effect of increasing nat. short-term risk perception				
Nat. short-term high-risk info	-0.33**	-0.26*	-0.47***	-0.46***
(base: nat. short-term low-risk)	(0.13)	(0.14)	(0.14)	(0.16)
Observations	783	783	617	617
Effect of increasing global long-term risk perception				
Global long-term high-risk info	0.21	0.25*	0.35**	0.36**
(base: global long-term low-risk)	(0.13)	(0.14)	(0.15)	(0.15)
Observations	752	752	593	593
Effect of increasing construal level of presented climate risks				
Global long-term high-risk info	0.40***	0.39***	0.48***	0.48***
(base: nat. short-term high-risk)	(0.13)	(0.13)	(0.15)	(0.15)
Observations	761	761	597	597

Significance levels: * $p<0.1$, ** $p<0.05$, *** $p<0.01$; robust standard errors in parentheses;
†CC = climate change

Appendix G: Robustness checks of mediator analyses results

In this Appendix, we apply robustness checks to the mediator analyses results provided within Section 5.2.2. Specifically, we provide the results applying the attention check filter and employing psychological distance to climate change (post-treatment) as an additional control variable. Firstly, Table G.1 provides the results based on participants passing the attention check only. Note that while the global long-term variation continues to show highly significant indirect effects throughout, the significance levels for the national variation's b-paths slightly decline. The p-values for these paths rise to 0.074 on average under this model, indicating a slight decrease in statistical significance.

Table G.1 Mediator analyses based on attentive respondents only and OLS regressions (independent variable (IV): national or global high-risk information; mediator variable (MV): national short-term or global long-term risk perception; dependent variable (DV): WTP for mitigation)

	Variables IV: nat. high-risk info (base: nat. low-risk info) MV: nat. short-term risk perception		Variables IV: glo. high-risk info (base: glo. low-risk info) MV: glo. long-term risk perception	
	Full sample (only attentive respondents)	Conceding major human CC† impact (only attentive respondents)	Full sample (only attentive respondents)	Conceding major human CC impact (only attentive respondents)
	Controls: all	Controls: all	Controls: all	Controls: all
Direct effect				
High-risk info (base: low-risk) → WTP mitigation	-0.39* (0.22)	-0.66*** (0.23)	0.20 (0.21)	0.37* (0.22)
Indirect effects				
a: High-risk info (base: low-risk) → Risk perception	0.86*** (0.12)	0.85*** (0.13)	0.67*** (0.11)	0.74*** (0.12)
b: Risk perception → WTP mitigation	-0.12* (0.07)	-0.12* (0.07)	0.28*** (0.08)	0.26*** (0.08)
ab (indirect effect of IV on DV via MV)	-0.10* (0.06)	-0.11* (0.06)	0.19*** (0.06)	0.20*** (0.07)
Total effect				
High-risk info (base: low-risk) → WTP mitigation	-0.49** (0.21)	-0.77*** (0.23)	0.39* (0.21)	0.56** (0.22)
Observations	771	608	736	587

Significance levels: * p<0.1, ** p<0.05, *** p<0.01; robust standard errors in parentheses;
†CC = climate change

Secondly, we provide the rationale for including psychological distance to climate change (post-treatment) as an additional control variable and the respective mediator analyses results. Figure G.1 illustrates that for the cases where national short-term or global long-term risk perception is varied, psychological distance (post-treatment) influences national short-term or global long-term risk perception, which then affects WTP for climate change mitigation. Thus, psychological distance (post-treatment) is part of the causal pathway from national short-term or global long-term high-risk information to WTP for climate change mitigation. However, psychological distance (post-treatment) does not have a direct (significant) effect on WTP. On this basis, and considering the guidelines of Cinelli et al. (2022), controlling for psychological distance (post-treatment) may yield more precise estimates.

Figure G.1 Causal chain from national (global) high-risk information to WTP for climate change mitigation including psychological distance (post-treatment) (arrows only show significant relationships)

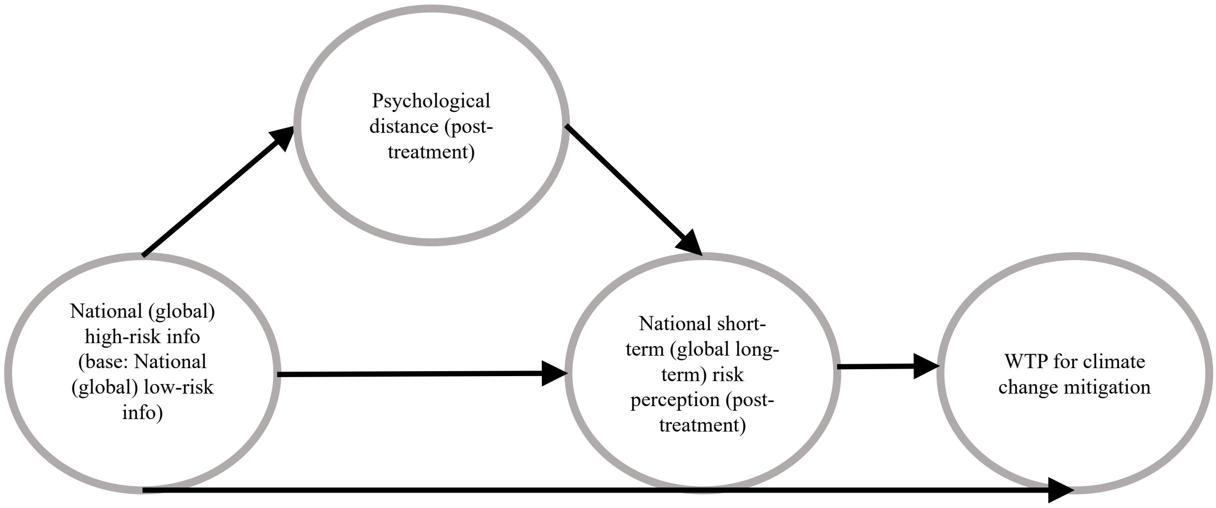


Table G.2 provides the results including psychological distance (post-treatment) as an additional control variable. Note that the for the national variation, where national short-term risk perception is varied, the b-path effect is now significant at the 5% level throughout. This suggests a more pronounced indirect information treatment effect and further highlights the significant negative national short-term risk perception effect on mitigation prioritization. All indirect effects stay at the 1% significance level for the global variation, highlighting the robustness of the positive global long-term risk perception effect.

Table G.2 Mediator analyses based on OLS regressions and including psychological distance (post-treatment) as additional control variable (independent variable (IV): national or global high-risk information; mediator variable (MV): national short-term or global long-term risk perception; dependent variable (DV): WTP for mitigation)

	Variables IV: nat. high-risk info (base: nat. low-risk info) MV: nat. short-term risk perception		Variables IV: glo. high-risk info (base: glo. low-risk info) MV: glo. long-term risk perception	
	Full sample	Conceding major human CC[†] impact	Full sample	Conceding major human CC impact
	All controls + psy. distance (post-treatment)	All controls + psy. distance (post-treatment)	All controls + psy. distance (post-treatment)	All controls + psy. distance (post-treatment)
Direct effect				
High-risk info (base: low-risk) → WTP mitigation	-0.36* (0.19)	-0.46** (0.21)	0.31* (0.19)	0.47** (0.20)
Indirect effects				
a: High-risk info (base: low-risk) → Risk perception	0.56*** (0.11)	0.57*** (0.12)	0.46*** (0.1)	0.45*** (0.11)
b: Risk perception → WTP mitigation	-0.13** (0.06)	-0.14** (0.07)	0.30*** (0.07)	0.34*** (0.08)
ab (indirect effect of IV on DV via MV)	-0.07* (0.04)	-0.08* (0.04)	0.14*** (0.04)	0.16*** (0.05)
Total effect				
High-risk info (base: low-risk) → WTP mitigation	-0.43** (0.19)	-0.53*** (0.20)	0.45** (0.19)	0.63*** (0.21)
Observations	931	732	863	693

Significance levels: * p<0.1, ** p<0.05, *** p<0.01; robust standard errors in parentheses;
[†]CC = climate change

Appendix H: Mediator analyses (psychological distance as mediator)

Table H.1 shows the mediator analyses using psychological distance (post-treatment) as the mediator variable instead of the national or global risk perception. It shows that under the national and global variations (having national and global high-risk information as experimental variables, respectively), the a-path effect is significant, while the b-path effect is insignificant. Interestingly, the b-path effect holds a 10% significance level when manipulating the climate risks' construal level, where, however, the a-path effect turns insignificant. Based on these results, psychological distance to climate change does not seem to substantially affect the mitigation-national adaptation tradeoff.

Table H.1 Mediator analyses with psychological distance as mediator based on OLS regressions (independent variable (IV): national or global high-risk information; mediator variable (MV): psy. distance to climate change; dependent variable (DV): WTP for mitigation)

	Variables IV: nat. high-risk info (base: nat. low-risk info)	Variables IV: glo. high-risk info (base: glo. low-risk info)	Variables IV: glo. high-risk info (base: nat. high-risk info)
	Full sample	Full sample	Full sample
	All controls	All controls	All controls
Direct effect			
High-risk info (base: low-risk) / glo. high-risk info (base: nat. high-risk) → WTP mitigation	-0.43** (0.19)	0.42** (0.19)	0.26*** (0.09)
Indirect effects			
a: High-risk info (base: low-risk) / glo. high-risk info (base: nat. high-risk) → Psy. distance	-0.12*** (0.03)	-0.10*** (0.03)	-0.02 (0.02)
b: Psy. distance → WTP mitigation	-0.03 (0.19)	-0.11 (0.19)	-0.35* (0.20)
ab (indirect effect of IV on DV via MV)	0.00 (0.02)	0.01 (0.02)	0.01 (0.00)
Total effect			
High-risk info (base: low-risk) / glo. high-risk info (base: nat. high-risk) → WTP mitigation	-0.43** (0.19)	0.43** (0.18)	0.27*** (0.09)
Observations	932	872	890

Significance levels: * p<0.1, ** p<0.05, *** p<0.01; robust standard errors in parentheses

9 References

Akerlof, G. A. (1997). Social Distance and Social Decisions. *Econometrica*, *65*(5), 1005–1027. https://doi.org/10.2307/2171877

Alló, M., & Loureiro, M. L. (2014). The role of social norms on preferences towards climate change policies: A meta-analysis. *Energy Policy*, *73*, 563–574. https://doi.org/10.1016/J.ENPOL.2014.04.042

AMS. (2023). *Explaining Extreme Events of 2021 and 2022 from a Climate Perspective*. https://www.ametsoc.org/index.cfm/ams/publications/bulletin-of-the-american-meteorological-society-bams/explaining-extreme-events-from-a-climate-perspective/explaining-extreme-events-of-2021-from-a-climate-perspective/

Biesbroek, G. R., Swart, R. J., Carter, T. R., Cowan, C., Henrichs, T., Mela, H., Morecroft, M. D., & Rey, D. (2010). Europe adapts to climate change: Comparing National Adaptation Strategies. *Global Environmental Change*, *20*(3), 440–450. https://doi.org/10.1016/J.GLOENVCHA.2010.03.005

Blanco, E., Dutcher, E., & Haller, T. (2020). Social dilemmas with public and private insurance against losses. *Journal of Economic Behavior and Organization*, *180*, 924–937.

BMU. (2024). *BMUV: Das Klimaanpassungsgesetz (KAnG)*. https://www.bmuv.de/themen/klimaanpassung/das-klimaanpassungsgesetz-kang

Böhm, R., Gürerk, Ö., & Lauer, T. (2020). Nudging climate change mitigation: A laboratory experiment with inter-generational public goods. *Games*, *11*(4). https://doi.org/10.3390/g11040042

Brienen, S., Walter, A., Brendel, C., Fleischer, C., Ganske, A., Haller, M., Helms, M., Höpp, S., Jensen, C., Jochumsen, K., Möller, J., Krähenmann, S., Nilson, E., Rauthe, M., Razafimaharo, C., Rudolph, E., Rybka, H., Schade, N., & Stanley, K. (2020). *Klimawandelbedingte Änderungen in Atmosphäre und Hydrosphäre: Schlussbericht des Schwerpunktthemas Szenarienbildung (SP-101) im Themenfeld 1 des BMVI-Expertennetzwerks*. https://doi.org/10.5675/ExpNBS2020.2020.02

Brügger, A. (2020). Understanding the psychological distance of climate change: The limitations of construal level theory and suggestions for alternative theoretical perspectives. *Global Environmental Change*, *60*. https://doi.org/10.1016/J.GLOENVCHA.2019.102023

Brügger, A., Morton, T. A., & Dessai, S. (2015). Hand in hand: Public endorsement of climate change mitigation and adaptation. *PLoS ONE*, *10*(4), 1–17. https://doi.org/10.1371/journal.pone.0124843

Cinelli, C., Forney, A., & Pearl, J. (2022). A Crash Course in Good and Bad Controls. *Sociological Methods and Research*, 1–30. https://doi.org/10.1177/00491241221099552

CRED. (2020). *Human cost of disasters: An overview of the last 20 years (2000-2019)*. https://www.undrr.org/publication/human-cost-disasters-overview-last-20-years-2000-2019

de Moor, J. (2022). Prioritizing adaptation and mitigation in the climate movement: evidence from a cross-national protest survey of the Global Climate Strike, 2019. *Mitigation and Adaptation Strategies for Global Change*, *27*(6). https://link.springer.com/article/10.1007/s11027-022-10003-y

Demski, C., Capstick, S., Pidgeon, N., Sposato, R. G., & Spence, A. (2017). Experience of extreme weather affects climate change mitigation and adaptation responses. *Climatic Change*, *140*(2), 149–164. https://doi.org/10.1007/s10584-016-1837-4

Deryugina, T., & Shurchkov, O. (2016). The Effect of Information Provision on Public Consensus about Climate Change. *PLOS ONE*, *11*(4). https://doi.org/10.1371/JOURNAL.PONE.0151469

DESTATIS. (2023a). *Bevölkerungsstand Bevölkerung nach Nationalität und Geschlecht*. https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bevoelkerung/Bevoelkerungsstand/Tabellen/deutsche-nichtdeutsche-bevoelkerung-nach-geschlecht-deutschland.html

DESTATIS. (2023b). *Pressemitteilung Nr. N 032 vom 1. Juni 2023*. https://www.destatis.de/DE/Presse/Pressemitteilungen/2023/06/PD23_N032_81.html

Findlater, K. M., St-Laurent, G. P., Hagerman, S., & Kozak, R. (2020). Surprisingly malleable public preferences for climate adaptation in forests. *Environmental Research Letters* , *15*(3). https://doi.org/10.1088/1748-9326/AB7464

Füssel, H. M., & Klein, R. J. T. (2006). Climate Change Vulnerability Assessments: An Evolution of Conceptual Thinking. *Climatic Change*, *75*, 301–329. https://doi.org/10.1007/S10584-006-0329-3

Gallagher Re. (2024). *Natural Catastrophe and Climate Report: 2023 Data, Insights, and Perspective*. https://www.ajg.com/gallagherre/-/media/files/gallagher/gallagherre/news-and-insights/2024/january/natural-catastrophe-and-climate-report-2023.pdf

German Weather Service. (2024). *Index of /climate_environment/CDC/grids_germany/annual/hot_days/*. https://opendata.dwd.de/climate_environment/CDC/grids_germany/annual/hot_days/

Gifford, R. (2011). The dragons of inaction: psychological barriers that limit climate change mitigation and adaptation. *The American Psychologist*, *66*(4), 290–302. https://doi.org/10.1037/A0023566

Google Trends. (2024). *Hitze, Starkregen, Dürre - Erkunden - Google Trends*. https://trends.google.com/trends/explore?date=today%205-y&geo=DE&q=Hitze,Starkregen,D%C3%BCrre&hl=de

Haaland, I., Roth, C., & Wohlfart, J. (2023). Designing Information Provision Experiments. *Journal of Economic Literature*, *61*(1), 3–40.

Haden, V. R., Niles, M. T., Lubell, M., Perlman, J., & Jackson, L. E. (2012). Global and Local Concerns: What Attitudes and Beliefs Motivate Farmers to Mitigate and Adapt to Climate Change? *PLoS ONE*, *7*(12). https://doi.org/10.1371/journal.pone.0052882

Halperin, A., & Walton, P. (2018). The Importance of Place in Communicating Climate Change to Different Facets of the American Public. *Weather, Climate, and Society*, *10*(2), 291–305. https://doi.org/10.1175/WCAS-D-16-0119.1

Harrison, G. W., & List, J. A. (2004). Field Experiments. *Journal of Economic Literature*, *42*(4), 1009–1055.

Hasson, R., Löfgren, Å., & Visser, M. (2010). Climate change in a public goods game: Investment decision in mitigation versus adaptation. *Ecological Economics*, *70*(2), 331–338.

Hasson, R., Löfgren, Å., & Visser, M. (2012). Treatment effects of climate change risk on mitigation and adaptation behaviour in an experimental setting. *South African Journal of Economics*, *80*(3), 415–430.

Hisali, E., Birungi, P., & Buyinza, F. (2011). Adaptation to climate change in Uganda: evidence from micro level data. *Global Environmental Change*, *21*(4), 1245–1261.

Howell, R. A., Capstick, S., & Whitmarsh, L. (2016). Impacts of adaptation and responsibility framings on attitudes towards climate change mitigation. *Climatic Change*, *136*, 445–461. https://link.springer.com/article/10.1007/s10584-016-1627-z

IMF. (2024). *World Economic Outlook. Steady but Slow: Resilience amid Divergence*. https://www.imf.org/en/Publications/WEO/Issues/2024/04/16/world-economic-outlook-april-2024

IPCC. (2007). *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on*

Climate Change (M. L. Parry, O. F. Canziani, J. P. Palutikof, P. J. van der Linden, & C. E. Hanson, Eds.). Cambridge University Press.

IPCC. (2021). *Climate Change 2021: The Physical Science Basis Summary for Policymakers. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (V. Masson-Delmotte, P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, & B. Zhou, Eds.). Cambridge University Press.

IPCC. (2022a). *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (H.-O. Pörtner, D. C. Roberts, M. Tignor, E. S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, & B. Rama, Eds.). Cambridge University Press.

IPCC. (2022b). *Climate Change 2022: Mitigation of Climate Change Working Group III Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (P. R. Shukla, J. Skea, R. Slade, R. Fradera, M. Pathak, A. Al Khourdajie, M. Belkacemi, R. van Diemen, A. Hasija, G. Lisboa, S. Luz, J. Malley, D. McCollum, S. Some, & P. Vyas, Eds.). Cambridge University Press.

Jones, C., Hine, D. W., & Marks, A. D. G. (2017). The Future is Now: Reducing Psychological Distance to Increase Public Engagement with Climate Change. *Risk Analysis*, *37*(2), 331–341. https://doi.org/10.1111/RISA.12601

Lehmkuhl, F., Schüttrumpf, H., Schwarzbauer, J., Brüll, C., Dietze, M., Letmathe, P., Völker, C., & Hollert, H. (2022). Assessment of the 2021 summer flood in Central Europe. *Environmental Sciences Europe*, *34*(1). https://enveurope.springeropen.com/articles/10.1186/s12302-022-00685-1

Leiserowitz, A. (2006). Climate change risk perception and policy preferences: The role of affect, imagery, and values. *Climatic Change*, *77*, 45–72. https://link.springer.com/article/10.1007/s10584-006-9059-9

Liberman, N., & Trope, Y. (2008). The Psychology of Transcending the Here and Now. *Science*, *322*(5905), 1201–1205. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2643344/

Löschel, A., Sturm, B., & Uehleke, R. (2017). Revealed preferences for voluntary climate change mitigation when the purely individual perspective is relaxed – evidence from a framed field experiment. *Journal of Behavioral and Experimental Economics*, *67*(C), 149–160.

Löschel, A., Sturm, B., & Vogt, C. (2013). The demand for climate protection—Empirical evidence from Germany. *Economics Letters*, *118*(3), 415–418. https://doi.org/10.1016/j.econlet.2012.12.007

Maiella, R., La Malva, P., Marchetti, D., Pomarico, E., Di Crosta, A., Palumbo, R., Cetara, L., Di Domenico, A., & Verrocchio, M. C. (2020). The psychological distance and climate change: A systematic review on the mitigation and adaptation behaviors. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/FPSYG.2020.568899

Markowitz, E., Hodge, C., Harp, G., St. John, C., Marx, S., Speiser, M., Zaval, L., & Perkowitz, R. (2014). *Connecting on Climate: A Guide to Effective Climate Change Communication*. https://doi.org/10.7916/D8-PJJM-VB57

McEvoy, D. M., Haller, T., & Blanco, E. (2022). The Role of Non-Binding Pledges in Social Dilemmas with Mitigation and Adaptation. *Environmental and Resource Economics*, *81*(4), 685–710. https://link.springer.com/article/10.1007/s10640-021-00645-y

Mohr, S., Küpfer, K., Wisotzky, C., Ehmele, F., & Mühr, B. (2021). *Hochwasser Mitteleuropa, Juli 2021 (Deutschland): 10. August 2021 Ergänzungen zum „Bericht Nr. 1 Nordrhein-Westfalen & Rheinland-Pfalz“*.

https://www.cedim.kit.edu/download/FDA_HochwasserJuli2021_Bericht1_Erg%C3%A4nzun.pdf
NASEM. (2016). *Attribution of Extreme Weather Events in the Context of Climate Change*. The National Academies Press.
NCEI. (2024a). *July 2023 Global Climate Report*. https://www.ncei.noaa.gov/access/monitoring/monthly-report/global/202307
NCEI. (2024b). *November 2023 Global Climate Report*. https://www.ncei.noaa.gov/access/monitoring/monthly-report/global/202311
Netzel, L. M., Heldt, S., Engler, S., & Denecke, M. (2021). The importance of public risk perception for the effective management of pluvial floods in urban areas: A case study from Germany. *Journal of Flood Risk Management*, *14*(3). https://doi.org/10.1111/JFR3.12688
Nordhaus, W. D. (2006). Paul Samuelson and Global Public Goods: A commemorative essay for Paul Samuelson. In *Samuelsonian Economics and the Twenty-first Century* (pp. 88–98). Oxford University Press.
NPR, The Robert Wood Johnson Foundation, & Harvard T.H. Chan School of Public Health. (2022). *The Impact of Extreme Weather on Views about Climate Policy in the United States*. https://www.rwjf.org/en/insights/our-research/2022/06/the-impact-of-extreme-weather-on-views-about-climate-policy-in-the-united-states.html
O'connor, R. E., Bord, R. J., & Fisher, A. (1999). Risk Perceptions, General Environmental Beliefs, and Willingness to Address Climate Change. *Risk Analysis*, *19*, 461–471.
Osberghaus, D. (2015). The determinants of private flood mitigation measures in Germany — Evidence from a nationwide survey. *Ecological Economics*, *110*, 36–50. https://doi.org/10.1016/j.ecolecon.2014.12.010
Pasquini, G., Spencer, A., Tyson, A., & Funk, C. (2023). *Why Some Americans Do Not See Urgency on Climate Change*.
Prognos, IÖW, & GWS. (2022). *Übersicht vergangener Extremwetterschäden in Deutschland: Methodik und Erstellung einer Schadensübersicht*.
Rains, S. A. (2013). The Nature of Psychological Reactance Revisited: A Meta-Analytic Review. *Human Communication Research*, *39*(1), 47–73. https://doi.org/10.1111/J.1468-2958.2012.01443.X
Rubio Juan, M., & Revilla, M. (2021). Support for mitigation and adaptation climate change policies: effects of five attitudinal factors. *Mitigation and Adaptation Strategies for Global Change*, *26*(6). https://doi.org/10.1007/S11027-021-09964-3
Spence, A., Poortinga, W., Butler, C., & Pidgeon, N. F. (2011). Perceptions of climate change and willingness to save energy related to flood experience. *Nature Climate Change*, *1*, 46–49.
Spence, A., Poortinga, W., & Pidgeon, N. (2012). The Psychological Distance of Climate Change. *Risk Analysis*, *32*(6), 957–972. https://doi.org/10.1111/j.1539-6924.2011.01695.x
Steentjes, K., Demski, C., Seabrook, A., Corner, A., & Pidgeon, N. (2020). *British Public Perceptions of Climate Risk, Adaptation Options and Resilience (RESiL RISK)*.
Steentjes, K., McCamley, M., Berman, J., & Pidgeon, N. (2022). *RESIL RISK NORTHERN IRELAND: Public perceptions of climate risks and adaptation in Northern Ireland*.
Thom, P., Kolb, E., & Huth, K. (2023). *Hitze in Deutschland: Das sind die zehn heißesten Regionen*. https://correctiv.org/aktuelles/klimawandel/2023/07/14/hitze-in-deutschland-das-sind-die-zehn-heissesten-regionen/
Tol, R. S. J. (2005). Adaptation and mitigation: trade-offs in substance and methods. *Environmental Science & Policy*, *8*(6), 572–578. https://doi.org/10.1016/J.ENVSCI.2005.06.011

Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review*, *117*(2), 440–463.
UNEP. (2023a). *Adaptation Gap Report 2023: Underfinanced. Underprepared. Inadequate investment and planning on climate adaptation leaves world exposed*.
UNEP. (2023b). *Emissions Gap Report 2023: Broken Record Temperatures hit new highs, yet world fails to cut emissions (again)*.
UNFCC. (2023). *Record Number of National Adaptation Plans Submitted in 2023, But More Are Needed | UNFCCC*. https://unfccc.int/news/record-number-of-national-adaptation-plans-submitted-in-2023-but-more-are-needed
van der Linden, S. (2015). The social-psychological determinants of climate change risk perceptions: Towards a comprehensive model. *Journal of Environmental Psychology*, *41*(March 2015), 112–124. https://doi.org/10.1016/j.jenvp.2014.11.012
Wilson, A. J., & Orlove, B. (2019). *What do we mean when we say climate change is urgent?* https://doi.org/10.7916/D8-B7CD-4136
Zaalberg, R., Midden, C., Meijnders, A., & McCalley, T. (2009). Prevention, adaptation, and threat denial: flooding experiences in the Netherlands. *Risk Analysis*, *29*(12), 1759–1778. https://doi.org/10.1111/J.1539-6924.2009.01316.X