Communicating Tail-Risk Credibly

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Abstract

Climate tail-risks are low-probability catastrophic outcomes, such as warming beyond a forecast's 90% confidence interval. How can tail-risk be communicated credibly? Across four preregistered experiments (N = 3,525) with policymakers, legal experts, and lay participants, lower-probability forecasts seem less credible. Low-probability tail-risk messages (e.g., 5% chance of 3.5ºC warming *or more*) seem less credible than their complements (e.g., 95% chance of 3.5ºC warming *or less*) and than high-probability forecasts of at least moderate warming (e.g., a 95% chance of 2.1ºC warming *or more*). People were also more concerned about climate change and climate tail-risk after reading higher-probability forecasts. Although they perceived "*or more*" frames as emphasizing tail-risk more than "*or less*" frames, this had minimal effect on concern. Consistent with the "or less" frame's lower tail-risk emphasis, audiences more skeptical of climate change found "*or less*" frames relatively more credible than "*or more*" frames.

Communicating Tail-Risk Credibly

In climate change[1], some outcomes are virtually certain while others are unlikely but potentially catastrophic, i.e., *tail-risks*. For example, sea levels are very likely to rise, but relatively unlikely to rise more than one meter. Despite their low probabilities, catastrophic tail-risks warrant serious attention. Credibly communicating tail-risk could improve policy design, risk preparation, and emergency response. Yet, communicating scientific uncertainty is challenging[2–7]. Given the polarization and skepticism surrounding climate change, credibility is crucial: public doubt can undermine support for mitigation policies[8,9]. Unfortunately, trust in scientists, institutions, and governments has recently declined, contributing to a broader "trust crisis"[10].

This research explores how to credibly communicate climate change, with a focus on tail-risk. T*ail-risks* are particularly challenging because of their low probability. People struggle to reason about probabilities[11,12]—especially low ones. They sometimes overweight low probabilities[13–15], but can also ignore them altogether[16]. Most importantly, low-probability estimates are often distrusted, and judged to be less honest than their higher-probability counterparts[17–21]. Even if people struggle to understand probabilities, research shows that acknowledging uncertainty *can improve* decision quality, enhance comprehension, and increase trust and credibility[2–4,7,22–27]. More broadly, there is a call for scientists to embrace nuance rather than obscure it, particularly in high-stakes contexts[26,28–30].

Building on this insight, we focus on *how* to best communicate uncertain climate tail-risk in ways that foster credibility. We define tail-risk as warming *above* the upper bound of the 90% confidence intervals in the IPCC Sixth Assessment Report[1]. Specifically, we investigate the credibility and downstream consequences of different temperature forecast framings, focusing on how low probabilities affect evaluations. To isolate probability effects, our studies orthogonally

manipulated the i) probability associated with the outcome—95% vs. 5%; and ii) magnitude of the forecasted temperature increase—moderate *vs.* tail-risk.

To illustrate this manipulation, we draw from scenario SSP2-4.5, a "*middle-of-the-road*" scenario assuming future emissions and socioeconomic trends follow current trajectories, projecting likely temperature increases between 2.1ºC and 3.5ºC (3.8ºF to 6.3ºF). Participants in our studies encountered one or two of the following message types, examined in more detail below (Figure 1):

- An explicit, low-probability tail-risk message: *5% chance of temperature increasing 6.3ºF or more*;
- The high-probability complement of this explicit tail-risk message: *95% chance of temperature increasing 6.3ºF or less*;
- The high probability of *moderate* warming: *95% chance of temperature increasing 3.8ºF or more*;
- Its low-probability complement: *5% chance of temperature increasing 3.8ºF or less*.

Across studies, we find that high-probability forecasts are more credible than low-probability ones. Yet there are other outcomes of interest: a climate tail-risk advocate may hesitate to use messages that, while credible, undermine concern about climate tail-risk. Accordingly, we examine perceived emphasis on tail-risk, concern about tail-risk, and concern about climate change more broadly. We find that although people perceive "*or more"* frames as emphasizing climate tail-risk more strongly than "*or less"* frames, this rarely translates into greater concern, which instead is heightened by using high (vs. low) probabilities. Finally, among climate skeptics, "*or*

less" frames seem relatively more credible than "*or more"* frames, while the opposite is true for believers in anthropogenic climate change.

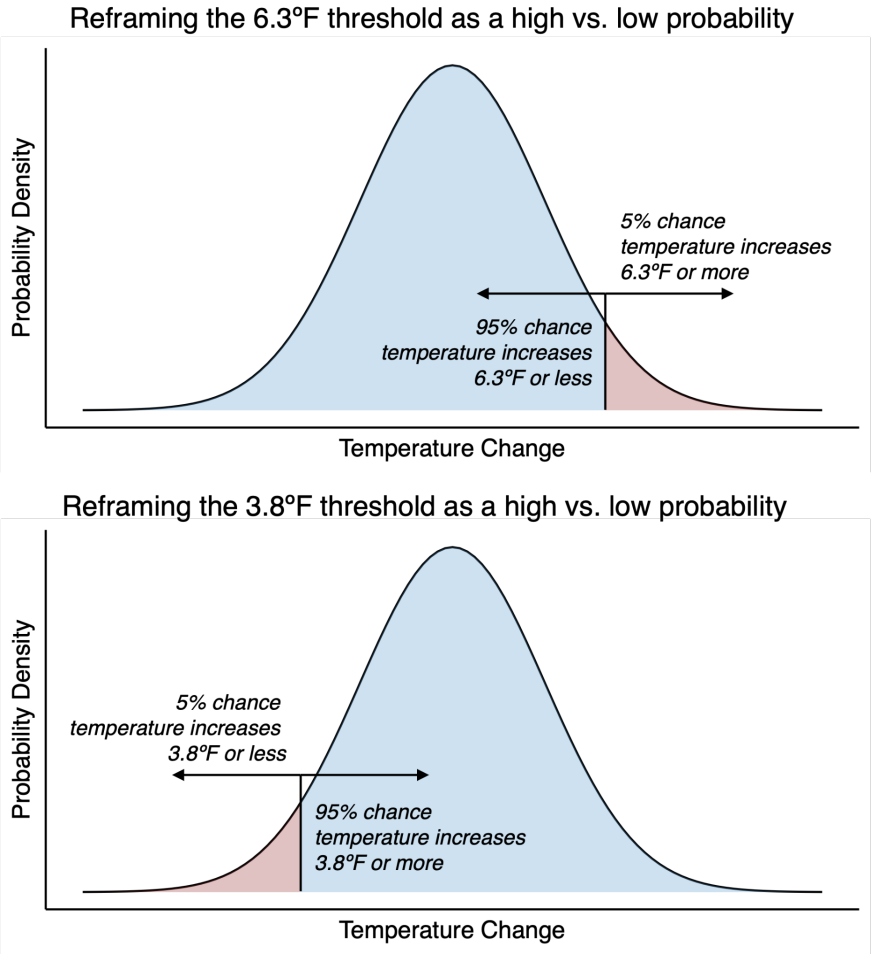

Figure 1. Visual depiction of the framing manipulation on a hypothetical distribution. The same sets of events can be described in terms of a low probability (red) or its high probability complement (blue), depending on how the threshold is framed. Top: 95% chance of temperature increasing 3.8ºF or more can be reframed as 5% chance of temperature increasing 3.8ºF or less. Bottom: 5% chance of temperature increasing 6.3ºF or more can be reframed as a 95% chance of temperature increasing 6.3ºF or less. Values were taken from the "*middle-of-the-road*" emissions scenario, model SSP2-4.5.

Low-probability, tail-risk message: *5% chance of temperature increasing 6.3ºF or more*

One message explicitly estimates low-probability tail-risk. For example, participants might read that there is a 5% chance of global temperature increasing 6.3ºF *or more*. This statement explicitly estimates tail-risk by giving the probability of temperature increases above the 90% confidence interval. Consider this statement's *emphasis*—what the author seems to want to draw attention to. Because the statement explicitly mentions temperature increases of 6.3ºF *or more*, the author seems to be emphasizing tail-risk[17,31–33], yet assigns it only a 5% probability. Readers may therefore question the *relevance* of the tail-risk emphasized, and this incongruity could harm credibility[17,34]: it may seem inconsistent to underscore the possibility of extreme warming if it only has a 5% chance of occurring.

High-probability, tail-risk complement message: *95% chance of temperature increasing 6.3ºF or less*

Alternatively, participants could read the logically equivalent high-probability complement of this estimate: a 95% chance of temperature increasing 6.3ºF *or less*. A substantial body of research shows that logically equivalent frames can result in different judgements and choices[35–38]. Here, there are implications for what the author appears to be emphasizing. By estimating the probability of temperature increasing 6.3ºF *or less*, the author seems to be emphasizing the possibility of *avoiding* tail-risk[31,39–42]. The message should seem credible, since the high probability is *consistent* with the perceived emphasis on temperature changes of 6.3ºF *or less,* but this emphasis on *avoiding* tail-risk could, in principle, decrease the audience's concern about it. We test this possibility in the empirical section.

High-probability, moderate-warming message: *95% chance of temperature increasing 3.8ºF or more*

We next consider a statement that estimates the probability of warming of at least a moderate temperature threshold: a 95% chance of temperature increasing 3.8ºF *or more*. Although this message does not specify tail-risk, it suggests its possibility: by emphasizing the likelihood of at least moderate warming, it invites consideration of even more extreme outcomes. Moreover, the high-probability should increase its credibility. Via its credibility, this message may sustain concern about severe temperature increases, even without specifying their likelihood.

Low-probability, moderate-warming complement message: *5% chance of temperature increasing 3.8ºF or less*

Finally, we consider the logical complement of the last message: a 5% chance of temperature increasing 3.8ºF *or less.* This message appears to emphasize the lower end of the distribution of possible temperature changes, and we would expect the low probability to harm credibility. Lacking any reference to the possibility of extreme warming, this message could dampen concern for severe outcomes, making it the least compelling for communicators wishing to advocate for climate tail-risk preparation.

Experiments

We present four preregistered studies (N = 3,525). In studies 1A (N = 389; U.S. policymakers) and 1B (N = 300; international legal experts), participants evaluated the credibility of one low- and one high-probability message. Information was drawn from the "*middle-of-the-road*" scenario[1], as described above. We recruited local U.S. elected policymakers (Study 1A) and international legal experts—lawyers and judges—(Study 1B) to assess whether low-probability forecasts carry a credibility penalty among high-stakes decision-makers. Then, in Studies 2 (N = 1,020; U.S.) and 3 (N = 1,816; U.S.), participants evaluated only one message. For generalizability, forecasts were drawn from one of five scenarios. To assess the role of pre-existing attitudes

towards climate change, Study 2 recruited participants stratified by climate change attitudes, ensuring a mix of those who are skeptical of climate change and human society's role in it, and those who believe in anthropogenic climate change. To generalize our findings to a broader (U.S.) sample, Study 3 recruited a politically balanced distribution of Democrats, Republicans, and Independents.

Do low probabilities undermine the credibility of temperature forecasts?

We begin by examining how the stated probability in a temperature change forecast affects credibility judgments. Collapsing across messages, low-probability forecasts seemed less credible than high-probability ones. Policymakers (Study 1A) rated low-probability messages as less credible (M = 2.77, SD = 1.11; 1-to-5 scale) than high-probability messages (M = 3.09, SD = 1.22; $t(388) = -5.33$, $p < .0001$, 95% CI [-0.44 -0.20], $d = 0.28$; Figure 2). A similar pattern emerged among legal experts (Study 1B; $M_{5\%} = 4.18$, $SD_{5\%} = 1.74$, $M_{95\%} = 4.66$, $SD_{95\%} = 1.67$, 1-to-7 scale; $t(299) = -4.44$, $p < .0001$, 95% CI [-0.69 -0.27], $d = 0.28$; Figure 2). We replicated this effect in both Study 2 ($b = 0.194$, $SE = 0.086$, $p = .025$, $\eta_p^2 = 0.005$; Supplemental Table 7) and Study 3 ($b = 0.172$, $SE = 0.059$, $p = .004$, $\eta_p^2 = 0.005$; Supplemental Table 14).

Suppose a communicator wished to communicate tail-risk credibly and planned to report a low probability, tail-risk message (e.g., 5% chance that temperature increases 6.3ºF *or more*). One way of leveraging the greater credibility of high probabilities would be to report its high-probability complement (e.g., 95% chance that temperature increases 6.3ºF *or less*). Indeed, across studies and samples, this high-probability complement *generally* seemed more credible ($p < .05$ in two of four studies—Studies 1A and 2; Supplemental Tables 5, 10, and 20). Another option would be to report the high probability of moderate warming *or more* (e.g., 95% chance that temperature increases 3.8ºF *or more*). This second type of high-probability message also *generally* seemed

more credible than reporting the low probability of tail-risk ($p < .05$ in three of four studies—Studies 1A, 1B, and 2; Supplemental Tables 5, 11, and 21). Thus, both strategies for communicating high-probability forecasts can boost credibility compared to the low-probability tail-risk message.

Which of these two high-probability messages seemed more credible? Credibility perceptions were similar for high-probability forecasts of moderate warming *or more* and of a tail-risk threshold *or less* in Studies 1A and 3 (Supplemental Tables 5 and 22). However, the moderate warming *or more* message seemed more credible in Study 1B ($p = .002$; Supplemental Table 5), while the opposite was true in Study 2 ($b = 0.274$, $SE = 0.123$, $p = .026$, $\eta_p^2 = 0.010$; Supplemental Table 12). This reversal may reflect differences in prior climate change attitudes, discussed in greater detail below.

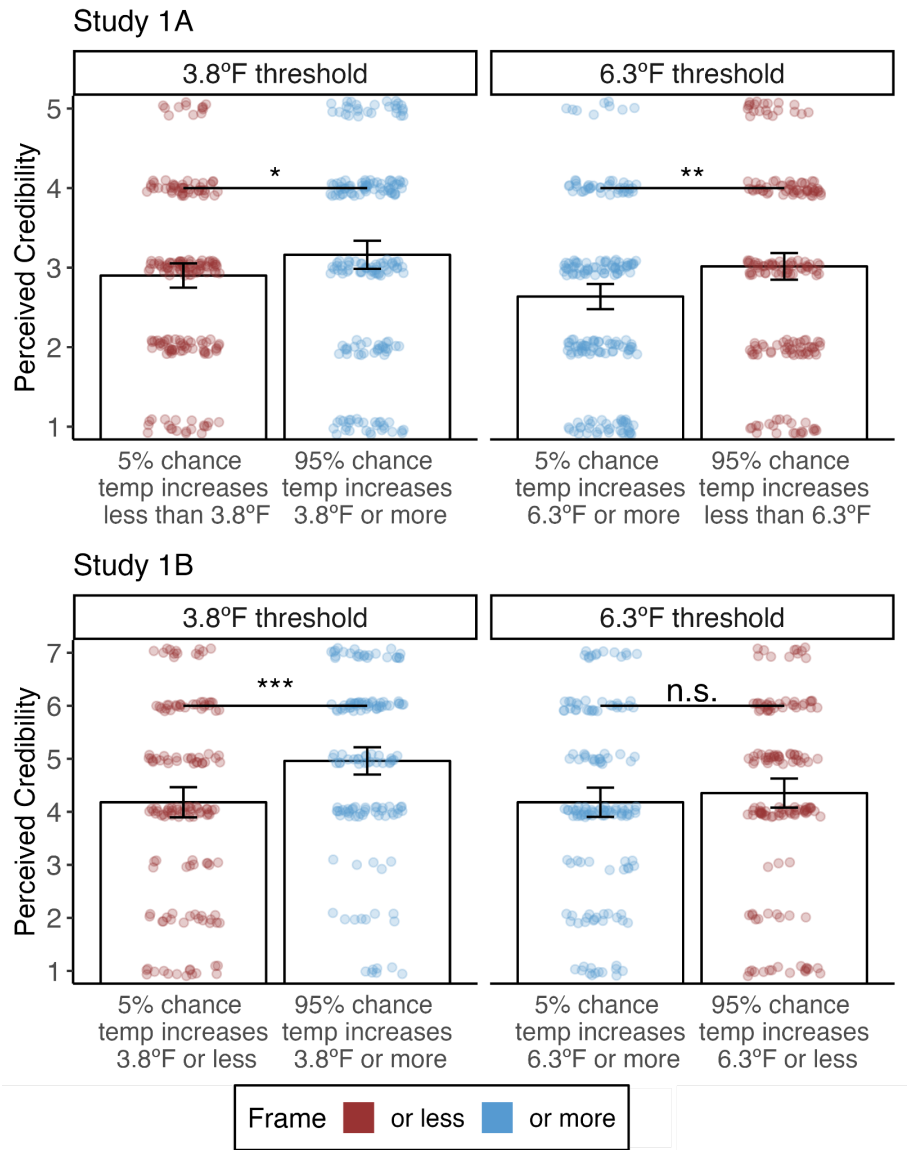

Figure 2. Mean credibility ratings in Studies 1A and 1B across conditions. Each colored dot represents one observation, jittered. Error bars indicate 95% confidence intervals of the mean. On average, people rated low-probability messages as less credible even when these conveyed the same information as the high-probability messages (Study 1A: policymakers; Study 1B: legal experts). The probability frame was manipulated by referring to the range of temperature changes above or below a temperature threshold (see Figure 1 for a visual depiction).

Do "*or less*" vs. "*or more*" temperature change frames influence perceived emphasis on climate tail-risk?

Communicators can increase their credibility by using high probabilities—either in a high-probability, moderate-warming message (e.g., 95% chance that temperature increases 3.8ºF *or more*) or a high-probability, tail-risk complement message (e.g., 95% chance that temperature increases 6.3ºF *or less*). Yet both high-probability messages might seem to deemphasize tail-risk relative to the low-probability tail-risk message. The high-probability tail-risk complement uses an "*or less*" frame, pointing to lower temperature increases, while the high-probability, moderate-warming message does not explicitly mention the tail-risk threshold.

In Studies 2 and 3, in addition to credibility, participants rated authors' emphasis on tail-risk, operationalized by how important the authors considered it to prepare for temperature increases *above* the tail-risk threshold (i.e., the upper bound of the 90% confidence interval of the emissions model referenced in the message). For example, if the message drew from the "*middle-of-the-road"* scenario (SSP2-4.5), participants indicated how important the authors considered it to prepare for temperature increases above 6.3ºF.

Collapsing across messages, "*or more*" framed forecasts were understood as placing greater emphasis on tail-risk warming than their "*or less*" complements (Study 2: b = -0.925, SE = 0.206, $p < .001$, $\eta_p^2 = 0.020$; Study 3: b = -1.239, SE = 0.147, $p < .001$, $\eta_p^2 = 0.020$; Supplemental Tables 7 and 14; Figure 3). Thus, although *logically* equivalent, participants inferred different levels of emphasis on extreme temperature increases based on how forecasts were framed[40,41].

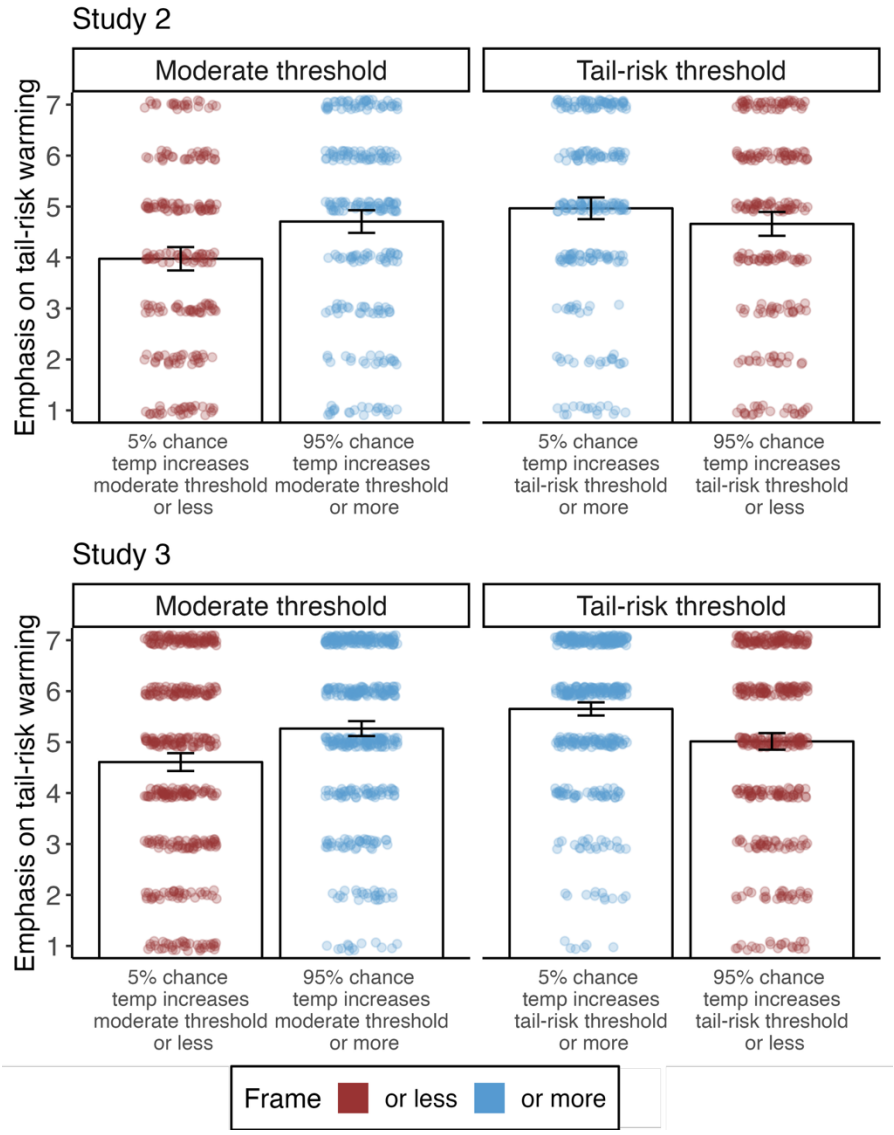

Figure 3. Mean ratings of perceived emphasis on tail-risk warming in Studies 2 and 3 across conditions. Messages using an "*or more*" frame were generally perceived as emphasizing specific tail-risk warming more strongly than messages using an "*or less*" frame. Messages that referenced the tail-risk temperature threshold were generally perceived as emphasizing tail-risk warming more strongly than messages referencing the moderate temperature threshold. The explicit low-probability tail-risk threshold message generally emphasized tail-risk warming most strongly. See Supplemental Tables 10-12 and 20-22 for results of statistical pairwise comparisons. Each colored dot represents one observation, jittered. Error bars indicate 95% confidence intervals of the mean.

Perceived tail-risk emphasis also depended on whether the message explicitly mentioned the tail-risk threshold (i.e., the low-probability tail-risk message or its high-probability complement) or not. Messages referencing tail-risk thresholds were seen as placing stronger emphasis on warming of *at least* that tail-risk threshold than those that referenced moderate thresholds (Study 2: b = 0.399, SE = 0.103, $p < .001$, $\eta_p^2 = 0.015$; Study 3: b = 0.459, SE = 0.073, $p < .001$, $\eta_p^2 = 0.019$; Supplemental Tables 7 and 14). Accordingly, participants generally perceived *both* high-probability messages as placing less emphasis on tail-risk than the explicit low-probability message, with no robust differences between the two high-probability messages (Supplemental Tables 10-12; 20-22).

How does the probability and the framing of a temperature forecast influence concern for climate tail-risk and climate risk more broadly?

High-probability forecasts seem more credible than low-probability ones, while "*or more*" frames emphasize tail-risk more strongly than "*or less*" frames. But how do these features affect concern for climate change? To address this, Studies 2 and 3 included three additional questions. First, participants rated the importance of preparing for temperature increases above a tail-risk threshold: the upper-bound of the 90% confidence interval of the IPCC model referenced in the message. For example, if the message drew from the "*middle-of-the-road*" scenario (SSP2-4.5), participants indicated how important it was to prepare for temperature increases above 6.3ºF. Second, for a general measure of tail-risk concern, participants rated the importance of preparing for "*worst-case climate scenarios*". Third, for a measure of broader climate change concern, participants rated the importance of "*governments preparing for climate change in general*". For

all comparisons in this section, we summarize the results of six statistical tests—one for each three of these measures in each of the two studies.

First, paralleling credibility judgements, high-probability messages were associated with increased importance judgments ($p < .05$ in five of six tests; $p < .1$ for the remaining test—importance of climate change preparation in Study 2; Supplemental Tables 7 and 14). We next examined the effects of framing on measures of importance. Given that "*or less*" frames appear to deemphasize tail-risk warming relative to "*or more*" frames, a climate communicator may worry that using "*or less*" frames may reduce the audience's tail-risk concern. However, we found no reliable effects of frame ($p > .05$ in five of six regressions; $p = .014$ for ratings of perceived importance of preparing for tail-risk warming in Study 3; Supplemental Tables 7 and 14). Thus, despite the robust inference that "*or more*" frames emphasize specific tail-risk warming more strongly than "*or less*" frames, this inference did not consistently translate into greater concern for climate risk.

Because high-probability messages generally elicited greater concern, the high-probability, tail-risk complement produced—directionally or significantly—more concern than the low-probability, tail-risk message ($ps < .05$ in two of six tests: importance of preparing for worst-case climate scenarios and importance of climate change preparation in Study 3; $p < .1$ for perceived importance of preparing for worst-case climate scenarios in Study 2; Supplemental Tables 10 and 20). Likewise, the high-probability, moderate-warming message also produced—directionally or significantly—more concern than the low-probability, tail-risk message ($p < .05$ in three of six tests: importance of tail-risk warming in Studies 2 and 3; importance of climate change preparation in Study 3; Supplemental Tables 11 and 21). The two high-probability messages did not

significantly differ from each other ($p > .05$ in six of six comparisons; Supplemental Tables 12 and 22).

How do individual differences in pre-existing climate change attitudes affect reception to different descriptions of temperature increases?

Given the polarized attitudes toward climate change in countries such as the U.S.[9], it is important to understand how these shape message evaluation. Reactions to forecasts may depend on the alignment between prior attitudes and perceived emphasis: climate change skeptics may find frames emphasizing the lower end of the distribution ("*or less*") more credible; whereas believers in anthropogenic climate change may find frames emphasizing the upper end of the distribution ("*or more*") more credible.

Consistent with this reasoning, the effect of frame on credibility judgements depended on prior attitudes (Study 2: $b = –0.445$, $SE = 0.121$, $p < .001$, $\eta_p^2 = 0.013$; Study 3: $b = -0.260$, $SE = 0.077$, $p = .001$, $\eta_p^2 = 0.006$; Supplemental Tables 4 and 17; Figure 4). Climate change skeptics tended to find "*or less*" frames more credible than "*or more*" frames (Study 2: $b = 1.238$, $SE = 0.310$, $p < .001$, $\eta_p^2 = 0.038$; Study 3: $b = 0.769$, $SE = 0.465$, $p = .100$, $\eta_p^2 = 0.016$); this preference reversed for believers in anthropogenic climate change, who tended to find "*or more*" frames more credible than "*or less*" frames (Study 2: $b = -0.242$, $SE = 0.235$, $p = .305$, $\eta_p^2 = 0.003$; Study 3: $b = -0.591$, $SE = 0.127$, $p < .001$, $\eta_p^2 = 0.014$; Supplemental Tables 8 and 15). This pattern may explain why, in Study 1B, the high-probability complement did not seem more credible than the low-probability tail-risk message. If the international legal experts in this sample were particularly concerned about climate risk, the credibility advantage of high probabilities may have been offset by the "*or less*" frame.

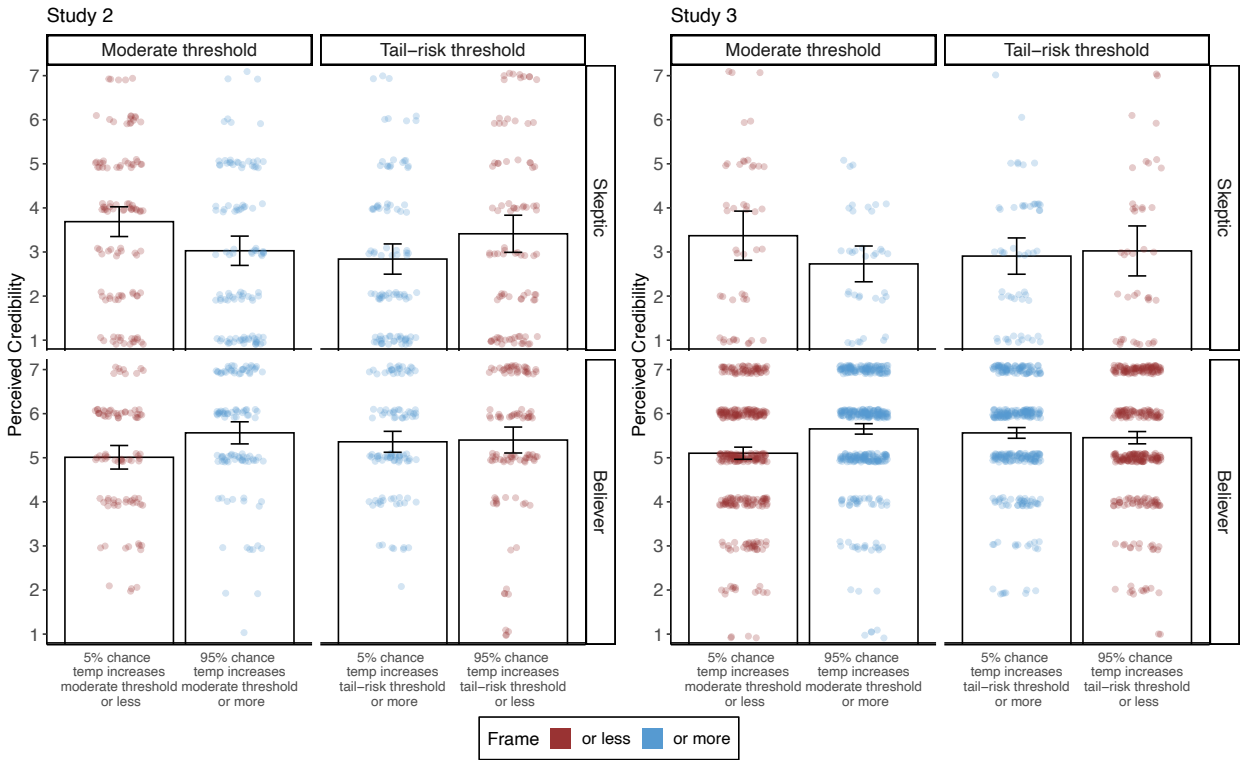

Figure 4. Mean credibility ratings in Studies 2 and 3 across conditions, and by prior attitudes toward climate change. In Study 2, participants were grouped into Skeptics and Believers based on their answers to a screener question on Connect: "Which of the following best describes your beliefs about climate change?". Skeptics either answered *Strongly skeptical of claims about climate change and its link to human activities* or *Somewhat skeptical about the impact of human activities on climate change, believing that climate change is a natural cycle.* Believers either answered *Strongly believe climate change is occurring and is primarily caused by human activities* or *Somewhat believe climate change is occurring and is influenced by human activities, but natural factors also play a significant role*. In Study 3, participants were grouped into Skeptics and Believers based on their answers to a baseline measure of perceived importance of climate change preparation, asked before exposure to the message: *Given competing priorities, how important do you think it is for governments to prepare for climate change?* This question was asked on a 1-7 scale anchored at the endpoints: 1 = Not important at all; 7 = Extremely important. Skeptics

answered between 1 and 3; Believers answered between 5 and 7. Climate change skeptics find "*or less*" frames more credible than "*or more*" frames; believers of anthropogenic climate change find "*or more*" frames more credible than "*or less*" frames. Each colored dot represents one observation, jittered. Error bars indicate 95% confidence intervals of the mean.

How do temperature forecasts affect climate attitudes relative to baseline?

Finally, we examined whether exposure to temperature change forecasts shifted climate and tail-risk attitudes relative to baseline, i.e., pre-message levels. In Studies 2 and 3, the importance measures—perceived importance of preparing for (i) tail-risk warming, (ii) general worst-case climate scenarios, and (iii) broader climate change—were assessed before and after message exposure.

The third measure, broader attitudes toward climate change, was relatively stable ($p > .05$ for the four messages in each of the two studies; Supplemental Tables 9 and 19). In contrast, for the measures focusing on tail-risk, concern was *reduced* both by the low-probability, tail-risk message ($p < .05$ in four of four comparisons—two measures across two studies) and the low-probability, moderate warming *complement* message ($p < .05$ in three of four comparisons; $p = .117$ for importance of worst-case climate scenarios in Study 3). In contrast, high-probability messages did not significantly shift concern about tail-risk ($p > .05$ in eight of eight comparisons—two conditions and two measures across two studies).

Discussion

Effectively communicating climate tail-risk is essential for preparation, yet our findings underscore the challenges to doing so credibly. Across diverse samples—including policymakers, legal experts, and lay participants—low-probability forecasts consistently incurred a credibility

penalty relative to high-probability ones. Although the effect sizes were modest, they are in line with recent work showing that psychological effect sizes are often smaller than traditionally assumed[43–46]. Moreover, the pattern was robust: it replicated across samples and climate projections; when low- and high-probability forecasts were combined (see Supplemental Study in Appendix A); and even when messages explicitly advocated for tail-risk preparation (Supplemental Table 18). When communicating climate forecasts, higher probabilities are more credible.

Although message framing ("*or more*" vs. "*or less*") shaped how strongly participants perceived a message to emphasize tail-risk, these inferences rarely translated into greater concern for climate tail-risk. Low-probability tail-risk messages, which most strongly emphasized tail-risk, were less effective at sustaining concern than higher-probability, more credible ones. Explicit advocacy for tail-risk preparation also had limited impact, producing only small shifts in perceived emphasis on tail-risk and weak effects on concern. Credibility, on the other hand, may have downstream consequences for climate concern. Low-probability messages were not only less credible, but also reduced concern about climate tail-risk relative to pre-message levels. While high-probability forecasts did not increase concern—perhaps because the public is already roughly aware of mainstream climate projections—they may ultimately help sustain concern over time.

Theoretically, these findings align with research showing that low probabilities are seen as less trustworthy because they seem inconsistent with the communicators' intended emphasis. Indeed, participants often inferred that authors were trying to highlight the outcomes tied to the probability estimate. Another possible contributing factor is that, as a heuristic for evaluating the forecast's credibility, participants used the *plausibility* of the specific outcome forecasted[47]. Either way, our results demonstrate the downstream consequences of reframing messages to show higher

probabilities: higher-probability messages can lead to more concern about climate tail-risk, even if they express the high probability of temperature increasing up to a tail-risk threshold *or less*. While these "*or less*" frames make people perceive the statement as putting lower emphasis on tail-risk, this does not seem to affect people's own tail-risk concern. Instead, "*or less*" vs. "*or more*" frames have more influence on *who* finds the message most credible, with climate skeptics preferring "*or less*" frames and believers preferring "*or more*" frames.

This work also extends research on scientific uncertainty. Prior research shows that acknowledging uncertainty fosters trust, but the low- and high-probability forecasts included were drawn from the same models and, technically, reflected the same degree of uncertainty. Nevertheless, participants may have perceived greater uncertainty in low-probability forecasts. If credibility judgements are a proxy for trust, our findings suggest that high-probability messages disclose uncertainty in ways that reap the trust benefits described in past literature[22–27]. Future work could extend these findings beyond the narrow set of messages tested, and examine whether pairing probabilities with verbal descriptors of likelihood or other non-numeric cues can improve both readability and credibility[4].

In conclusion, our findings suggest that credible communication should avoid low probabilities, even when the goal is to emphasize extreme outcomes. Low-probability tail-risk messages may convey the author's intended emphasis, but high-probability forecasts are both more credible and more effective at sustaining tail-risk concern. Ultimately, given the scale at which climate messages are disseminated, the cumulative impact of repeated exposures, and the importance of sustaining public support for climate preparation, even small effects of credibility and concern could make a big difference.

Methods

We preregistered all experiments on aspredicted.org and we post data, code, survey files, and preregistrations on https://researchbox.org/3595&PEER_REVIEW_passcode=DNJFER. All the analyses we preregistered are reported in detail in Appendix B, and any exploratory analyses are labeled as such. We report two-sided p-values. Effect sizes are calculated as follows: Cohen's d was calculated using *cohensD* function from *lsr* package in R; η_p^2 calculated using *etaSquared* function from *lsr* package in R.

We report full materials in Appendix D. All conditions and data exclusions are described in Appendix C. We determined and preregistered our sample sizes and exclusion rules ahead of data collection. We did not substantially deviate from preregistered exclusion rules for any studies (see Appendix C). We determined sample sizes for Studies 1A based on what CivicPulse could guarantee, and for the remainder based on informal rules-of-thumb. To implement randomization and counterbalancing, we used Qualtrics survey software. Across studies, we base the probability estimates on confidence intervals from scenarios in the latest IPCC report. Research protocols were approved by the Institutional Review Board at New York University. Participants consented to participate in all experiments, and we did not use deception.

Study 1A

We recruited 389 elected local U.S. policymakers from CivicPulse to participate in our study (267 men, 116 women, 3 prefer to self-describe, 3 did not answer; M_{age} = 61.75, SD_{age} = 12.31). This study was part of a larger survey, and participants also completed two other studies, presented in random order. These studies are not the focus of the present work and are not included in this report. To ensure all studies in the survey had sufficient participants, we randomly assigned only 80% of them to participate in this study (Study 1A), with the other 20%

providing no data. We included in our analysis all observations available, that is, all observations from participants who completed this study in the survey.

Participants judged the credibility of probability estimates for global temperature increases over the next 75 years. We based these estimates on the 90% confidence intervals of the SSP2-4.5 "*middle-of-the-road*" scenario of the latest IPCC report, which projects a likely temperature increase between 2.1ºC and 3.5ºC, or 3.8ºF and 6.3ºF (converted from Celsius to Fahrenheit for U.S. participants and rounded to one decimal place). Each participant judged the credibility of two statements, one describing the chances of temperature increases of 3.8ºF or more / less than 3.8ºF; the other describing the chances of temperature increases of 6.3ºF or more / less than 6.3ºF. The study followed a 2 (Probability: low vs. high; within-subjects) × 2 (Frame: more vs. less than; between-subjects) mixed design.

Specifically, participants in the "*or more*" frame saw probabilities of temperature increases of the relevant bound or more, while participants in the "*or less*" frame saw probabilities of temperature increases of less than the relevant bound. Thus, the participants in the "*or more*" frame (N = 198) rated the credibility of the 5% chance of temperature changes of 6.3ºF *or more* (low-probability condition) and the 95% chance of temperature changes of 3.8ºF *or more* (high-probability condition); participants in the "*or less*" frame (N = 191) rated the credibility of the 5% chance of temperature changes of *less than* 3.8ºF (low-probability condition) and the 95% chance of temperature changes of *less than* 6.3ºF (high-probability condition). This study employed slightly different wording than all subsequent studies when referring to the chances of temperatures *below* a given threshold: these were described as *less than* the threshold rather than as the threshold *or less*. By using "less than" instead of "*or less*", we made the information more precisely logically equivalent between conditions, i.e., only the ranges in the "*or more*" messages

contained the threshold, and so there was no overlap between the ranges. However, in the future studies, we prioritized keeping the wording more consistent, either using "*or more*" or "*or less*" messages, such that all ranges contained the threshold.

Here is an example of the full scenario wording in the *more* [*less*] frame for when participants evaluated a message referencing the upper bound of the 90% confidence interval, that is, the tail-risk temperature threshold:

Imagine you are reading the United Nation's latest report on climate change as you think about preparing your community for the future. It details the probability of different global temperature increases over the next 75 years based on the latest generation of climate models. Please rate the credibility of two statements you might read below:

There is a 5% [95%] chance that global temperature increases 6.3ºF or more [less than 6.3ºF].

(1 - Not at all credible; 5 - Extremely credible)

When participants judged the moderate temperature threshold, the *more* [*less than*] frame was as follows:

There is a 95% [5%] chance that global temperature increases 3.8ºF or more [less than 3.8ºF].

(1 - Not at all credible; 5 - Extremely credible)

Each participant read the text for each threshold within their randomly assigned frame, with the text shown on consecutive pages in random order. Afterward, they continued to another part of the study.

Study 1B

We aimed to recruit 300 legal experts on a voluntary basis by email starting in August 2023. We preregistered that we would recruit only judges until October 30, after which we would try to recruit the remaining sample via a combination of judges, lawyers, law academics, and law students. However, our initial response rate from judges was very low (less than 20 valid responses in the first month) so we began recruiting lawyers on September 24. Our sample (N = 300) contained 261 lawyers and 39 judges (173 men, 78 women, 3 other, 6 prefer not to say, 40 NA; M_{age} = 69.60, SD_{age} = 11.60). We preregistered to keep the first observation only in case there were shared IP addresses. This study was part of a larger survey, so participants also answered five other studies, presented in random order. These studies are not the focus of the present work and are not included in this report.

Procedure and design followed Study 1A (N_{more} = 150, N_{less} = 150), with slight scenario modifications adapted to the legal context and to reflect the sample's international diversity (i.e., temperature values were presented in both Celsius and Fahrenheit).

For example, when participants evaluated a message referencing the upper bound of the 90% confidence interval, that is, the tail-risk temperature threshold, they read the following text in the *more* [*less*] frame:

> *Imagine you are presiding over a case about government climate policy. An expert witness is called to give the court a balanced sense of possible temperature changes that would result from business-as-usual climate policy over the next 75 years. Their best climate model estimates that there is a 5% [95%] chance of a temperature increase of 3.5ºC (6.3ºF) or more [less].*

When participants judged the moderate temperature threshold, the *more* [*less*] frame was as follows:

> *Imagine you are presiding over a case about government climate policy. An expert witness is called to give the court a balanced sense of possible temperature changes that would result from business-as-usual climate policy over the next 75 years. Their best climate model estimates that there is a 95% [5%] chance of a temperature increase of 2.1℃ (3.8℉) or more [less].*

Credibility was measured with the following item, on a 7-point self-report scale anchored at the endpoints: "*Please rate the credibility of two statements you might read below*" (1 - Extremely uncredible; 7 - Extremely credible).

Each participant read the text for each threshold within their randomly assigned frame, with the text shown on consecutive pages in random order. Afterward, they continued to another part of the study.

Study 2

We recruited 1,201 participants from Connect to participate in our study in exchange for a small payment. Participants were recruited based on their responses to a Climate Change Belief screener on Connect: "*Which of the following best describes your beliefs about climate change?*". We sampled a target 240 participants (20%) from each of the following answer categories: 1) Strongly believe climate change is occurring and is primarily caused by human activities (N = 204); 2) Somewhat believe climate change is occurring and is influenced by human activities, but natural factors also play a significant role (N = 204); 3) Uncertain about the causes and extent of climate change (N = 199); 4) Somewhat skeptical about the impact of

human activities on climate change, believing that climate change is a natural cycle (N = 205); 5) Strongly skeptical of claims about climate change and its link to human activities (N = 208). The final sample after exclusions consisted of 1,020 participants (M = 42.53, SD = 12.83; 523 men, 490 women, 6 non-binary/third gender, 1 prefers not to say).

First, to measure participants' baseline climate change and climate tail-risk concern, we asked the following on 1-7 self-report scales anchored at the endpoints (1 = Not important at all; 7 = Extremely important):

(i) **Baseline importance of tail-risk warming:** *Given competing priorities, how important would you think it was for society to prepare for global temperature increases above [tail-risk temperature threshold]ºF*;

(ii) **Baseline importance of worst-case climate scenarios:** *Given competing priorities, how important would you think it was for society to prepare for worst-case climate scenarios*?;

(iii) **Baseline importance of climate change preparation:** *Given competing priorities, how important do you think it is for governments to prepare for climate change*?;

Note that in item (i) the "tail-risk temperature temperature threshold" always corresponded to the upper bound of the 90% confidence interval of the same climate model that we used to generate the stimuli that participants would later evaluate. Thus, if participants subsequently read about a tail-risk temperature threshold (e.g., 6.3ºF in model SSP2-4.5), the value in baseline item (i) matched that same temperature threshold. If they later read about a moderate temperature threshold (e.g., 3.78ºF in model SSP2-4.5), the baseline value in item (i) did not match the later temperature threshold; instead, it was the tail-risk temperature threshold from the same model that produced the moderate threshold.

After obtaining these baseline measures, participants evaluated a probability estimate for global temperature increase over the next 75 years. This study followed a 2 (Probability: low vs. high) × 2 (Threshold: moderate vs. tail-risk) between-subjects design. Specifically, participants in the low-probability condition (N = 508) evaluated either a statement describing a 5% chance of temperature increases of a tail-risk temperature threshold or more (tail-risk threshold condition, N = 263) or describing a 5% chance of temperature increases of a moderate temperature threshold or less (moderate threshold condition; N = 245). In contrast, participants in the high-probability condition (N = 512) evaluated either a statement describing a 95% chance of temperature increases of a moderate temperature threshold or more (moderate threshold condition, N = 262) or describing a 95% chance of temperature increases of a tail-risk temperature threshold or less (tail-risk threshold condition, N = 250). In sum, participants were randomly assigned to one of four groups: i) low-probability moderate-threshold (N = 245); ii) low-probability tail-risk-threshold (N = 263); iii) high-probability moderate-threshold (N = 262); iv) and high-probability tail-risk-threshold (N = 250).

For example, participants who read about the tail-risk [moderate] temperature threshold in the low-probability condition read the following text (depending on the IPCC model, see below):

There is a 5% chance that, by the end of this century, global temperature increases 3.78ºF [6.3ºF] or less [more].

Conversely, participants who read about the tail-risk [moderate] temperature threshold in the high-probability condition read the following text:

There is a 95% chance that, by the end of this century, global temperature increases 6.3ºF [3.78ºF] or more [less].

The specific temperature thresholds were randomly sampled from 90% confidence intervals from projections SSP1-1.9, SSP1-2.6, SSP2-4.5, SSP3-7.0, and SSP5-8.5 of the latest IPCC report, converted from Celsius to Fahrenheit for a U.S. sample (Table 1).

Table 1. Temperatures seen by participants in the different models

Model	Moderate threshold	Tail-risk threshold
SSP1-1.9	1ºC x 1.8 = 1.8ºF	1.8ºC x 1.8 = 3.24ºF
SSP1-2.6	1.3ºC x 1.8 = 2.34ºF	2.4ºC x 1.8 = 4.32ºF
SSP2-4.5	2.1ºC x 1.8 = 3.78ºF	3.5ºC x 1.8 = 6.3ºF
SSP3-7.0	2.8ºC x 1.8 = 5.04ºF	4.6ºC x 1.8 = 8.28ºF
SSP5-8.5	3.3ºC x 1.8 = 5.94ºF	5.7ºC x 1.8 = 10.26ºF

Note. Unlike studies 1A and 1B, temperature increase forecasts were rounded to two decimal places instead of one, although final digits of "0" were omitted.

After reading the excerpt with the probability estimate, participants answered three comprehension questions, which they had to get right to be allowed to move on with the survey:

(i) What is the probability described in the statement? (in %);

(ii) What is the temperature increase mentioned in the statement? (in ºF);

(iii) Which one is correct?

a) The excerpt describes the chances that global temperature increases [temperature threshold]ºF or **more**

b) The excerpt describes the chances that global temperature increases [temperature threshold]ºF **or less**

Our primary analysis only includes participants who finished the survey, which required passing a bot screening test (N = 1,199), and answered these comprehension questions at first try (N = 1,022).

After reading the excerpt, participants evaluated it on 5 dimensions, each measured on 1-7 self-report scales anchored at the endpoints.

(i) **Credibility**: *How credible would you find the claim that there was a [prob: 5 vs. 95]% chance that global temperature increases [temperature threshold] or [frame: more vs. less]?* (1 = Not credible at all; 7 = Extremely credible)

(ii) **Post-message importance of tail-risk warming**: *Given competing priorities, how important would you think it was for society to prepare for global temperature increases above [tail-risk temperature threshold] (the same temperature mentioned in the excerpt/a higher temperature than mentioned in the excerpt)?* (1 = Not important at all; 7 = Extremely important)

(iii) **Post-message importance of worst-case climate scenarios**: *Given competing priorities, how important would you think it was for society to prepare for worst-case climate scenarios?* (1 = Not important at all; 7 = Extremely important)

(iv) **Emphasis on tail-risk warming:** *How much would you agree that the authors of this excerpt considered it important to prepare for temperature increases above [tail-risk*

temperature threshold] (the same temperature mentioned in the excerpt/a higher temperature than mentioned in the excerpt)? (1 = Strongly disagree; 7 = Strongly agree)

(v) **Post-message importance of climate change preparation:** *Given competing priorities, how important would you think it was for governments to prepare for climate change in general?* (1 = Not important at all; 7 = Extremely important)

As for the baseline measure of importance of tail-risk warming, the post-message measures that referenced the tail-risk temperature threshold—that is, importance of tail-risk warming (ii) and emphasis on tail-risk warming (iv)—referenced the upper bound of the 90% confidence interval of the climate model that was used to generate the excerpt. Thus, if participants read a message forecasting a tail-risk temperature threshold, this value matched the one in the message. In this case, we added a note in parentheses in the item itself, clarifying: *the same temperature mentioned in the excerpt*. If participants had instead read a message forecasting a moderate temperature threshold, we instead clarified that the tail-risk temperature threshold mentioned in the measure was higher: *a higher temperature than mentioned in the excerpt.*

Finally, we collected demographic information.

Study 3

We aimed to recruit 2,002 participants from Connect to participate in our study in exchange for a small payment. Participants were recruited based on their responses to a Political Affiliation question on Connect: "*Generally speaking do you think of yourself as a Republican, a Democrat, an Independent, or something else?*". We aimed to recruit 28.3% democrats (N = 566), 28.2% republicans (N = 566) and 43.4% (N = 868) independents, to reflect U.S political identification as reported in a 2024 Gallup poll (https://news.gallup.com/poll/15370/party-

affiliation.aspx). The final sample after exclusions consisted of 1,816 participants (M = 39.19, SD = 12.82; 750 men, 1030 women, 23 non-binary/third gender, 13 prefers not to say).

Procedure followed that of Study 2, except that, in addition to the probability and temperature threshold manipulation, we manipulated whether the excerpt included a tail-risk advocacy statement ($N_{control}$ = 913; $N_{treatment}$ = 903), that read "*Given that there is uncertainty about future temperature changes, society should prepare for the risk of temperature increases being surprisingly large, even catastrophic*". As such, participants were randomly assigned to one of eight groups: i) low-probability moderate-threshold without advocacy (N = 228); ii) low-probability moderate-threshold with advocacy (N = 224); iii) low-probability tail-risk-threshold without advocacy (N = 225); iv) low-probability tail-risk-threshold with advocacy (N = 228); v) high-probability moderate-threshold without advocacy (N = 240); vi) high-probability moderate-threshold with advocacy (N = 238); vii) high-probability tail-risk-threshold without advocacy (N = 220); viii) high-probability tail-risk-threshold with advocacy (N = 213).

For example, participants who read about the tail-risk [moderate] temperature threshold in the low-probability condition [with the advocacy statement] read the following text:

> *There is a 5% chance that, by the end of this century, global temperature increases 3.78ºF [6.3ºF] or less [more]. [Given that there is uncertainty about future temperature changes, society should prepare for the risk of temperature increases being surprisingly large, even catastrophic.]*

Conversely, participants who read about the tail-risk [moderate] temperature threshold in the high-probability condition [with the advocacy statement] read the following text:

There is a 95% chance that, by the end of this century, global temperature increases 6.3ºF [3.78ºF] or more [less]. [Given that there is uncertainty about future temperature changes, society should prepare for the risk of temperature increases being surprisingly large, even catastrophic.]

Our primary analysis only includes participants who finished the survey which required passing a bot screening test (N = 1,999), and answered these comprehension questions at first try (N = 1,819).

To compare climate skepticism levels between samples of Studies 2 and 3, we examined the baseline (i.e., before message exposure) ratings of perceived importance of climate change preparation, which strongly correlated with the climate change attitudes screener in Study 2 (r = 0.75, $p < .001$). These baseline ratings were significantly higher in Study 3 (M = 5.74, SD = 1.55) than in Study 2 (M = 4.49, SD = 2.04; $t(2834) = -18.39$, $p < .001$, 95% CI [-1.39 -1.12], d = 0.72), confirming that participants in Study 3 were, on average, less skeptical about climate change.

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Supplementary Information for "Communicating Tail-Risk Credibly"

Table of Contents

APPENDIX READ ME

This Web Appendix provides additional context for the article *"Communicating Tail-Risk Credibly"*. Key features include:

1. ***Preregistration notes (Appendix A):*** Under each analysis table, we indicate which analyses were preregistered (if any). If these notes are difficult to locate, you can search the document for the term "preregistered."
2. ***Purpose of analyses (Appendix B):*** Above each table, we explain succinctly the purpose of the displayed analyses. When analyses support claims in the main article, we reference the relevant section directly. For additional analyses not discussed in the article, we clarify why they are included (e.g., preregistered but not reported, or exploratory). If you are looking for the results corresponding to a specific section of the article, you can search for that section's title.
3. ***Exclusions (Studies 2 and 3):*** In both Studies 2 and 3, participants who failed comprehension questions about the forecast were excluded from main analyses. For each study's section in Appendix B, we note which key analyses (i.e., preregistered analyses or analyses reported in the main article) change significance at $p < .05$ when those participants are retained. We also include a summary of these changes in Appendix C, under the respective study.

Appendix A – Supplemental Study

Participants and Methods

We aimed to recruit 1,050 participants from Connect, and received a total of 1,051 responses. As preregistered, participants completed a captcha before beginning the study. We also included an attention check in the middle of the survey requiring participants to read a paragraph and respond with a specific answer (1 Strongly disagree). We excluded from the main analyses all observations who responded incorrectly to this attention check (N = 6). In addition, to detect bots, we included a disguised (white text) question with an open-ended text-box which human participants should not be able to detect or fill out. We excluded observations where this question was non-empty (N = 1). The final sample after exclusions consisted of 1,044 participants (M = 37.75, SD = 13.68; 431 men, 583 women, 24 non-binary/third gender, 6 prefer not to say).

Participants evaluated a probability estimate for global temperature increase over the next 75 years. Specifically, they evaluated a statement that offered partial or complete description of the 90% CI for temperature increases described in model SSP2-4.5 of the latest IPCC report (i.e., 2.1ºC-3.5ºC, or 3.78ºF-6.3ºF).[1] This statement could describe: i) the 90% confidence interval; ii) the 5% chance of tail-risk warming or more; iii) the 95% chance of tail-risk warming or less; iv) the 95% chance of moderate warming or more; v) both the 5% chance of moderate warming or less and the 5% chance of tail-risk warming or more; vi) both the 5% chance of tail-risk warming or more and the 95% chance of moderate warming or less; vii) both the 95% chance of moderate warming or more and the 95% chance of tail-risk warming or less.

That is, participants evaluated one of seven statements belonging to three categories: i) the explicit 90% confidence interval; ii) single-forecast messages; iii) hybrid-forecast messages, combining two forecasts.

For example, participants in the 90% CI condition read the following message:

There is a 90% chance that, by the end of this century, global temperature increases between 3.68ºF and 6.3ºF.

[1] Due to a typo, in this study participants read 3.68ºF instead of 3.78ºF.

Whereas participants reading about the chances of tail-risk warming or more [or less], read:

There is a 5% [95%] chance that, by the end of this century, global temperature increases 6.3ºF or more [less].

And participants in the hybrid condition describing the chances of either moderate or tail-risk warming or more read:

There is a 95% chance that, by the end of this century, global temperature increases 3.68ºF or more, and there is also a 5% chance that it increases 3.68ºF or more. (order of presentation counterbalanced).

In sum, participants were randomly assigned to one of seven groups: i) 90% CI (N = 149); ii) 5% chance of tail-risk warming or more (5%-tail; N = 150); iii) 95% chance of tail-risk warming or less (95%-tail; N = 147); iv) 95% chance of moderate warming or more (95%-moderate; N = 149); v) 5% chance of tail-risk warming or more, combined with the 5% chance of moderate warming or less (5%-tail+5%-moderate; N = 151); vi) 5% chance of tail-risk warming or more, combined with the 95% chance of moderate warming or more (5%-tail+95%-moderate; N = 150); vii) 95% chance of tail-risk warming or less, combined with the 95% chance of moderate warming or more (95%-tail+95%-moderate; N = 148).

After reading the excerpt, participants evaluated its credibility with one single 7-point item, anchored at the endpoints: *How credible would you find this claim?* (1 = Not credible at all; 7 = Extremely credible).

Results

We examined how different framings of climate projections affected perceived credibility. Our main questions were whether adding a high-probability forecast to a low-probability message could mitigate the credibility penalty associated with low probabilities, and how different characterizations of the same confidence interval compared.

First, we compared the three single-forecast messages (Supplemental Table 2). The most credible was the 95% chance of moderate warming *or more* (M = 5.38, SD = 1.41). This message was more credible than both the 95% chance of tail-risk warming or less (M = 5.01, SD = 1.48, $t(294) = 2.19$, $p = .029$) and the 5% chance of tail-risk warming or more (M = 4.91, SD = 1.38, $t(297) = -2.910$, $p = .004$). The latter two did not significantly differ from each other ($t(295) = -$

0.605, p = .546). Importantly, none of the single-forecast messages significantly differed from simply presenting the 90% confidence interval (M = 5.20, SD = 1.44; Supplemental Table 1).

We next asked whether combining multiple forecasts into hybrid messages enhanced or undermined credibility (Supplemental Table 3). Combining the two high-probability forecasts – the 95% chance of moderate warming or more and the 95% chance of tail-risk warming or less – was less credible (M = 4.82, SD = 1.42) than each component alone. This hybrid message was less credible than the 95% chance of moderate warming or more (M = 5.38, SD = 1.41; t(592) = -0.563, p = .003) and the 95% chance of tail-risk warming or less (M = 5.01, SD = 1.48; t(441) = -3.424, p = .001). It was also less credible than simply reporting the 90% confidence interval (M = 5.20, SD = 1.44; t(594) = -4.625, p < .001; Supplemental Table 4).

Similarly, adding a low-probability tail-risk forecast to the high-probability moderate warming forecast – that is, adding the 5% chance of tail-risk warming or more to the 95% chance of moderate warming or more – reduced credibility (M = 4.41, SD = 1.60; t(592) = -5.688, p < .001). This hybrid message was no more credible than the low-probability message alone (M = 4.91, SD = 1.38; t(596) = -0.572, p = .894, two-sided Bayes Factor = 0.28), indicating that adding a high-probability forecast did not offset the low-probability credibility penalty and instead undermined the credibility of the high-probability message. This hybrid message did not significantly differ from simply reporting the 90% confidence interval (M = 5.20, SD = 1.44; t(594) = -2.242, p = .113; Supplemental Table 4).

Combining the two low-probability forecasts – the 5% chance of moderate warming or less and the 5% chance of tail-risk warming or more – was as credible (M = 4.40, SD = 1.42) as the low-probability tail-risk forecast alone (M = 4.91, SD = 1.38; t(594) = -2.242, p = .113), but was less credible than simply reporting the 90% confidence interval (M = 5.20, SD = 1.44; t(594) = -4.735, p < .001).

Finally, we compared the three hybrid messages (Supplemental Table 4). The hybrid message combining a low- with a high-probability forecast – that is, combining the 5% chance of tail-risk warming or more to the 95% chance of moderate warming or more – was the most credible hybrid message. It was marginally more credible than combining the two high-probability forecasts (t(594) = -2.394, p = .079) or the two low-probability forecasts (t(594) = -2.494, p = .062). These latter two hybrid messages did not significantly differ from each other (t(594) = -0.087, p = .100).

Table 1. Descriptive statistics of credibility ratings in the Supplemental Study, by condition

Condition	*M*	*SD*	*N*	*SE*	95% CI
95%-moderate	5.383	1.412	149	0.116	[5.154 5.611]
90% CI	5.201	1.443	149	0.118	[4.968 5.435]
95%-tail	5.014	1.480	147	0.122	[4.772 5.255]
5%-tail	4.913	1.375	150	0.112	[4.691 5.135]
5%-tail+95%-moderate	4.820	1.419	150	0.116	[4.591 5.049]
95%-moderate+95%-tail	4.412	1.599	148	0.131	[4.152 4.672]
5%-moderate+5%-tail	4.397	1.415	151	0.115	[4.170 4.625]

Note. Conditions presented in descending order of credibility.
90% CI = 90% confidence interval
95%-moderate = 95% chance of moderate warming or more
5%-tail = 5% chance of tail-risk warming or more
95%-tail = 95% chance of tail-risk warming or less
5%-tail+95%-moderate = combining the 5% chance of tail-risk warming or more with the 95% chance of moderate warming or more
95%-moderate+95%-tail = combining the 95% chance of moderate warming or more with the 95% chance of tail-risk warming or less
5%-moderate+5%-tail = combining the 5% chance of moderate warming or less with the 5% chance of tail-risk warming or more

Supplemental Table 2 reports a series of t-tests comparing the three single-forecast messages against each other.

Table 2. T-tests comparing single-forecast messages

Comparison	*df*	*t*	*p*	95% CI	*d*
(5%-tail)–(95%-moderate)	297	-2.910	.004	[-0.787 -0.152]	0.337
(5%-tail)–(95%-tail)	295	-0.605	.546	[-0.427 0.226]	0.070
(95%-moderate)–(95%- tail)	294	2.194	.029	[0.038 0.700]	0.256

Supplemental Table 3 reports a series of Dunnett's tests comparing the three single-forecast messages against alternative messages – hybrid messages and the 90% confidence interval.

Table 3. Dunnett's tests

Comparison	Estimate	*SE*	*df*	*t*	*p*	95% CI
vs. 95%-moderate						
5%-tail+95%-moderate	-0.563	0.170	592	-3.309	.003	[-0.963 -0.162]
95%-moderate+95%-tail	-0.970	0.171	592	-5.688	< .001	[-1.372 -0.569]
90% CI	-0.181	0.170	592	-1.064	.580	[-0.582 0.220]
vs. 5%-tail						
5%-tail+95%-moderate	0.288	0.163	596	1.762	.190	[-0.097 0.673]
5%-moderate+5%-tail	-0.093	0.163	596	-0.572	.894	[-0.178 0.291]
90% CI	-0.516	0.163	596	-3.167	.005	[-0.900 -0.132]
vs. 95%-tail						
95%-moderate+95%-tail	0.188	0.175	441	1.070	.457	[-0.201 0.577]
90% CI	-0.601	0.176	441	-3.424	.001	[-0.991 -0.212]

Note: Two-tailed tests reported.

These analyses were preregistered.

Finally, Supplemental Table 4 reports pairwise Tukey HSD tests comparing the three hybrid forecasts and the 90% confidence interval against each other.

Table 4. Tukey HSD tests comparing hybrid forecasts

Comparison	Estimate	*SE*	*df*	*t*	*p*	95% CI
vs. 5%-moderate+5%-tail						
95%-moderate+95%-tail	-0.015	0.170	594	-0.087	.100	[-0.453 0.423]
95%-moderate+5%-tail	-0.423	0.169	594	-2.494	0.062	[-0.859 0.014]
90% CI	-0.804	0.170	594	-4.735	< .001	[-1.241 -0.367]
vs. 95%-moderate+95%-tail						
95%-moderate+5%-tail	-0.408	0.170	594	-2.394	.079	[-0.847 0.031]
90% CI	-0.789	0.171	594	-4.625	< .001	[-1.229 -0.350]
vs. 95%-moderate+5%-tail						
90% CI	-0.381	0.170	594	-2.242	.113	[-0.819 0.057]

Note: Two-tailed tests reported.

These analyses were preregistered.

Appendix B – Supplemental Data and Analysis

Study 1A and 1B

Key t-tests assessing the effects of Probability and Temperature Threshold

In the Section *Do low probabilities undermine the credibility of temperature forecasts?,* the manuscript references t-tests marked with ^ in the Supplemental Table 5 below. We include the additional analyses for completeness, though these are not reported in the main text due to space constraints. Tests marked with * were preregistered.

Table 5. Descriptive statistics and comparisons on perceived credibility in Studies 1A and 1B

Study 1A (1-5 self-report scale)									
	5%		95%						
	M	*SD*	*M*	*SD*	*df*	*t*	*p*	95% CI	*d*
*^ Overall	2.77	1.11	3.09	1.22	388	-5.33	< .001	[-0.44 -0.20]	0.28
Moderate threshold	2.90	1.07	3.16	1.26	387	-2.20	.028	[-0.49 -0.03]	0.22
^Tail-risk threshold	2.64	1.13	3.02	1.18	387	-3.24	.001	[-0.61 -0.15]	0.33
^"Or more" frame	2.64	1.13	3.16	1.26	394	-4.37	<.001	[-0.76 -0.29]	0.44
	Moderate Threshold		Tail-risk threshold						
	M	*SD*	*M*	*SD*	*df*	*t*	*p*	95% CI	*d*
Overall	3.03	1.18	2.82	1.17	388	-3.40	<.001	[-0.44 -0.09]	0.18
5%	2.90	1.07	2.64	1.13	387	2.37	.018	[0.05 0.48]	0.24
^95%	3.16	1.26	3.02	1.18	287	1.18	.239	[-0.10 0.39]	0.12
Study 1B (1-7 self-report scale)									
	5%		95%						
	M	*SD*	*M*	*SD*	*df*	*t*	*p*	*M*	*SD*
*^ Overall	4.18	1.74	4.66	1.67	299	-4.44	<.001	[-0.69 -0.27]	0.28
Moderate threshold	4.18	1.76	4.96	1.60	298	-4.01	<.001	[-1.16 -0.40]	0.46
^Tail-risk threshold	4.18	1.71	4.35	1.70	298	-0.88	.379	[-0.56 0.21]	0.10
^"Or more" frame	4.18	1.71	4.96	1.60	298	-4.08	<.001	[-1.16 -0.40]	0.47
	Moderate Threshold		Tail-risk threshold						
	M	*SD*	*M*	*SD*	*df*	*t*	*p*	95% CI	*d*

Overall	4.57	1.72	4.27	1.70	299	-2.77	.006	[-0.52 -0.09]	0.18
5%	4.18	1.76	4.18	1.71	298	0	1	[-0.39 0.39]	0
^95%	4.96	1.60	4.35	1.70	298	3.19	.002	[0.23 0.98]	0.37

Note: M = Mean; SD = Standard Deviation.
Two-tailed t-tests reported.
Study 1A: 1-5 self-report scale.
Study 1B: 1-7 self-report scale.

* preregistered t-test. The remaining analyses were *not* preregistered.

Regressions assessing the effect of Frame

These analyses were not preregistered and are not referenced in the manuscript, but they are included for completeness, as they inspect effects of High Probability × Tail-risk Threshold interaction (i.e., Frame) in Studies 1A and 1B.

Table 6. Regressions on perceived credibility in Studies 1A and 1B

	Study 1A	Study 1B
(Intercept)	2.93***	4.42***
	(0.05)	(0.08)
High Probability	0.32***	0.48***
	(0.06)	(0.11)
Tail-risk Threshold	-0.21***	-0.30**
	(0.06)	(0.11)
High Probability × Tail-risk Threshold	0.12	-0.61^
	(0.20)	(0.33)
N	389	300
R^2	0.03	0.03

Note: *** p<0.001, ** p<0.01, * p<0.05, ^ p<0.1 (two-tailed). Standard error in parentheses, clustered at the participant level.
High Probability was contrast coded (low: -0.5, high: 0.5). Tail-risk Threshold was contrast coded (moderate threshold: -0.5, tail-risk threshold: 0.5).

Study 1A: 1-5 self-report scale.
Study 1B: 1-7 self-report scale.

These analyses were *not* preregistered, but they test the effects of Frame (Probability × Threshold interaction).

Study 2

Key regressions assessing the effects of Probability, Temperature Threshold, and Frame

In the section *Do low probabilities undermine the credibility of temperature forecasts?*, the manuscript reports the result of the High Probability term in regression (1). We preregistered to inspect this coefficient in this regression.

In the section *How do individual differences in pre-existing climate change attitudes affect reception to different descriptions of temperature increases?*, the manuscript reports the High Probability × Tail-risk Threshold × Climate Change Attitudes interaction term from regression (1). We preregistered to inspect this coefficient in this regression.

Regression (2) is included to demonstrate that the extremity of the climate model used in the forecasts—ranging from more optimistic to more pessimistic—does not interact with the effect of probability on credibility. This analysis was not preregistered and is noted briefly in the Discussion section as a demonstration of robustness.

In the section *Do "or less" vs. "or more" temperature change frames influence perceived emphasis on climate tail-risk?*, the manuscript reports the effects of the High Probability × Tail-risk Threshold interaction (i.e., Frame) in regression (3). We preregistered to inspect this coefficient in this regression.

Finally, in the section *How does the probability and the framing of a temperature forecast influence concern for climate tail-risk and climate risk more broadly?*, the manuscript reports the High Probability × Tail-risk Threshold interaction from regressions (4)–(6). These analyses were *not* preregistered, but were included to test the effects of Frame on importance measures.

Table 7. Key regressions in Study 2

	(1) Credibility	(2) Credibility	(3) Emphasis on Tail-Risk Warming	(4) Importance of Tail-Risk Warming	(5) Importance of Worst-case Scenarios	(6) Importance of Climate Change Preparation
(Intercept)	4.342*** (0.043)	4.633*** (0.101)	4.594*** (0.051)	3.974*** (0.038)	4.280*** (0.032)	4.396*** (0.026)
High Probability	0.194* (0.086)	0.309 (0.201)	0.201^ (0.103)	0.196** (0.076)	0.221*** (0.063)	0.103^ (0.053)

Tail-risk Threshold	-0.001 (0.086)	-0.004 (0.086)	0.399*** (0.103)	0.128^ (0.076)	0.039 (0.063)	-0.000 (0.053)
Climate Change Attitudes	0.196*** (0.045)	0.197*** (0.045)	0.061 (0.054)	0.166*** (0.040)	0.140*** (0.033)	0.146*** (0.028)
Model		-0.097** (0.030)				
Baseline Importance of Tail-Risk Warming	0.050 (0.041)	0.049 (0.041)	0.211*** (0.049)	0.394*** (0.036)	0.096** (0.030)	0.047^ (0.025)
Baseline Importance of Worst-Case Scenarios	0.077^ (0.043)	0.075^ (0.042)	0.201*** (0.051)	0.151*** (0.037)	0.470*** (0.031)	0.090*** (0.026)
Baseline Importance of Climate Change Preparation	0.392*** (0.047)	0.399*** (0.047)	-0.008 (0.056)	0.226*** (0.041)	0.292*** (0.035)	0.730*** (0.029)
High Probability × Tail-Risk Threshold	0.545** (0.172)	0.534** (0.172)	-0.925*** (0.206)	-0.119 (0.152)	-0.092 (0.126)	-0.125 (0.106)
High Probability × Climate Change Attitudes	0.093 (0.061)	0.106^ (0.061)	0.016 (0.072)	0.028 (0.053)	0.104* (0.044)	0.033 (0.037)
Tail-Risk Threshold × Climate Change Attitudes	0.118^ (0.061)	0.116^ (0.060)	-0.146* (0.073)	0.025 (0.053)	0.022 (0.044)	0.003 (0.037)
High Probability × Model		-0.038 (0.060)				
High Probability × Tail-risk Threshold × Climate Change Attitudes	-0.445*** (0.121)	-0.438*** (0.121)	-0.010 (0.145)	-0.012 (0.107)	-0.039 (0.089)	-0.073 (0.075)
N	1020	1020	1020	1020	1020	1020
R2	0.459	0.464	0.226	0.645	0.749	0.833

Note: *** p<0.001, ** p<0.01, * p<0.05, ^ p<0.1 (two-tailed). Standard error in parentheses.
High Probability was contrast coded (low: -0.5, high: 0.5). Tail-risk Threshold was contrast coded (moderate threshold: -0.5, tail-risk threshold: 0.5).
Climate Change Attitudes were coded such that smaller values indicate skepticism about anthropogenic climate change.
Climate Change Attitudes and all baseline measures were mean-centered.
Model is treated as continuous (1, 2, 3, 4, 5) and then mean-centered, with larger values indicating more pessimistic forecasts and higher temperature changes.

Regressions (1) and (3) were preregistered, the remaining analyses were *not* preregistered.

Post-hoc analyses unpacking Probability × Tail-risk Threshold × Climate Change Attitudes interaction on Credibility

In the section *How do individual differences in pre-existing climate change attitudes affect reception to different descriptions of temperature increases?*, the manuscript reports the High Probability × Tail-risk Threshold Attitudes interaction term among Skeptics and Believers. These analyses were *not* preregistered, but unpack the 3-way interaction Probability × Tail-risk Threshold × Climate Change Attitudes detected for Credibility in Supplemental Table 7.

Table 8. Post-hoc regressions on credibility in Study 2 by recruitment group

	Skeptics	Unsure	Believers
(Intercept)	4.136***	4.380***	4.510***
	(0.107)	(0.098)	(0.095)
High Probability	0.009	0.328^	0.321**
	(0.154)	(0.197)	(0.117)
Tail-Risk Threshold	-0.254	0.402*	0.085
	(0.154)	(0.196)	(0.118)
Baseline Importance of Tail-Risk Warming	0.067	0.130	0.041
	(0.076)	(0.094)	(0.055)
Baseline Importance of Worst-Case Scenarios	0.105	-0.075	0.080
	(0.064)	(0.106)	(0.070)
Baseline Importance of Climate Change Preparation	0.405***	0.403***	0.458***
	(0.077)	(0.113)	(0.070)
High Probability × Tail-Risk Threshold	1.238***	0.735^	-0.242
	(0.310)	(0.390)	(0.235)
N	408	199	413
R2	0.299	0.221	0.250

Note. *** p<0.001, ** p<0.01, * p<0.05, ^ p<0.1 (two-tailed). Standard error in parentheses.
High Probability was contrast coded (low: -0.5, high: 0.5). Tail-risk Threshold was contrast coded (moderate threshold: -0.5, tail-risk threshold: 0.5).
All baseline measures were mean-centered.
Participants were grouped into Skeptics, Unsure, and Believers based on their answers to a screener question on Connect: "Which of the following best describes your beliefs about climate change?". Skeptics either answered "*Strongly skeptical of claims about climate change and its link to human activities"* or "*Somewhat skeptical about the impact of human activities on climate change, believing that climate change is a natural cycle".* Unsure participants answered *"Uncertain about the causes and extent of climate change".* Believers either answered "*Strongly believe climate change is occurring and is primarily caused by human activities"* or "*Somewhat believe climate change is occurring and is influenced by human activities, but natural factors also play a significant role*."

These analyses were *not* preregistered, but unpack the 3-way interaction Probability × Tail-risk Threshold × Climate Change Attitudes detected for Credibility in Supplemental Table 7.

Comparing importance ratings before and after message exposure

In the section *How do temperature forecasts affect climate attitudes relative to baseline?,* the manuscript references comparisons of ratings of importance of tail-risk warming, worst-case climate scenarios, and climate change preparation before message exposure (i.e., baseline) and after message exposure. All these analyses were preregistered and inspect how attitudes shift with message exposure.

Table 9. Comparing importance measures before and after message exposure in Study 2

	Importance of Tail-Risk Warming									
	Baseline		Post							
Condition	*M*	*SD*	*M*	*SD*	*df*	*t*	*p*	95% CI	*d*	BF
5%-moderate	4.13	1.95	3.64	1.93	488	2.797	.005	[-0.834 -0.146]	0.253	
95%-moderate	4.24	1.95	4.00	2.00	522	1.415	.158	[-0.583 0.095]	0.124	0.463
5%-tail	4.48	1.93	4.06	1.99	524	2.445	.015	[-0.754 -0.082]	0.213	
95%-tail	4.25	2.08	4.10	2.11	498	0.790	.430	[-0.516 0.220]	0.071	0.253
	Importance of Worst-Case Scenarios									
5%-moderate	4.43	1.85	3.98	1.88	488	2.688	.007	[-0.784 -0.122]	0.243	
95%-moderate	4.59	1.90	4.36	2.00	522	1.314	.180	[-0.564 0.106]	0.117	0.42
5%-tail	4.65	1.84	4.27	1.99	524	2.275	.023	[-0.709 -0.052]	0.198	
95%-tail	4.67	1.89	4.42	2.07	498	1.421	.156	[-0.600 0096]	0.127	0.48
	Importance of Climate Change Preparation									
5%-moderate	4.38	1.98	4.18	2.01	488	1.157	.248	[-0.562 0.145]	0.105	0.35
95%-moderate	4.48	2.05	4.44	2.04	522	0.214	.831	[-0.389 0.313]	0.019	0.19
5%-tail	4.57	2.04	4.43	2.08	524	0.784	.434	[-0.493 0.212]	0.068	0.25
95%-tail	4.51	2.12	4.42	2.09	498	0.489	.625	[-0.461 0.277]	0.044	0.21

Note. M = Mean; SD = Standard Deviation; BF = Bayes Factor.
Two-tailed t-tests reported; Two-sided Bayes Factor reported.
1 > BF > 0.32 indicates evidence against the alternative hypotheses, but not worth more than bare mention;
0.32 > BF > 0.10 indicates substantial evidence against alternative hypothesis;
0.10 > BF > 0.03 indicates strong evidence against alternative hypothesis;
0.03 > BF > 0.01 indicates very strong evidence against null hypothesis.
BF < 0.01 indicates decisive evidence against alternative hypothesis (Jeffreys, 1998).

These analyses were preregistered.

Pairwise comparisons between conditions of interest

We examined pairwise comparisons among three messages: (i) the explicit low-probability tail-risk message, (ii) its high-probability complement, and (iii) the high-probability of moderate warming or more. This yielded three sets of regressions, reported in Supplemental Tables 10–12. Table 10 compares the two tail-risk threshold messages (low-probability tail-risk vs. its high-probability complement); Table 11 compares the two "*or more*" frames (low-probability tail-risk vs. high-probability moderate warming or more); and Table 12 compares the two high-probability messages (tail-risk complement vs. moderate warming or more).

In the section *Do low probabilities undermine the credibility of temperature forecasts?*, the manuscript reports the result of High Probability or Tail-risk Threshold on credibility in Tables 10-12. We preregistered to inspect these coefficients in these regressions.

In the section *Do "or less" vs. "or more" temperature change frames influence perceived emphasis on climate tail-risk?*, the manuscript reports the result of High Probability or Tail-risk Threshold on Emphasis on Tail-risk in Supplemental Tables 10-12. We preregistered to inspect these coefficients in these regressions.

Finally, in the section *How does the probability and the framing of a temperature forecast influence concern for climate tail-risk and climate risk more broadly?*, the manuscript reports the result of High Probability or Tail-risk Threshold on the importance measures in Supplemental Tables 10-12. We preregistered to inspect these coefficients in these regressions.

Most key results are robust (at $p = .05$) even when including those participants who did not pass all three comprehension questions at first try. There were two exceptions (one result going from marginal to significant, the other from significant to non-significant). First, we detected and noted in the main article that when communicators wish to convey tail-risk information, using the *more* frame low-probability message, despite being less credible, conveys more emphasis on specific tail-risk than its high-probability complement (Supplemental Table 10). This effect, with exclusions, was only marginal (b = -0.265, SE = 0.145, p = .069; BF = 0.340), but became significant without exclusions (b = -0.301, SE = 0.132, p = .024). Second, we detected and noted in the main article that high-probability messages reporting the chances of moderate warming *or more* (e.g., 95% chance that temperature increases 3.8ºF *or more*) seemed more credible than low-

probability messages reporting the chances of tail-risk warming *or more* (e.g., 5% chance that temperature increases 6.3ºF *or more*; Supplemental Table 11).This effect (-0.221, SE = 0.110, p = .045) was not statistically significant without exclusions (b = -0.157, SE = 0.102, p = .124; BF = .014).

Table 10. Regressions comparing the two tail-risk threshold conditions in Study 2 (5% *or more* vs. 95% *or less)*

	Credibility	Emphasis on Tail-Risk Warming	Importance of Tail-Risk Warming	Importance of Worst-Case Scenarios	Importance of Climate Change Preparation
(Intercept)	4.348*** (0.060)	4.798*** (0.072)	4.041*** (0.052)	4.299*** (0.046)	4.395*** (0.038)
High Probability	0.467*** (0.121)	-0.265^ (0.145)	0.138 (0.104)	0.179^ (0.092)	0.041 (0.076)
Climate Change Belief	0.216*** (0.063)	-0.107 (0.076)	0.106^ (0.054)	0.125** (0.048)	0.139*** (0.040)
Baseline Importance of Tail-Risk Warming	0.005 (0.057)	0.176* (0.068)	0.385*** (0.049)	0.117** (0.043)	0.056 (0.036)
Baseline Importance of Worst-case Scenarios	-0.018 (0.060)	0.235** (0.072)	0.168** (0.052)	0.475*** (0.046)	0.121** (0.038)
Baseline Importance of Climate Change Preparation	0.537*** (0.065)	0.087 (0.078)	0.288*** (0.056)	0.294*** (0.049)	0.707*** (0.041)
Baseline Importance of Specific Tail-Risk					
High Probability × Climate Change Belief	-0.128 (0.087)	0.020 (0.104)	0.028 (0.075)	0.086 (0.066)	-0.003 (0.055)
N	513	513	513	513	513
R2	0.499	0.206	0.678	0.745	0.832

Note: *** p<0.001, ** p<0.01, * p<0.05, ^ p<0.1 (two-tailed). Standard error in parentheses.
High Probability was contrast coded (low: -0.5, high: 0.5). Climate Change Belief was mean-centered.

These analyses were preregistered.

Table 11. Regressions comparing the two "*or more*" conditions in Study 2 (5% *or more* vs. 95% *or more)*

	Credibility	Emphasis on Tail-Risk Warming	Importance of Tail-Risk Warming	Importance of Worst-Case Scenarios	Importance of Climate Change Preparation
(Intercept)	4.201*** (0.055)	4.827*** (0.070)	4.005*** (0.050)	4.300*** (0.044)	4.427*** (0.037)
Tail-Risk Threshold	-0.221* (0.110)	0.210 (0.140)	-0.072 (0.101)	-0.192* (0.088)	-0.101 (0.074)
Climate Change Belief	0.226*** (0.060)	0.072 (0.076)	0.130* (0.055)	0.138** (0.048)	0.187*** (0.040)
Baseline Importance of Tail-Risk Warming	0.201*** (0.056)	0.151* (0.071)	0.409*** (0.052)	0.157*** (0.045)	0.038 (0.038)
Baseline Importance of Worst-Case Scenarios	0.079 (0.052)	0.321*** (0.066)	0.144** (0.048)	0.443*** (0.042)	0.099** (0.035)
Baseline Importance of Climate Change Preparation	0.339*** (0.063)	-0.054 (0.080)	0.254*** (0.058)	0.272*** (0.050)	0.709*** (0.042)
Tail-Risk Threshold × Climate Change Belief	0.012 (0.077)	-0.160 (0.098)	-0.005 (0.071)	-0.086 (0.061)	-0.029 (0.052)
N	525	525	525	525	525
R2	0.567	0.222	0.670	0.753	0.834

Note: *** p<0.001, ** p<0.01, * p<0.05, ∧ p<0.1 (two-tailed). Standard error in parentheses. Tail-risk Threshold was contrast coded (moderate threshold: -0.5, tail-risk threshold: 0.5). Climate Change Belief was mean-centered.

These analyses were preregistered.

Table 12. Regressions comparing the two high-probability conditions in Study 2 (95% *or more* vs. 95% *or less)*

	Credibility	Emphasis on Tail-Risk Warming	Importance of Tail-Risk Warming	Importance of Worst-Case Scenarios	Importance of Climate Change Preparation
(Intercept)	4.444*** (0.062)	4.693*** (0.074)	4.078*** (0.052)	4.393*** (0.042)	4.451*** (0.034)
Tail-Risk Threshold	0.274* (0.123)	-0.064 (0.147)	0.072 (0.104)	-0.006 (0.083)	-0.059 (0.067)
Climate Change Belief	0.175** (0.063)	0.031 (0.076)	0.152** (0.054)	0.170*** (0.043)	0.155*** (0.034)
Baseline Importance of Tail-Risk Warming	0.072 (0.060)	0.161* (0.071)	0.465*** (0.051)	0.125** (0.040)	0.101** (0.032)
Baseline Importance of Worst-Case Scenarios	0.074 (0.059)	0.213** (0.070)	0.136** (0.050)	0.467*** (0.040)	0.067* (0.032)
Baseline Importance of Climate Change Preparation	0.438*** (0.067)	0.062 (0.080)	0.203*** (0.057)	0.289*** (0.045)	0.708*** (0.036)
Tail-Risk Threshold × Climate Change Belief	-0.105 (0.086)	-0.144 (0.103)	0.012 (0.073)	0.000 (0.058)	-0.039 (0.047)
N	512	512	512	512	512
R2	0.493	0.208	0.674	0.791	0.867

Note: *** p<0.001, ** p<0.01, * p<0.05, ∧ p<0.1 (two-tailed). Standard error in parentheses. Tail-risk Threshold was contrast coded (moderate threshold: -0.5, tail-risk threshold: 0.5). Climate Change Belief was mean-centered.

These analyses were preregistered.

Bayes Factors of pairwise comparisons

We preregistered to report one-sided Bayes Factors for any key coefficient with $p > .05$ in the pairwise comparisons analysis above (i.e., coefficient for High Probability or Tail-Risk Threshold in Supplemental Tables 10-12). Our goal with these analyses was to assess degree of evidence for the following:

- The high-probability of moderate warming or more message has ratings at least as high as any of two messages that reference tail-risk (i.e., low-probability tail-risk message or its high-probability complement);
- The high-probability tail-risk complement message has ratings at least as high as the low-probability tail-risk message.

Table 13. Bayes Factor for pairwise comparisons on conditions of interest in Study 2

	95%-moderate < 95%-tail vs. 95%-moderate = 95%-tail (threshold > 0 vs. threshold = 0)	95%-moderate < 5%-tail vs. 95%-moderate = 5%-tail (threshold > 0 vs. threshold = 0)	95%-tail < 5%-tail vs. 95%-tail = 5%-tail (probability < 0 vs. probability = 0)
Importance of Tail-Risk Warming	0.066	0.022	0.017
Importance of Worst-Case Scenarios	0.034	NA	0.013
Emphasis on Tail-Risk Warming	0.026	0.195	0.340
Importance of Climate Change Preparation	0.020	0.016	0.025

Note. BF = Bayes Factor, one-sided.
1 > BF > 0.32 indicates evidence against the alternative hypotheses, but not worth more than bare mention;
0.32 > BF > 0.10 indicates substantial evidence against alternative hypothesis;
0.10 > BF > 0.03 indicates strong evidence against alternative hypothesis;
0.03 > BF > 0.01 indicates very strong evidence against null hypothesis.
BF < 0.01 indicates decisive evidence against alternative hypothesis (Jeffreys, 1998).

These analyses were preregistered.

Study 3

Key regressions assessing the effects of Probability, Temperature Threshold, and Frame

In the section *Do low probabilities undermine the credibility of temperature forecasts?*, the manuscript reports the result of the High Probability term in regression (1). We preregistered to inspect this coefficient in this regression.

In the section *How do individual differences in pre-existing climate change attitudes affect reception to different descriptions of temperature increases?*, the manuscript reports the High Probability × Tail-Risk Threshold × Climate Change Attitudes interaction term from regression (1). We preregistered to inspect this coefficient in this regression.

Regression (2) is included to demonstrate that the extremity of the climate model used in the forecasts—ranging from more optimistic to more pessimistic—does not interact with the effect of probability on credibility. This analysis was not preregistered and is noted briefly in the Discussion section as a demonstration of robustness.

In the section *Do "or less" vs. "or more" temperature change frames influence perceived emphasis on climate tail-risk?*, the manuscript reports the effects of the High Probability × Tail-risk Threshold interaction (i.e., Frame) in regression (3). We preregistered to inspect this coefficient in this regression.

Finally, in the section *How does the probability and the framing of a temperature forecast influence concern for climate tail-risk and climate risk more broadly?*, the manuscript reports the High Probability × Tail-risk Threshold interaction from regressions (4)–(6). These analyses were *not* preregistered, but were included to test the effects of Frame on importance measures.

Table 14. Key regressions in Study 3

	(1) Credibility	(2) Credibility	(3) Emphasis on Tail-Risk Warming	(4) Importance of Tail-Risk Warming	(5) Importance of Worst-Case Scenarios	(6) Importance of Climate Change Preparation
(Intercept)	5.110*** (0.029)	5.109*** (0.029)	5.132*** (0.037)	5.006*** (0.028)	5.391*** (0.021)	5.645*** (0.019)
High Probability	0.172** (0.059)	0.170** (0.059)	0.001 (0.073)	0.149** (0.056)	0.168*** (0.042)	0.167*** (0.039)

Tail-Risk Threshold	0.099^ (0.059)	0.099 (0.059)	0.439*** (0.073)	0.038 (0.056)	-0.066 (0.042)	-0.060 (0.039)
Baseline Importance of Climate Change Preparation	0.397*** (0.033)	0.397*** (0.033)	0.062 (0.042)	0.242*** (0.032)	0.251*** (0.024)	0.743*** (0.022)
Model		-0.035^ (0.021)				
Baseline Importance of Tail-Risk Warming	0.136*** (0.029)	0.137*** (0.029)	0.175*** (0.036)	0.379*** (0.027)	0.019 (0.020)	0.033^ (0.019)
Baseline Importance of Worst-Case Scenarios	0.059 ^ (0.034)	0.058^ (0.034)	0.170*** (0.042)	0.257*** (0.032)	0.634*** (0.024)	0.142*** (0.022)
High Probability × Tail-Risk Threshold	-0.348** (0.118)	-0.346** (0.118)	-1.239*** (0.147)	-0.275* (0.112)	0.058 (0.084)	0.038 (0.077)
High Probability × Baseline Importance of Climate Change Preparation	0.105** (0.038)	0.106** (0.038)	-0.021 (0.048)	-0.038 (0.036)	0.017 (0.027)	-0.041 (0.025)
Tail-Risk Threshold × Baseline Importance of Climate Change Preparation	0.061 (0.038)	0.059 (0.038)	-0.110* (0.048)	0.010 (0.036)	-0.009 (0.027)	0.001 (0.025)
High Probability × Model		-0.051 (0.041)				
High Probability × Tail-Risk Threshold × Baseline Importance of Climate Change Preparation	-0.260*** (0.07)	-0.266*** (0.077)	-0.084 (0.095)	0.001 (0.073)	0.045 (0.055)	0.028 (0.050)
N	1816	1816	1816	1816	1816	1816
R2	0.336	0.338	0.172	0.538	0.691	0.738

Note: *** p<0.001, ** p<0.01, * p<0.05, ∧ p<0.1 (two-tailed). Standard error in parentheses.

Probability was contrast coded (low: -0.5, high: 0.5). Tail-risk Threshold was contrast coded (moderate threshold: -0.5, tail-risk threshold: 0.5).
Climate Change Attitudes were coded such that smaller values indicate skepticism about anthropogenic climate change.
Climate Change Attitudes and all baseline measures are mean-centered.
Model is treated as continuous and mean-centered, with larger values indicating more pessimistic forecasts and higher temperature changes.

Regressions (1) and (3) were preregistered, the remaining analyses were *not* preregistered.

Post-hoc analyses unpacking Probability × Tail-risk Threshold × Climate Change Attitudes interaction on Credibility

In the section *How do individual differences in pre-existing climate change attitudes affect reception to different descriptions of temperature increases?*, the manuscript reports the High Probability × Tail-risk Threshold Attitudes interaction term among Skeptics and Believers. These analyses were *not* preregistered, but unpack the 3-way interaction Probability × Tail-risk Threshold × Climate Change Attitudes detected for Credibility in Supplemental Table 14.

Table 15. Post-hoc regressions on credibility in Study 3 by climate change attitudes

	Skeptics	Unsure	Believers
(Intercept)	4.259***	4.667***	5.297***
	(0.282)	(0.197)	(0.035)
High Probability	-0.322	-0.327	0.259***
	(0.233)	(0.227)	(0.064)
Tail-Risk Threshold	-0.081	-0.214	0.139*
	(0.232)	(0.229)	(0.063)
Baseline Importance of Tail-Risk Warming	0.405***	0.099	0.174***
	(0.107)	(0.102)	(0.030)
Baseline Importance of Worst-Case Scenarios	0.042	0.239*	0.155***
	(0.092)	(0.105)	(0.036)
High Probability × Tail-Risk Threshold	0.769	0.732	-0.591***
	(0.465)	(0.456)	(0.127)
N	178	133	1505
R2	0.145	0.095	0.098

Note. *** p<0.001, ** p<0.01, * p<0.05, ∧ p<0.1 (two-tailed). Standard error in parentheses.
High Probability was contrast coded (low: -0.5, high: 0.5). Tail-risk Threshold was contrast coded (moderate threshold: -0.5, tail-risk threshold: 0.5).
All baseline measures were mean-centered.
Participants were grouped into Skeptics, Unsure, and Believers based on their answers to a baseline measure of perceived importance of climate change preparation, asked before

exposure to the message: *Given competing priorities, how important do you think it is for governments to prepare for climate change?* This question was asked on a 1-7 scale anchored at the endpoints: 1 = Not important at all; 7 = Extremely important. Skeptics answered between 1-3; Unsure answered 4; Believers answered between 5-7.

These analyses were *not* preregistered, but probe the 3-way interaction detected for Credibility in Supplemental Table 14.

Regressions assessing the effect of Advocacy

Though omitted from the main text, an additional goal of Study 3 was to evaluate the effectiveness of an alternative way of drawing attention to tail-risk: explicitly advocating for tail-risk preparation through a brief statement (i.e., *Given that there is uncertainty about future temperature changes, society should prepare for the risk of temperature increases being surprisingly large, even catastrophic). Such advocacy might be expected to strongly influence perceptions of the communicator's emphasis* on specific tail-risk warming, given its explicit nature. Including this statement also provides a benchmark for comparing the effect size of advocacy against that of frame.

As preregistered, we ran regressions including Advocacy, Baseline Importance of Climate Change Preparation, their interaction, and covariates (Table 16). While advocacy did not affect credibility judgements (b = –0.033, SE = 0.059, p = .574, η_p^2 = 0.0002, two-sided Bayes Factor = 0.022), it increased perceived emphasis on tail-risk warming (b = 0.299, SE = 0.075, p < .001, η_p^2 = 0.009), though this effect was small. Importantly, the effect of advocacy on perceived emphasis on tail-risk was moderated by prior attitudes toward climate change (b = -0.114, SE = 0.049, p = .019, η_p^2 = 0.003), such that the advocacy statement had a stronger impact among participants less concerned about climate change (i.e., climate skeptics; b = 0.985, SE = 0.313, p = .002, η_p^2= 0.054) than among those concerned about climate change (i.e., climate change believers; b = 0.255, SE = 0.079, p = .001, η_p^2= 0.007). In other words, urging preparation for tail-risk emphasized the issue more strongly for those initially less concerned about climate change, perhaps because believers were already attuned to these risks. See Supplemental Table 16.

We also assessed how advocacy affected concern for climate tail-risk and climate change. Adding the advocacy statement had a small effect in perceived importance of worst-case climate scenarios in general (b = 0.083, SE = 0.042, p = .049, η_p^2 = 0.002), but had minimal impact on perceived importance of tail-risk warming or climate change preparation (ps > .05).

Most key results are robust (at $p = .05$) even when including those participants who did not pass all three comprehension questions at first try. However, the positive effect of advocacy on the importance of worst-case climate scenarios in general ($b = 0.083$, $SE = 0.042$, $p = .049$; Supplemental Table 16) is marginal without exclusions ($b = 0.079$, $SE = 0.041$, $p = .054$)

Table 16. Preregistered regressions in Study 3 assessing advocacy effects

	Credibility	Emphasis on Tail-Risk Warming	Importance of Tail-Risk Warming	Importance of Worst-Case Scenarios	Importance of Climate Change Preparation
(Intercept)	5.111***	5.137***	5.007***	5.392***	5.645***
	(0.030)	(0.037)	(0.028)	(0.021)	(0.019)
Advocacy	-0.033	0.299***	0.091	0.083*	0.064^
	(0.059)	(0.075)	(0.056)	(0.042)	(0.039)
Baseline Importance of Climate Change Preparation	0.402***	0.052	0.243***	0.255***	0.747***
	(0.034)	(0.043)	(0.032)	(0.024)	(0.022)
Baseline Importance of Tail-Risk Warming	0.133***	0.193***	0.380***	0.014	0.029
	(0.029)	(0.036)	(0.027)	(0.020)	(0.019)
Baseline Importance of Worst-Case Scenarios	0.058^	0.163***	0.258***	0.635***	0.145***
	(0.034)	(0.043)	(0.032)	(0.024)	(0.022)
Advocacy × Baseline Importance of Climate Change Preparation	-0.025	-0.114*	0.005	0.007	-0.013
	(0.039)	(0.049)	(0.036)	(0.027)	(0.025)
N	1816	1816	1816	1816	1816
R2	0.321	0.130	0.535	0.689	0.735

Note: *** p<0.001, ** p<0.01, * p<0.05, ∧ p<0.1 (two-tailed). Standard error in parentheses. High Probability was contrast coded (low: -0.5, high: 0.5). Advocacy was contrast coded (treatment: 0.5; control: -0.5). All baseline measures were mean-centered.

These analyses were preregistered.

Table 17. Post-hoc regressions on emphasis on tail-risk in Study 3 by climate change attitudes

	Skeptics	Unsure	Believers
(Intercept)	3.670***	2.803***	2.740***
	(0.355)	(0.590)	(0.232)
Advocacy	0.985**	-0.106	0.255**
	(0.313)	(0.274)	(0.079)
Baseline Importance of Tail-Risk Warming	-0.010	0.062	0.254***
	(0.146)	(0.121)	(0.027)
Baseline Importance of Worst-Case Scenarios	0.174	0.342***	0.190***
	(0.125)	(0.125)	(0.044)
N	178	133	1505
R2	0.145	0.095	0.098

Note. *** p<0.001, ** p<0.01, * p<0.05, ∧ p<0.1 (two-tailed). Standard error in parentheses. Advocacy was contrast coded (treatment: 0.5; control: -0.5). All baseline measures were mean-centered.

Participants were grouped into Skeptics, Unsure, and Believers based on their answers to a baseline measure of perceived importance of climate change preparation, asked before exposure to the message: *Given competing priorities, how important do you think it is for governments to prepare for climate change?* This question was asked on a 1-7 scale anchored at the endpoints: 1 = Not important at all; 7 = Extremely important. Skeptics answered between 1-3; Unsure answered 4; Believers answered between 4-7.

These analyses were preregistered: we preregistered to characterize the moderating effect of baseline importance of climate change preparation in the event of a significant ($p < .05$) interaction in the analyses of Supplemental Table 16.

We conducted additional analyses (*not* preregistered) to examine whether the presence of explicit advocacy moderated the effects of probability and frame (Supplemental Table 18). These results are referenced in the Discussion as robustness of the probability effects on credibility to explicit advocacy for tail-risk preparation.

Most key results are robust (at $p = .05$) even when including those participants who did not pass all three comprehension questions at first try. However, the interaction High Probability × Tail-risk Threshold × Advocacy, marginal with exclusions (Supplemental Table 18), is significant without exclusions ($b = 0.547$, $SE = 0.278$, $p = .049$).

Table 18. Additional regressions in Study 3 assessing advocacy effects

	Credibility	Emphasis on Tail-Risk Warming	Importance of Tail-Risk Warming	Importance of Worst-Case Scenarios	Importance of Climate Change Preparation
(Intercept)	5.110*** (0.030	5.137*** (0.037)	5.005*** (0.028)	5.391*** (0.021)	5.645*** (0.019)
High Probability	0.181** (0.059)	0.007 (0.073)	0.149** (0.056)	0.166*** (0.042)	0.166*** (0.039)
Tail-Risk Threshold	0.095 (0.059)	0.438*** (0.073)	0.038 (0.056)	-0.067 (0.042)	-0.059 (0.039)
Advocacy	-0.032 (0.059)	0.297*** (0.073)	0.089 (0.056)	0.083* (0.042)	0.065^ (0.039)
Baseline Importance of Climate Change Preparation	0.403*** (0.034)	0.061 (0.042)	0.242*** (0.032)	0.250*** (0.024)	0.742*** (0.022)
Baseline Importance of Tail-Risk Warming	0.133*** (0.029)	0.177*** (0.036)	0.379*** (0.027)	0.019 (0.020)	0.033^ (0.019)
Baseline Importance of Worst-Case Scenarios	0.057^ (0.034)	0.173*** (0.042)	0.258*** (0.032)	0.634*** (0.024)	0.143*** (0.022)
High Probability × Tail-Risk Threshold	-0.362** (0.119)	-1.236*** (0.146)	-0.268* (0.112)	0.056 (0.084)	0.045 (0.077)
High Probability × Advocacy	-0.006 (0.119)	-0.085 (0.146)	-0.013 (0.112)	-0.064 (0.084)	-0.056 (0.077)
Tail-Risk Threshold × Advocacy	0.121 (0.119)	0.016 (0.146)	-0.040 (0.112)	-0.073 (0.084)	0.047 (0.077)
High Probability × Tail-Risk Threshold × Advocacy	0.161 (0.237)	0.526^ (0.292)	-0.172 (0.223)	-0.012 (0.168)	0.031 (0.155)
N	1816	1816	1816	1816	1816
R2	0.329	0.178	0.539	0.692	0.738

Note: *** p<0.001, ** p<0.01, * p<0.05, ∧ p<0.1 (two-tailed). Standard error in parentheses.

High Probability was contrast coded (low: -0.5, high: 0.5). Tail-Risk Threshold was contrast coded (moderate threshold: -0.5, tail-risk threshold: 0.5). Advocacy was contrast coded (treatment: 0.5; control: -0.5). All baseline measures were mean-centered.

These analyses were *not* preregistered, but test any moderating effects of Advocacy on Probability and Frame.

Comparing importance ratings before and after message exposure

In the section *How do temperature forecasts affect climate attitudes relative to baseline?,* the manuscript references comparisons of ratings of importance of tail-risk warming, worst-case climate scenarios, and climate change preparation before message exposure (i.e., baseline) and after message exposure. All these analyses were preregistered and inspect how attitudes shift with message exposure.

Most key results are robust (at $p = .05$) even when including those participants who did not pass all three comprehension questions at first try. As noted in the main article, low-probability messages describing the changes of moderate warming *or less* did not decrease the perceived importance of worst-case climate scenarios in general, relative to baseline (Supplemental Table 19; 5%-moderate condition). Without exclusions, this difference reached statistical significance, $t(994) = -1.95$, $p = .050$, 95% CI [-0.40, -0.00], $d = 0.12$.

Table 19. Comparisons between baseline measures and after message exposure in Study 3

	Baseline		Post							
Condition	*M*	*SD*	*M*	*SD*	*df*	*t*	*p*	95% CI	*d*	*BF*
Importance of Tail-Risk Warming										
5%-moderate	5.26	1.70	4.86	1.85	902	3.370	< .001	[-0.630 -0.166]	0.224	
95%-moderate	5.32	1.55	5.21	1.64	954	1.114	.265	[-0.318 0.088]	0.072	0.254
5%-tail	5.29	1.69	4.99	1.73	904	2.644	.008	[-0.523 -0.77]	0.176	
95%-tail	5.12	1.60	4.96	1.74	864	1.462	.144	[-0.390 0.057]	0.071	0.404
Importance of Worst-Case Climate Scenarios										
5%-moderate	5.54	1.54	5.37	1.64	902	1.568	.117	[-0.374 0.042]	0.104	0.462
95%-moderate	5.61	1.51	5.58	1.54	954	0.318	.750	[-0.225 0.162]	0.021	0.148
5%-tail	5.45	1.64	5.19	1.71	904	2.300	.022	[-0.475 -0.038]	0.153	
95%-tail	5.48	1.46	5.41	1.51	864	0.709	.479	[-0.270 0.127]	0.048	0.188
Importance of Climate Change Preparation										

5%-moderate	5.77	1.52	5.63	1.61	902	1.318	.188	[-0.341 0.067]	0.088	0.329
95%-moderate	5.86	1.47	5.96	1.48	954	0.044	.965	[-0.192 0.184]	0.003	0.142
5%-tail	5.65	1.66	5.45	1.73	904	1.763	.078	[-0.420 0.023]	0.117	0.626
95%-tail	5.68	1.52	5.66	1.55	864	0.177	.860	[-0.224 0.187]	0.012	0.150

Note. M = Mean; SD = Standard Deviation; BF = Bayes Factor.
Two-tailed t-tests reported. Two-sided Bayes Factor reported.
1 > BF > 0.32 indicates evidence against the alternative hypotheses, but not worth more than bare mention;
0.32 > BF > 0.10 indicates substantial evidence against alternative hypothesis;
0.10 > BF > 0.03 indicates strong evidence against alternative hypothesis;
0.03 > BF > 0.01 indicates very strong evidence against null hypothesis.
BF < 0.01 indicates decisive evidence against alternative hypothesis (Jeffreys, 1998).

These analyses were preregistered.

Pairwise comparisons between conditions of interest

We examined pairwise comparisons among three messages: (i) the explicit low-probability tail-risk message, (ii) its high-probability complement, and (iii) the high-probability of moderate warming or more. This yielded three sets of regressions, reported in Supplemental Tables 20–22. Table 20 compares the two tail-risk threshold messages (low-probability tail-risk vs. its high-probability complement); Table 21 compares the two "*or more*" frames (low-probability tail-risk vs. high-probability moderate warming or more); and Table 22 compares the two high-probability messages (tail-risk complement vs. moderate warming or more).

In the section *Do low probabilities undermine the credibility of temperature forecasts?*, the manuscript reports the result of High Probability or Tail-risk Threshold on credibility in Supplemental Tables 20–22. We preregistered to inspect these coefficients in these regressions.

In the section *Do "or less" vs. "or more" temperature change frames influence perceived emphasis on climate tail-risk?*, the manuscript reports the result of High Probability or Tail-risk Threshold on Emphasis on Tail-risk in Supplemental Tables 20-22. We preregistered to inspect these coefficients in these regressions.

Finally, in the section *How does the probability and the framing of a temperature forecast influence concern for climate tail-risk and climate risk more broadly?*, the manuscript reports the result of High Probability or Tail-risk Threshold on the importance measures in Supplemental Tables 20–22. We preregistered to inspect these coefficients in these regressions.

Most key results are robust (at $p = .05$) even when including those participants who did not pass all three comprehension questions at first try. However, the significant interaction between Baseline Importance of Climate Change Preparation × Tail-risk Threshold observed for perceived emphasis on tail-risk warming when comparing the two high-probability messages (Supplemental Table 22) is not significant without exclusions ($b = -0.096$, $SE = 0.066$, $p = .148$).

Table 20. Regressions comparing the two tail-risk threshold conditions in Study 3 (5% *or more* vs. 95% *or less)*

	Credibility	Emphasis on Tail-Risk Warming	Importance of Tail-Risk Warming	Importance of Worst-Case Scenarios	Importance of Climate Change Preparation
(Intercept)	3.924***	3.801***	1.779***	1.924***	4.804***
	(0.277)	(0.333)	(0.260)	(0.204)	(0.191)
High Probability	0.003	-0.617***	0.009	0.193**	0.187**
	(0.083)	(0.100)	(0.078)	(0.062)	(0.058)
Baseline Importance of Climate Change Preparation	0.399***	0.050	0.271***	0.271***	0.762***
	(0.047)	(0.056)	(0.044)	(0.035)	(0.032)
Baseline Importance of Tail-Risk Warming	0.162***	0.178***	0.368***	0.001	0.041
	(0.040)	(0.048)	(0.038)	(0.030)	(0.028)
Baseline Importance of Worst-Case Scenarios	0.069	0.111^	0.238***	0.620***	0.108***
	(0.047)	(0.057)	(0.045)	(0.035)	(0.033)
Baseline Importance of Climate Change Preparation × High Probability	-0.023	-0.068	-0.039	0.037	-0.030
	(0.052)	(0.063)	(0.049)	(0.039)	(0.036)
N	886	886	886	886	886
R2	0.372	0.143	0.555	0.684	0.734

Note: *** p<0.001, ** p<0.01, * p<0.05, ^ p<0.1 (two-tailed). Standard error in parentheses.
High Probability was contrast coded (low: -0.5, high: 0.5). All baseline measures were mean-centered.

These analyses were preregistered.

Table 21. Regressions comparing the two "*or more*" conditions in Study 3 (5% *or more* vs. 95% *or more)*

	Credibility	Emphasis on Tail-Risk Warming	Importance of Tail-Risk Warming	Importance of Worst-Case Scenarios	Importance of Climate Change Preparation
(Intercept)	3.898 ***	3.694 ***	1.735 ***	1.504 ***	4.629 ***
	(0.249)	(0.298)	(0.237)	(0.187)	(0.177)
Tail-Risk Threshold	-0.082	0.449 ***	-0.103	-0.231 ***	-0.231 ***
	(0.077)	(0.092)	(0.073)	(0.057)	(0.054)
Climate Change Belief	0.424 ***	0.099 ^	0.252 ***	0.201 ***	0.728 ***
	(0.043)	(0.052)	(0.041)	(0.033)	(0.031)
Baseline Importance of Tail-Risk Warming	0.206 ***	0.089 ^	0.316 ***	-0.005	0.064 *
	(0.039)	(0.047)	(0.037)	(0.029)	(0.028)
Baseline Importance of Worst-Case Scenarios	0.038	0.232 ***	0.304 ***	0.706 ***	0.121 ***
	(0.044)	(0.052)	(0.042)	(0.033)	(0.031)
Baseline Importance of Climate Change Preparation × Tail-Risk Threshold	-0.045	-0.087	0.049	-0.027	0.041
	(0.049)	(0.059)	(0.046)	(0.037)	(0.035)
N	931	931	931	931	931
R2	0.423	0.178	0.576	0.716	0.742

Note: *** p<0.001, ** p<0.01, * p<0.05, ^ p<0.1 (two-tailed). Standard error in parentheses.
Tail-Risk threshold was contrast coded (moderate threshold: -0.5; tail-risk threshold: 0.5). All baseline measures were mean-centered.

These analyses were preregistered.

Table 22. Regressions comparing the two high-probability conditions in Study 3 (95% *or more* vs. 95% *or less)*

	Credibility	Emphasis on Tail-Risk Warming	Importance of Tail-Risk Warming	Importance of Worst-Case Scenarios	Importance of Climate Change Preparation
(Intercept)	4.142 ***	3.206 ***	1.568 ***	1.846 ***	4.648 ***
	(0.265)	(0.334)	(0.254)	(0.171)	(0.169)
Tail-Risk Threshold	-0.080	-0.179 ^	-0.102	-0.038	-0.042
	(0.083)	(0.105)	(0.080)	(0.054)	(0.053)
Baseline Importance of Climate Change Preparation	0.450 ***	0.041	0.210 ***	0.256 ***	0.705 ***
	(0.046)	(0.058)	(0.044)	(0.030)	(0.029)
Baseline Importance of Tail-Risk Warming	0.064	0.193 ***	0.348 ***	0.006	0.019
	(0.041)	(0.051)	(0.039)	(0.026)	(0.026)
Baseline Importance of Worst-Case Scenarios	0.129 **	0.165 **	0.305 ***	0.650 ***	0.177 ***
	(0.047)	(0.059)	(0.045)	(0.030)	(0.030)
Baseline Importance of Climate Change Preparation × Tail-Risk Threshold	-0.066	-0.151 *	0.013	0.014	0.016
	(0.056)	(0.070)	(0.053)	(0.036)	(0.035)
N	911	911	911	911	911
R2	0.349	0.123	0.501	0.721	0.725

Note: *** p<0.001, ** p<0.01, * p<0.05, ^ p<0.1 (two-tailed). Standard error in parentheses.
Tail-Risk threshold was contrast coded (moderate threshold: -0.5; tail-risk threshold: 0.5). All baseline measures were mean-centered.

These analyses were preregistered.

Bayes Factors of pairwise comparisons

We preregistered to report one-sided Bayes Factors for any key coefficient with $p > .05$ in the pairwise comparisons analysis above (i.e., coefficient for High Probability or Tail-risk Threshold in Supplemental Tables 20-22). Our goal with these analyses was to assess degree of evidence for the following:

- The high-probability of moderate warming or more message has ratings at least as high as any of two messages that reference tail-risk (i.e., low-probability tail-risk message or its high-probability complement);
- The high-probability tail-risk complement message has ratings at least as high as the low-probability tail-risk message.

Table 23. Bayes Factors for pairwise comparisons in Study 3

	95%-moderate < 95%-tail vs. 95%-moderate = 95%-tail (threshold > 0 vs. threshold = 0)	95%-moderate < 5%-tail vs. 95%-moderate = 5%-tail (threshold > 0 vs. threshold = 0)	95%-tail < 5%- tail vs. 95%- tail = 5%-tail (probability < 0 vs. probability = 0)
Credibility	0.010	0.010	0.018
Importance of Tail-Risk Warming	0.011	0.009	0.020
Importance of Worst-Case Scenarios	0.012	NA	NA
Emphasis on Tail-Risk Warming	0.007	NA	NA
Importance of Climate Change Preparation	0.009	NA	NA

Note. BF = Bayes Factor, one-sided.
1 > BF > 0.32 indicates evidence against the alternative hypotheses, but not worth more than bare mention;
0.32 > BF > 0.10 indicates substantial evidence against alternative hypothesis;
0.10 > BF > 0.03 indicates strong evidence against alternative hypothesis;
0.03 > BF > 0.01 indicates very strong evidence against null hypothesis.
BF < 0.01 indicates decisive evidence against alternative hypothesis (Jeffreys, 1998).

These analyses were preregistered.

Appendix C – Supplemental Design Details

Study 1A

We preregistered to recruit 400 participants via CivicPulse to participate in this study. A total of 503 policymakers participated in a survey that included this study. We included responses from participants who did not complete the entire survey in our final analysis as long as they answered the questions relevant for this experiment.

The sample was randomly drawn from a comprehensive list of local elected policymakers in U.S. township, municipality, and county governments serving communities of 1,000 or more. Elected policymakers included top elected officials and governing board members.

A total of 389 respondents completed this part of the survey.

Participants' judgements were randomly assigned to one of two cells, in a 2 cell within-subjects design (Prediction: high probability vs. low probability). Due to a mistake, the explicit design of this study was missing from the preregistration (Q4). We counterbalanced whether the statements were "or more" statements or "less than" statements such that, overall, the information conveyed in the statement was independent of the probability used.

Study 1B

We aimed to recruit 300 legal experts on a voluntary basis by email starting in August 2023. We preregistered that we would recruit only judges until October 30th, 2023, after which point we would recruit the remaining sample through a combination of judges, lawyers, law academics, and law students. However, the initial response rate from judges was very low, so we began recruiting lawyers on September 24th, 2023. This experiment was part of a larger survey, so participants also answered questions about 5 other projects in addition to this experiment (all sections in randomized order). We included responses from participants who did not complete the entire survey in our final analysis as long as they answered the questions relevant for this experiment.

As preregistered, for our main analysis, we included all observations except any that share the same IP address as a previous response (in which case we'll include the first response only) or any otherwise valid responses after the first 300.

Final sample (N = 300) has 261 lawyers and 39 judges.

Participants' judgements were randomly assigned to one of two cells, in a 2 cell within-subjects design (Prediction: high probability vs. low probability). We counterbalanced whether the statements were "or more" statements or "or less" statements such that, overall, the information conveyed in the statement was independent of the probability used.

Study 2

We aimed to recruit 1,200 participants from Connect, and received a total of 1,201 responses. Our goal was to recruit 240 participants (20% of the total sample) for each level of the Climate Change Belief screener: Which of the following best describes your beliefs about climate change? Responses were recoded such that higher numbers signal stronger belief in climate change.

Table 24. Sample size by climate change attitudes in Study 2

	Before exclusions	*After exclusions*
Screener		
Strongly believe climate change is occurring and is primarily caused by human activities (5)	240	204 (85%)
Somewhat believe climate change is occurring and is influenced by human activities, but natural factors also play a significant role (4)	240	204 (85%)
Uncertain about the causes and extent of climate change (3)	242	199 (82.23%)
Somewhat skeptical about the impact of human activities on climate change, believing that climate change is a natural cycle (2)	241	205 (85.06%)
Strongly skeptical of claims about climate change and its link to human activities (1)	238	208 (87.39%)
Total	1,201	1,020 (84.93%)

As preregistered, participants completed a captcha before beginning the study. In addition, to detect bots, we included a disguised (white text) question with an open-ended text-box which human participants should not be able to detect or fill out. We excluded observations where this question was non-empty (N = 2).

We included three comprehension questions about the excerpt, asking about: 1) the probability in the excerpt; 2) the temperature threshold in the excerpt; 3) the frame. Only those participants who got these comprehension questions right at first try (N = 1,022) were included in

our main analyses. Participants were not able to move on with the study until they answered these questions correctly.

The final sample for main analyses after exclusions consisted of 1,020 participants (M = 42.53, SD = 12.83; 523 men, 490 women, 6 non-binary/third gender, 1 prefers not to say).

Most key results are robust (at p = .05) even when including those participants who did not pass all three comprehension questions at first try. There were two exceptions (one result going from marginal to significant, the other from significant to non-significant). First, we detected and noted in the main article that when communicators wish to convey tail-risk information, using the *more* frame low-probability message, despite being less credible, conveys more emphasis on specific tail-risk than its high-probability complement (Supplemental Table 10). This effect, with exclusions, was only marginal (b = -0.265, SE = 0.145, p = .069; two-sided Bayes Factor = 0.340), but became significant without exclusions (b = -0.301, SE = 0.132, p = .024). Second, we detected and noted in the main article that high-probability messages reporting the chances of moderate warming *or more* (e.g., 95% chance that temperature increases 3.8ºF *or more*) seemed more credible than low-probability messages reporting the chances of tail-risk warming *or more* (e.g., 5% chance that temperature increases 6.3ºF *or more*).This effect (b = -0.221, SE = 0.110, p = .045; Supplemental Table 11) was not statistically significant without exclusions (b = -0.157, SE = 0.102, p = .124; two-sided Bayes Factor = .014).

Study 3

We aimed to recruit 2,000 participants from Connect, and received a total of 2,002 responses. Our goal was to recruit 566 (28.3%) democrats, 566 (28.3% republicans), 868 (43.4% independent) based on participants responses to a Connect screener. The ratios were approximated from a 2024 Gallup poll (https://news.gallup.com/poll/15370/party-affiliation.aspx): 28% democrats, 28% republican, 43% independent. See Supplemental Table 25 for a distribution of participants in this sample, before and after exclusions.

Table 25. Sample size by political affiliation in Study 3

	Before exclusions	*After exclusions*
Screener		
Democrat	565	521 (92.21%)
Republican	568	512 (90.14%)
Independent	869	783 (90.10%)
Total	2,002	1,816 (90.71%)

As preregistered, participants completed a captcha before beginning the study. In addition, to detect bots, we included a disguised (white text) question with an open-ended text-box which human participants should not be able to detect or fill out. We excluded observations where this question was non-empty (N = 3).

We included three comprehension questions about the excerpt, asking about: 1) the probability in the excerpt; 2) the temperature threshold in the excerpt; 3) the frame. Only those participants who got these comprehension questions right at first try (N = 1,819) were included in our main analyses. Participants were not able to move on with the study until they answered these questions correctly.

The final sample after exclusions consisted of 1,816 participants (M = 39.19, SD = 12.82; 750 men, 1,030 women, 23 non-binary/third gender, 13 prefers not to say).

Most key results are robust (at $p = .05$) even when including those participants who did not pass all three comprehension questions at first try. There are, however, several exceptions. First, the positive effect of advocacy on the importance of worst-case climate outcomes in general ($b = 0.083$, $SE = 0.042$, $p = .049$; Supplemental Table 16) is marginal without exclusions ($b = 0.079$, $SE = 0.041$, $p = .054$). Second, the interaction High Probability × Tail-risk Threshold × Advocacy, marginal with exclusions (Supplemental Table 18), is significant without exclusions ($b = 0.547$, $SE = 0.278$, $p = .049$). Third, as noted in the main article, low-probability messages describing the changes of moderate warming *or less* did not decrease the perceived importance of worst-case climate scenarios in general, relative to baseline (Supplemental Table 19; 5%-moderate condition). Without exclusions, this difference reached statistical significance, $t(994) = -1.95$, $p = .050$, 95% CI [-0.40, -0.00], $d = 0.12$. Finally, the significant interaction between Baseline Importance of Climate Change Preparation × Tail-risk Threshold observed for perceived emphasis on tail-risk warming when comparing the two high-probability messages (Supplemental Table 22) is not significant without exclusions ($b = -0.096$, $SE = 0.066$, $p = .148$).

In some analyses, we rely on the baseline measure of climate change preparation importance as a proxy for climate change attitudes. See Supplemental Table 26 for a distribution of responses in this sample.

Table 26. Sample size by climate change attitudes in Study 3

1 Not important at all	2	3	4	5	6	7 Extremely important
Skeptic			Unsure		Endorser	
54	50	74	133	310	396	799
	178		133		1,505	

Note. Based on responses to the baseline importance of climate change preparation item: *Given competing priorities, how important do you think it is for governments to prepare for climate change in general?*

Appendix D – Materials

Study 1A

[Consent Form]

PAGE BREAK

[UK GDPR disclaimer]

PAGE BREAK

{items belonging to other studies omitted}

Imagine you are reading the United Nation's latest report on climate change as you think about preparing your community for the future. It details the probability of different global temperature increases over the next 75 years based on the latest generation of climate models.

[Credibility] Please rate the credibility of two statements you might read below:
{Statement and credibility item repeated according to design structure}

- 5% probability, high temperature threshold, more frame

"There is a 5% chance that global temperature increases 6.3 ºF or more."

- 95% probability, high temperature threshold, less frame

"There is a 95% chance that global temperature increases 6.3 ºF or less."

- 95% probability, moderate temperature threshold, more frame

"There is a 95% chance that global temperature increases 3.8 ºF or more."

- 5% probability, moderate temperature threshold, less frame

"There is a 5% chance that global temperature increases 3.8 ºF or less."

  - Not at all credible
  - Not very credible
  - Somewhat credible
  - Very credible
  - Extremely credible

PAGE BREAK

{items belonging to other studies omitted}

Finally, just a few questions to better understand the demographics of our survey respondents.

In general, do you think of yourself as:

  - Very conservative
  - Somewhat conservative
  - Moderate, middle of the road
  - Somewhat liberal
  - Very liberal
  - Not sure

Generally speaking, do you usually think of yourself as a...

  - Democrat
  - Republican
  - Independent

- Other party ____

(If Independent of Other Party was selected) Do you think of yourself as closer to the Democratic Party or the Republican Party?

- Democratic Party
- Republican Party
- None

What is your gender?

- Man
- Woman
- Prefer to self-describe _____

When were you born?

- 1920 or earlier
- 1921-1925
- 1926 – 1930
- 1931 – 1935
- 1936 – 1940
- 1941 – 1945
- 1946 – 1950
- 1951 – 1955
- 1956 – 1960
- 1961 – 1965
- 1966 – 1970
- 1971 – 1975
- 1976 – 1980
- 1981 – 1985
- 1986 – 1990
- 1991 – 1995
- 1996 – 2000

- 2001 – 2005
- 2006 or later

What is the highest level of education you have completed?

- Less than high school
- High school graduate
- Technical/trade school
- Some college
- College graduate
- Some graduate school
- Graduate degree

Which of the following best describes your race/ethnicity? Please check all that apply.

- Asian/Pacific Islander
- Black/African American
- Hispanic/Latinx
- Native American
- Middle Eastern
- Mixed Race
- White
- Prefer to self-describe _____

Study 1B

[Consent Form]

PAGE BREAK

The next page contains the first (out of six) scenarios.

(In this survey, we are asking you **to imagine that you are a judge**.) {shown if participant was preselected as judge}

Please keep the following in mind:

- These scenarios are entirely hypothetical.
- They may contain questions that judges wouldn't face.
- You may have objections or questions about the scenarios.

These are intentional aspects of the study. Please interpret the scenarios to the best of your abilities in a common-sensical way and accept the stated hypothetical assumptions. **If you are unsure, pick the option you consider best given the limited information you have.** We understand this is different from how you make decisions in the courtroom. In this study, we're interested in your interpretation and responses to these hypothetical scenarios.

PAGE BREAK

{items belonging to other studies omitted}

Now consider this scenario:

- 5% probability, high temperature threshold, more frame

Imagine you are presiding over a case about government climate policy. An expert witness is called to give the court a balanced sense of possible temperature changes that would result from business-as-usual climate policy over the next 75 years. Their best climate model estimates that there is a **5%** chance of a temperature increase of **3.5ºC** (6.3 ºF) or more.

- 95% probability, high temperature threshold, less frame

Imagine you are presiding over a case about government climate policy. An expert witness is called to give the court a balanced sense of possible temperature changes that would result from business-as-usual climate policy over the next 75 years. Their best climate model estimates that there is a **95%** chance of a temperature increase of **3.5ºC** (6.3 ºF) or less.

- 95% probability, moderate temperature threshold, more frame

Imagine you are presiding over a case about government climate policy. An expert witness is called to give the court a balanced sense of possible temperature changes that would result from business-as-usual climate policy over the next 75 years. Their best climate model estimates that there is a **95%** chance of a temperature increase **2.1ºC** (3.8 ºF) or more.

- 5% probability, moderate temperature threshold, less frame

Imagine you are presiding over a case about government climate policy. An expert witness is called to give the court a balanced sense of possible temperature changes that would result from business-as-usual climate policy over the next 75 years. Their best climate model estimates that there is a **5%** chance of a temperature increase of **2.1ºC** (3.8 ºF) or less.

[Credibility] How credible would you find this testimony?

- Extremely uncredible
-
-
-

-
-
- Extremely credible

We now repeat the same scenario, but this time, we will ask you to imagine the expert witness gave slightly different information.

PAGE BREAK

{condition and credibility item repeated according to design structure}

{items belonging to other studies omitted}

To complete the study, don't forget to click the button at the very end of this page.

What is your age?

What is your gender?

- Man
- Woman
- Other
- Prefer not to answer

How many years have you been a lawyer/judge for? Please respond with a number.

In which country is your jurisdiction?

Do you have any comments, questions, or feedback about the survey? (optional)

Study 2

[Consent Form]

PAGE BREAK

In this study, we are interested in understanding **how people evaluate information about risk.**

PAGE BREAK

First, we want to understand how you perceive rare, catastrophic climate scenarios, as well as climate change more broadly.
Please answer the following questions.

[Baseline importance of tail-risk warming] Given competing priorities, how important do you think it is for society to prepare for global temperature increases **above [high temperature threshold]ºF**?

- o 1 Not important at all
- o 2
- o 3
- o 4
- o 5
- o 6
- o 7 Extremely important

[Baseline importance of worst-case climate scenarios] Given competing priorities, how important do you think it is for society to prepare for worst-case climate scenarios?

- 1 Not important at all
- 2
- 3
- 4
- 5
- 6
- 7 Extremely important

[Baseline importance of climate change preparation] Given competing priorities, how important do you think it is for governments to prepare for climate change in general?

- 1 Not important at all
- 2
- 3
- 4
- 5
- 6
- 7 Extremely important

PAGE BREAK

Thank you for your answers. Now, imagine you are reading the latest **United Nations report on climate change.**

This report details the chances of different global temperature increases over the next 75 years based on the latest generation of climate models and offers policy insights.

PAGE BREAK

Thank you for your answers. Now, imagine you are reading the latest **United Nations report on climate change.**

This report details the chances of different global temperature increases over the next 75 years based on the latest generation of climate models and offers policy insights.

We will ask you to evaluate **one excerpt from this report.**

PAGE BREAK

Thank you for your answers. Now, imagine you are reading the latest **United Nations report on climate change.**

This report details the chances of different global temperature increases over the next 75 years based on the latest generation of climate models and offers policy insights.

We will ask you to evaluate **one excerpt from this report.**

Please click the arrow below when you are ready to proceed.

PAGE BREAK

Suppose you read the following in a section of the report:

- 5% probability, moderate temperature threshold, less frame

There is a 5% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or less.

- 95% probability, moderate temperature threshold, more frame

There is a 95% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or more.

- 5% probability, high temperature threshold, more frame

There is a 5% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or more.

- 95% probability, high temperature threshold, less frame

There is a 95% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or less.

PAGE BREAK

Suppose you read the following in a section of the report:

- 5% probability, moderate temperature threshold, less frame

There is a 5% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or less.

- 95% probability, moderate temperature threshold, more frame

There is a 95% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or more.

- 5% probability, high temperature threshold, more frame

There is a 5% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or more.

- 95% probability, high temperature threshold, less frame

There is a 95% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or less.

Before you move on, we want to make sure you understand this excerpt. Please answer the questions below.

[Comprehension Question 1] What is the probability described in the statement? (in %)

[Comprehension Question 2] What is the temperature increase mentioned in the statement? (in ºF)

[Comprehension Question 3] Which one is correct?

- The excerpt describes the chances that global temperature increases [temperature threshold]ºF or **more**
- The excerpt describes the chances that global temperature increases temperature threshold]ºF **or less**

PAGE BREAK

Suppose you read the following in a section of the report:

- 5% probability, moderate temperature threshold, less frame

There is a 5% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or less.

- 95% probability, moderate temperature threshold, more frame

There is a 95% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or more.

- 5% probability, high temperature threshold, more frame

There is a 5% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or more.

- 95% probability, high temperature threshold, less frame

There is a 95% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or less.

[Credibility] How credible would you find the claim that there was a [probability]% chance that global temperature increases [temperature threshold]ºF or [frame]?

- 1 Not credible at all
- 2
- 3
- 4
- 5
- 6
- 7 Extremely credible

[Importance of tail-risk warming] Given competing priorities, how important would you think it was for society to prepare for global temperature increases **above [high temperature threshold]ºF (**the same temperature mentioned in the excerpt/a higher temperature than mentioned in the excerpt)?

- 1 Not important at all
- 2
- 3
- 4
- 5
- 6

- 7 Extremely important

[Importance of worst-case climate scenarios] Given competing priorities, how important would you think it was for society to prepare for worst-case climate scenarios?

- 1 Not important at all
- 2
- 3
- 4
- 5
- 6
- 7 Extremely important

[Emphasis on tail-risk warming] How much would you agree that the authors of this excerpt considered it important to prepare for temperature increases **above [high temperature threshold]°F (**the same temperature mentioned in the excerpt/a higher temperature than mentioned in the excerpt)?

- 1 Not important at all
- 2
- 3
- 4
- 5
- 6
- 7 Extremely important

[Importance of climate change preparation] Given competing priorities, how important would you think it was for governments to prepare for climate change in general?

- 1 Not important at all
- 2
- 3
- 4
- 5

- 6
- 7 Extremely important

PAGE BREAK

Thank you for your answers. We have some final questions about yourself.

Please indicate your age (in years):

How do you describe yourself?

- Male
- Female
- Non-binary / third gender
- Prefer to self-describe

Generally speaking, which of the following best describes your political position?

- Democrat
- Republican
- Libertarian
- Green
- Independent
- Other (specify)
- No preference

Which of the following best describes your political preference?

- 1 Strongly liberal
- 2
- 3
- 4 Moderate

- 5
- 6
- 7 Strongly conservative

On social issues I am:

- 1 Strongly liberal
- 2
- 3
- 4 Moderate
- 5
- 6
- 7 Strongly conservative

On economic issues I am:

- 1 Strongly liberal
- 2
- 3
- 4 Moderate
- 5
- 6
- 7 Strongly conservative

Study 3

[Consent Form]

PAGE BREAK

In this study, we are interested in understanding **how people evaluate information about risk.**

PAGE BREAK

First, we want to understand how you perceive rare, catastrophic climate scenarios, as well as climate change more broadly.
Please answer the following questions.

[Baseline importance of tail-risk warming] Given competing priorities, how important do you think it is for society to prepare for global temperature increases **above [high temperature threshold]ºF**?

- o 1 Not important at all
- o 2
- o 3
- o 4
- o 5
- o 6
- o 7 Extremely important

[Baseline importance of worst-case climate scenarios] Given competing priorities, how important do you think it is for society to prepare for worst-case climate scenarios?

- 1 Not important at all
- 2
- 3
- 4
- 5
- 6
- 7 Extremely important

[Baseline importance of climate change preparation] Given competing priorities, how important do you think it is for governments to prepare for climate change in general?

- 1 Not important at all
- 2
- 3
- 4
- 5
- 6
- 7 Extremely important

PAGE BREAK

Thank you for your answers. Now, imagine you are reading the latest **United Nations report on climate change.**

This report details the chances of different global temperature increases over the next 75 years based on the latest generation of climate models and offers policy insights.

PAGE BREAK

Thank you for your answers. Now, imagine you are reading the latest **United Nations report on climate change.**

This report details the chances of different global temperature increases over the next 75 years based on the latest generation of climate models and offers policy insights.

We will ask you to evaluate **one excerpt from this report.**

PAGE BREAK

Thank you for your answers. Now, imagine you are reading the latest **United Nations report on climate change.**

This report details the chances of different global temperature increases over the next 75 years based on the latest generation of climate models and offers policy insights.

We will ask you to evaluate **one excerpt from this report.**

Please click the arrow below when you are ready to proceed.

PAGE BREAK

Suppose you read the following in a section of the report:

- 5% probability, moderate temperature threshold, less frame [Advocacy statement]

There is a 5% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or less. [Given that there is uncertainty about future temperature changes, society should prepare for the risk of temperature increases being surprisingly large, even catastrophic.]

- 95% probability, moderate temperature threshold, more frame [Advocacy statement]

There is a 95% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or more. [Advocacy: Given that there is uncertainty about future temperature changes, society should prepare for the risk of temperature increases being surprisingly large, even catastrophic.]

- 5% probability, high temperature threshold, more frame [Advocacy statement]

There is a 5% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or more. [Advocacy: Given that there is uncertainty about future temperature changes, society should prepare for the risk of temperature increases being surprisingly large, even catastrophic.]

- 95% probability, high temperature threshold, less frame [Advocacy statement]

There is a 95% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or less. [Advocacy: Given that there is uncertainty about future temperature changes, society should prepare for the risk of temperature increases being surprisingly large, even catastrophic.]

PAGE BREAK

Suppose you read the following in a section of the report:

- 5% probability, moderate temperature threshold, less frame [Advocacy statement]

There is a 5% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or less. [Given that there is uncertainty about future temperature changes, society should prepare for the risk of temperature increases being surprisingly large, even catastrophic.]

- 95% probability, moderate temperature threshold, more frame [Advocacy statement]

There is a 95% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or more. [Advocacy: Given that there is uncertainty about future temperature changes, society should prepare for the risk of temperature increases being surprisingly large, even catastrophic.]

- 5% probability, high temperature threshold, more frame [Advocacy statement]

There is a 5% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or more. [Advocacy: Given that there is uncertainty about future temperature changes, society should prepare for the risk of temperature increases being surprisingly large, even catastrophic.]

- 95% probability, high temperature threshold, less frame [Advocacy statement]

There is a 95% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or less. [Advocacy: Given that there is uncertainty about future temperature changes, society should prepare for the risk of temperature increases being surprisingly large, even catastrophic.]

Before you move on, we want to make sure you understand this excerpt. Please answer the questions below.

[Comprehension Question 1] What is the probability described in the statement? (in %)

[Comprehension Question 2] What is the temperature increase mentioned in the statement? (in ºF)

[Comprehension Question 3] Which one is correct?

- The excerpt describes the chances that global temperature increases [temperature threshold]ºF or **more**
- The excerpt describes the chances that global temperature increases temperature threshold]ºF **or less**

PAGE BREAK

Suppose you read the following in a section of the report:

- 5% probability, moderate temperature threshold, less frame

There is a 5% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or less.

- 95% probability, moderate temperature threshold, more frame

There is a 95% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or more.

- 5% probability, high temperature threshold, more frame

There is a 5% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or more.

- 95% probability, high temperature threshold, less frame

There is a 95% chance that, by the end of the century, global temperature increases [temperature threshold]ºF or less.

[Credibility] How credible would you find the claim that there was a [probability]% chance that global temperature increases [temperature threshold]ºF or [frame]?

- o 1 Not credible at all
- o 2
- o 3

- 4
- 5
- 6
- 7 Extremely credible

[Importance of tail-risk warming] Given competing priorities, how important would you think it was for society to prepare for global temperature increases **above [high temperature threshold]ºF (**the same temperature mentioned in the excerpt/a higher temperature than mentioned in the excerpt)?

- 1 Not important at all
- 2
- 3
- 4
- 5
- 6
- 7 Extremely important

[Importance of worst-case climate scenarios] Given competing priorities, how important would you think it was for society to prepare for worst-case climate scenarios?

- 1 Not important at all
- 2
- 3
- 4
- 5
- 6
- 7 Extremely important

[Emphasis on tail-risk warming] How much would you agree that the authors of this excerpt considered it important to prepare for temperature increases **above [high temperature threshold]ºF (**the same temperature mentioned in the excerpt/a higher temperature than mentioned in the excerpt)?

- 1 Not important at all
- 2
- 3
- 4
- 5
- 6
- 7 Extremely important

[Importance of climate change preparation] Given competing priorities, how important would you think it was for governments to prepare for climate change in general?

- 1 Not important at all
- 2
- 3
- 4
- 5
- 6
- 7 Extremely important

PAGE BREAK

Thank you for your answers. We have some final questions about yourself.

Please indicate your age (in years):

How do you describe yourself?

- Male
- Female
- Non-binary / third gender
- Prefer to self-describe

Generally speaking, which of the following best describes your political position?

- Democrat
- Republican
- Libertarian
- Green
- Independent
- Other (specify)
- No preference

Which of the following best describes your political preference?

- 1 Strongly liberal
- 2
- 3
- 4 Moderate
- 5
- 6
- 7 Strongly conservative

On social issues I am:

- 1 Strongly liberal
- 2
- 3
- 4 Moderate
- 5
- 6
- 7 Strongly conservative

On economic issues I am:

- 1 Strongly liberal
- 2

- 3
- 4 Moderate
- 5
- 6
- 7 Strongly conservative

Supplemental Study

[Consent Form]

PAGE BREAK

In this study, we are interested in understanding **how people evaluate information about risk.**

PAGE BREAK

Imagine you are reading the latest **United Nations report on climate change.**

This report details the chances of different global temperature increases over the next 75 years based on the latest generation of climate models and offers policy insights.

PAGE BREAK

Thank you for your answers. Now, imagine you are reading the latest **United Nations report on climate change.**

This report details the chances of different global temperature increases over the next 75 years based on the latest generation of climate models and offers policy insights.

We will ask you to evaluate **one excerpt from this report.**

PAGE BREAK

Thank you for your answers. Now, imagine you are reading the latest **United Nations report on climate change.**

This report details the chances of different global temperature increases over the next 75 years based on the latest generation of climate models and offers policy insights.

We will ask you to evaluate **one excerpt from this report.**

Please click the arrow below when you are ready to proceed.

PAGE BREAK

Suppose you read the following in a section of the report:

- 5% probability, high temperature threshold, more frame

There is a 5% chance that, by the end of this century, global temperature increases 6.3ªF or more.

- 95% probability, high temperature threshold, less frame

There is a 95% chance that, by the end of this century, global temperature increases 6.3ªF or less.

- 95% probability, moderate temperature threshold, more frame

There is a 95% chance that, by the end of this century, global temperature increases 3.68ªF or more.

- 5% probability, moderate temperature threshold, less frame

There is a 5% chance that, by the end of this century, global temperature increases 3.68ªF or less.

- 95% probability, moderate temperature threshold, more frame + 5% probability, high temperature threshold, more frame

There is a 95% chance that, by the end of this century, global temperature increases 3.68ºF or more, and there is also a 5% chance that it increases 6.3ºF or more.

There is a 5% chance that, by the end of this century, global temperature increases 6.3ºF or more, and there is also a 95% chance that it increases 3.68ºF or more.

- 5% probability, moderate temperature threshold, less frame + 5% probability, high temperature threshold, more frame

There is a 5% chance that, by the end of this century, global temperature increases 3.68ºF or less, and there is also a 5% chance that it increases 6.3ºF or more.

There is a 5% chance that, by the end of this century, global temperature increases 6.3ºF or more, and there is also a 5% chance that it increases 3.68ºF or less.

- 95% probability, moderate temperature threshold, more frame + 95% probability, high temperature threshold, less frame

There is a 95% chance that, by the end of this century, global temperature increases 3.68ºF or more, and there is also a 95% chance that it increases 6.3ºF or less.

There is a 95% chance that, by the end of this century, global temperature increases 6.3ºF or less, and there is also a 95% chance that it increases 3.68ºF or more.

- 90% confidence interval

There is a 90% chance that, by the end of this century, global temperature increases between 3.68ºF and 6.3ºF.

PAGE BREAK

Suppose you read the following in a section of the report:

- 5% probability, high temperature threshold, more frame

There is a 5% chance that, by the end of this century, global temperature increases 6.3ªF or more.

- 95% probability, high temperature threshold, less frame

There is a 95% chance that, by the end of this century, global temperature increases 6.3ªF or less.

- 95% probability, moderate temperature threshold, more frame

There is a 95% chance that, by the end of this century, global temperature increases 3.68ªF or more.

- 5% probability, moderate temperature threshold, less frame

There is a 5% chance that, by the end of this century, global temperature increases 3.68ªF or less.

- 95% probability, moderate temperature threshold, more frame + 5% probability, high temperature threshold, more frame

There is a 95% chance that, by the end of this century, global temperature increases 3.68ºF or more, and there is also a 5% chance that it increases 6.3ºF or more.

There is a 5% chance that, by the end of this century, global temperature increases 6.3ºF or more, and there is also a 95% chance that it increases 3.68ºF or more.

- 5% probability, moderate temperature threshold, less frame + 5% probability, high temperature threshold, more frame

There is a 5% chance that, by the end of this century, global temperature increases 3.68ºF or less, and there is also a 5% chance that it increases 6.3ºF or more.

There is a 5% chance that, by the end of this century, global temperature increases 6.3ºF or more, and there is also a 5% chance that it increases 3.68ºF or less.

- 95% probability, moderate temperature threshold, more frame + 95% probability, high temperature threshold, less frame

There is a 95% chance that, by the end of this century, global temperature increases 3.68ºF or more, and there is also a 95% chance that it increases 6.3ºF or less.

There is a 95% chance that, by the end of this century, global temperature increases 6.3ºF or less, and there is also a 95% chance that it increases 3.68ºF or more.

- 90% confidence interval

There is a 90% chance that, by the end of this century, global temperature increases between 3.68ºF and 6.3ºF.

[Credibility] How credible would you find this claim?

- 1 Not credible at all
- 2
- 3
- 4
- 5
- 6
- 7 Extremely credible

[Attention check] This question is here to ensure that participants are paying attention to the questions they are given. If you have read the entire question carefully, please select "1 Strongly Disagree".

- 1 Strongly disagree
- 2
- 3
- 4
- 5
- 6
- 7 Strongly agree

PAGE BREAK

Thank you for your answers. We have some final questions about yourself.

Please indicate your age (in years):

How do you describe yourself?

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- 4 Moderate
- 5
- 6
- 7 Strongly conservative

References

Jeffreys, H. (1998). *The Theory of Probability*. OuP Oxford.