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Eliciting empathy and anticipated guilt to promote pro-environmental actions: the impact of narrative and psychological distance in stories about climate-change impacts on animals

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Climate change threatens wildlife by disrupting habitats, food sources, and ecosystems, highlighting the need for effective communication strategies that promote environmental actions. Storytelling, particularly through narrative messaging, can be an effective tool for fostering emotional engagement and motivating pro-environmental behaviors. This study explored how narrative messages about animals affected by climate change can elicit empathy and anticipated guilt and ultimately encourage behavioral intentions to mitigate harm. Study 1 ($N = 229$) investigated the role of narrative features and psychological distance in eliciting empathy. Using a 3×2 experimental design, it examined first-person, third-person, and non-narrative formats while varying animals' phylogenetic similarity to humans (similar vs. dissimilar). Narrative messages, regardless of perspective, significantly increased empathy compared to non-narrative messages. Empathy levels were consistent across animals similar (e.g., mammals) and dissimilar (e.g., insects) to humans, demonstrating the broad applicability of narrative storytelling in environmental advocacy. Building on these insights, Study 2 ($N = 250$) employed a 2×4 experimental design to assess how narrative formats influenced pro-environmental intentions via mediators of discrete emotions (sadness and anger), empathy, and anticipated guilt. Path analyses indicated that narrative messages elicited greater anger and sadness but not empathy. Empathy and sadness influenced anticipated guilt, which was associated with pro-environmental behavioral intentions. These findings highlight the complex role of narrative storytelling in environmental communication and contribute to theoretical development and practical applications by demonstrating how narratives can elicit emotional engagement, foster moral emotions, and promote pro-environmental behavioral intentions.

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Introduction

Climate change poses significant threats to wildlife by disrupting habitats and food sources, leading to biodiversity losses and destabilization of ecosystems (Waller et al., 2025). Although human-centered consequences of climate change have been extensively documented, the profound and widespread impacts on non-human animals have received comparatively less attention (Almiron and Faria, 2019; Rottman et al., 2015). Globally, wildlife species face escalating climate-based challenges, highlighting the need for effective communication strategies to motivate public action to address the crisis (e.g., Kaufmann et al., 2023).

Storytelling is a particularly effective tool for bridging the gap between scientific knowledge and public engagement. Narratives are uniquely powerful because they convey complex information in ways that are relatable, emotional, and memorable (e.g., Green and Brock, 2002). By allowing audiences to experience worlds through the lenses of others, stories can evoke strong emotional connections that motivate behavioral change. In the context of environmental communication, narrative-based approaches can vividly illustrate the tangible consequences of climate change and transform abstract scientific data into emotionally resonant stories (Kolandai-Matchett et al., 2020). Stories featuring non-human animals hold the potential to elicit moral emotions by personalizing their plight, which may foster empathy and cultivate a sense of shared responsibility among audiences (Małecki et al., 2019).

Empathy and guilt are central to the moral-emotional processes that drive pro-environmental behaviors (Davis, 2006; Tangney et al., 2007; Swim and Bloodhart, 2014). Empathy enables individuals to emotionally connect with the experiences of others, fostering compassion and concern, whereas guilt—particularly anticipated guilt associated with inaction—motivates corrective behaviors aimed at alleviating harm (Basil et al., 2008; Tangney et al., 2007). Despite the theoretical potential of these emotions, prior research on empathy-driven narratives has predominantly focused on human-centered stories (e.g., Zillmann, 2006; Zillmann et al., 1974), leaving the effects of animal-focused narratives underexplored. Previous research indicates that exposure to images of animals in general can increase empathy and altruistic behavior (e.g., Thomas-Walters et al., 2020; Whitley et al., 2020), suggesting that visual depictions may complement narrative strategies in fostering pro-environmental engagement.

The current project examined the interplay of empathy and anticipated guilt in response to narrative messages about animals impacted by climate change. Across two studies, we explored the extent to which narrative messages elicited empathy and anticipated guilt, which may encourage audiences to help mitigate harm to animals and the environment. The goal was to identify which narrative elements were more effective in environmental communication. Study 1 focused on how narrative format, narrative perspective, and psychological distance influenced empathy. Study 2 examined the effects of narrative format on pro-environmental intentions through sadness, anger, empathy, and anticipated guilt.

Study 1

Moral considerations play a key role in motivating individuals to adopt behaviors that benefit, or do not harm, the environment (e.g., Jia et al., 2017). Empathy, as both a moral disposition and emotion, is a critical component of effective environmental communication, especially when addressing climate-change challenges to wildlife (Smith et al., 2024; Xue et al., 2023). Previous research demonstrated that taking the perspective of animals and nature can increase individuals' concern for

environmental issues (e.g., Schultz, 2000), suggesting that empathizing with nonhumans can expand moral concern beyond the self and influence pro-environmental attitudes. In turn, Study 1 examined how narrative structure (operationalized as first- vs. third-person point of view narration) and psychological distance influenced empathy toward animals affected by climate change.

Narrative feature and emotional engagement. As simulations of social experiences, narratives have long been recognized as powerful tools for fostering emotional engagement (e.g., Coplan, 2004; Hamby and Jones, 2021). By engaging in mental simulations of social experiences, audiences can enhance their own socio-emotional skills, especially empathy. For instance, numerous studies show that frequent readers of (fictional) narratives perform better on empathy-related tasks than frequent readers of non-fiction (e.g., Bal and Vektkamp, 2013; Mar et al., 2006, 2009). Two mechanisms are thought to facilitate these effects. First, the degree of transportation into the narrative world (i.e., an audience's immersion in the story; Green and Brock, 2002) plays a key role in eliciting empathy. Vivid, realistic, and emotionally intense narrative storylines make it easier for audiences to imagine events happening to a character, leading to increased immersion into the story and greater likelihood of experiencing characters' emotions. Similarly, narratives promote character identification, or the merging of perspectives with the character through which one experiences events through their eyes (e.g., Cohen, 2001). Character identification requires and promotes affective (e.g., feelings and affinity toward the character) and cognitive empathy (e.g., adopting the character's motivations and point of view) (Tal-Or and Cohen, 2010).

Most prior studies of empathy-triggering transportation and identification have examined narratives featuring human protagonists. This is reasonable, as empathy research in general has focused on humans (Young et al., 2018). However, ample evidence shows that humans experience empathy toward animals in the same way that they do humans (e.g., Ascione, 1992; de Waal, 2008; Ruckert, 2016). In fact, Young et al. (2018) offered a definition of empathy that acknowledges this reality: "Empathy is a stimulated emotional state that relies on the ability to perceive, understand and care about the experiences or perspectives of another person *or animal*" (p. 3; emphasis added). Furthermore, the psychological processes associated with experiencing empathy toward humans and animals are thought to be the same (Myers, 2007) and develop in childhood through anthropomorphism (i.e., attribution of human-like traits to animals; e.g., Harrison and Hall, 2010).

Although infants can detect animacy—the basis for anthropomorphic attributions—within the first year, children begin making reliable peer-like anthropomorphic attributions to animals during their preschool years (i.e., ages 3–5; Geerds, 2016). In an attempt to understand the biological world, young children are thought to extend their knowledge about humans to other living things based on behavioral similarity to humans (Carey, 1985); that is, children apply knowledge of their own beliefs, intentions, and emotions in an attempt to understand the mental states of other species (Gallup, 1985). Formal and informal education, direct contact with animals, and exposure to anthropomorphic representations in children's television and films can all increase a child's tendency to generalize human traits to animals (e.g., Geerds, 2016; Tarłowski and Rybska, 2021). Such anthropomorphic attributions foster emotional engagement with animals, make animals more relatable, and can increase positive attitudes toward and reduce fear of animals (e.g., Reider and LoBue, 2024). Thus, anthropomorphism is thought to be a

component of a general empathic ability that may have evolved from the need to understand other's intentions and emotions of others (Eddy et al., 1993).

As noted above, narratives can transport audiences to story worlds filled with compelling characters, which trigger empathic responses. Through anthropomorphic attributions, those empathic responses can be elicited by animal characters. Moreover, animals in both the mediated and material world are often perceived as innocent beings who are not responsible for any harm they suffer, which can further enhance audience empathy (Angantyr et al., 2011), as can their physical appearance (Paulhus, 2023). Thus, a narrative featuring an animal harmed by climate change should trigger an empathic response in audiences. Consequently, we predicted:

H1: Messages presented in a narrative format featuring an animal harmed by climate change will elicit higher levels of empathy compared to similar non-narrative messages.

Narrative point of view and empathy. Research consistently shows that narrative structures—for instance, narration from a first- versus a third-person point of view (POV) (e.g., Chen and Bell, 2022)—can also facilitate audience engagement and emotional responses. First-person narratives—those in which the narrator is an active character, conveying the story from their own perspective—are generally more effective than third-person narratives (i.e., narrator as observer) in influencing a variety of audience responses (e.g., Kim, and Lee (2017); Nan et al., 2015; Winterbottom et al., 2008), though some mixed results have been reported (e.g., Christy, 2017; Kaufman and Libby, 2012). When observed, these effects were presumed to be facilitated through the transportation and identification processes described above (e.g., Nan et al., 2015). However, most studies have featured humans as narrative characters. Thus, the effectiveness of first-versus third-person POVs in eliciting empathy in animal-centered narratives remains unclear.

RQ1: Do narrative stories of an animal suffering from climate change narrated from a first-person POV elicit greater levels of empathy than similar stories narrated from a third-person POV?

Psychological distance and perceived similarity. Although animals can elicit empathy, evidence suggests that they do not all do so in equal measure. Paulhus (2023) identified four characteristics that shape empathic responses to animals: perceived intelligence (i.e., smarter animals evoke more empathy), size (i.e., larger animals tend to evoke more empathy), esthetic appeal (i.e., attractive or “cute” animals elicit stronger empathy), and lack of harmfulness (i.e., animals perceived to be gentle or harmless evoke more empathy). Moreover, according to construal level theory, psychological distance (i.e., perceived closeness or remoteness of an entity or event) shapes how individuals mentally represent a subject and can influence their capacity for empathy (Li and Lee, 2023; Tang and Chooi, 2023; Williams et al., 2014), with closer distances eliciting more concrete and emotionally engaging representations (Trope and Liberman, 2010). In the context of animals, social distance—defined here by their phylogenetic similarity to humans—may also play a role in shaping empathic responses.

Studies have shown that animals perceived as more similar to humans elicit higher levels of empathy than dissimilar species (Harrison and Hall, 2010; Priguda and Neumann, 2014). For instance, empathic responses to mammals depicted as victims of harm were stronger than those to reptiles (Ingham et al., 2015). The current study built on these insights by testing effects of psychological distance on empathy for animals impacted by climate change. Based on prior findings, we predicted:

Table 1 Study 1 research conditions and means.

Condition	<i>n</i>	Mean (Empathy)	SD
Moose, first-person	19	4.77	1.63
Moose, third-person	20	4.56	1.24
Moose, non-narrative	18	3.79	1.38
Bear, first-person	20	5.21	0.98
Bear, third-person	18	4.70	1.59
Bear, non-narrative	20	3.51	1.17
Salamander, first-person	19	4.31	1.70
Salamander, third-person	18	4.66	1.41
Salamander, non-narrative	19	3.52	1.50
Beetle, first-person	19	4.35	1.29
Beetle, third-person	19	4.43	1.39
Beetle, non-narrative	20	3.53	1.54

H2: Messages featuring an animal similar to humans will elicit higher levels of empathy than messages featuring an animal dissimilar to humans.

Study 1 method

Design and stimuli. An online experiment was conducted using a 3 (message type: first-person narrative, third-person narrative, non-narrative facts) x 2 (psychological distance: similarity vs. dissimilarity to humans) between-subjects design. Participants were randomly assigned to read a story featuring a moose or brown bear (similar) or a beetle or salamander (dissimilar). Within-condition animal type repetition helped minimize potential individual message confounds and enhance generalizability (e.g., Thorson et al., 2012).

To enhance credibility and ecological validity, the selected animals were identified as vulnerable or endangered species impacted by climate change, as documented by scientific organizations (e.g., National Geographic, World Wildlife Fund). Species were also chosen for their limited symbolic associations (e.g., butterflies, which can symbolize transformation and freedom; bees, which are associated with industriousness; Antil and Kanaujia, 2024; Hollingsworth, 2005).

The stimuli were text-based short stories (≈300 words) detailing negative impacts of climate change on animals, narrated either from a first- (e.g., use of “I” statements) or third-person POV (e.g., use of “she” and “her”). Content about the animals and their plight was held consistent across all story versions, except for animal names, features, and habits. The non-narrative version contained only facts about the animals’ general characteristics and their suffering from climate change. All stories included images of the featured animals. Experimental stimuli are available on our Open Science Framework (OSF) project site: https://osf.io/ve7h9/?view_only=714c0c1b65c6468291b324eba5a53625. After providing consent, participants were randomly assigned to read one of 12 narratives (see Table 1).

Participants. The study was approved by the Florida State University Institutional Review Board (IRB) prior to data collection. A total of 229 undergraduates participated in the online experiment for course credit. Participant ages ranged from 18 to 38 ($M = 21$, $SD = 2.49$). Most participants (87.8%) identified as female (10.9% male, 1.3% gender non-binary) and as White (71.6%; 13.1% Hispanic, 7.4% African American, and 4.4% Asian). The sample exceeded the ideal sample size of $N = 225$ calculated using G*Power (version 3.1.9.4), with effect size f set at 0.25 (medium effect size) and power at 0.8.

Measurement. Full item wording and descriptive statistics for all measures are provided in Appendix Table A1 and on the OSF

site. Cognitive and affective dimensions of *empathy* were measured by seven items adapted from Basil et al. (2006) and Escalas and Stern (2003). Items were reworded to reflect the perspective of the animals/insects while preserving the original meaning. Participants rated their agreement with statements on a 7-point scale, (1 = *not at all* to 7 = *extremely*). To account for individual differences in dispositional empathy, eight *trait empathy* items from Davis's (1980) Interpersonal Reactivity Index were used in a pretest prior to message exposure. Participants rated their agreement on 7-point scales (1 = *completely disagree*, and 7 = *completely*).

Manipulation check. Two items from a previous study (Kim and Lee, 2017) assessed the effectiveness of the narrative and POV manipulations. Participants responded to two statements: "The article showed an animal/insect suffering in a story format" (narrative check) and "The article showed an animal/insect suffering in a story format from the animal's/insect's point of view" (POV check). Responses were coded (-1 = *No*, 0 = *Unsure*, 1 = *Yes*) and averaged.

Participants in the narrative conditions ($M = 0.95$, $SD = 0.24$) scored higher on the narrative check item than those in the non-narrative conditions ($M = 0.51$, $SD = 0.81$), $t_{227} = -6.33$, $p < 0.001$. Additionally, participants in the first-person POV conditions ($M = 0.92$, $SD = 0.35$) scored higher on the POV check item than those in the third-person conditions ($M = 0.51$, $SD = 0.78$), $t_{150} = 4.26$, $p < 0.001$. Accordingly, both manipulations were considered successful.

Study 1 results

A two-way ANCOVA using the general linear model (GLM) was conducted to examine the effects of message type (narrative vs. non-narrative) and psychological distance (similar vs. dissimilar to humans) on empathy, controlling for trait empathy measured prior to message exposure. In support of H1, a significant main effect of message type on empathy was observed, $F_{1, 224} = 34.71$, $p < 0.001$, $\eta^2 = 0.13$, indicating that narrative messages ($M = 4.63$, $SD = 1.41$) elicited higher levels of empathy than non-narrative messages ($M = 3.58$, $SD = 1.38$). Trait empathy was a significant covariate, $B = 0.59$, $F_{1, 224} = 33.72$, $p < 0.001$, $\eta^2 = 0.13$, with greater trait empathy associated with greater empathy elicited by the messages.

Psychological distance did not significantly affect empathy, $F_{1, 224} = 1.55$, $p = 0.22$. Stories about animals more psychologically close to humans ($M = 4.23$, $SD = 1.44$) elicited similar levels of empathy to those about animals more psychologically distant ($M = 4.12$, $SD = 1.51$)¹. Additionally, the interaction between message type and psychological distance on empathy was not significant, $F_{1, 224} = 0.12$, $p = 0.74$. Thus, H2 was not supported.

A separate ANCOVA comparing the influence of point of view on empathy scores across the narrative conditions found no significant difference between first- ($M = 4.67$, $SD = 1.45$) and third-person POV ($M = 4.59$, $SD = 1.38$), $F_{1, 149} = 0.14$, $p = 0.71$, $\eta^2 = 0.001$. Trait empathy was a significant covariate in the model, $B = 0.59$, $F_{1, 149} = 23.29$, $p < 0.001$, $\eta^2 = 0.14$, with greater trait empathy associated with greater empathy elicited by the messages. Thus, with respect to RQ1, first- and third-person narratives elicited similar levels of empathy.

Study 1 discussion

Results indicated that narrative messages were more effective in eliciting empathy toward animals harmed by climate change than non-narrative messages. This finding is consistent with prior evidence of the persuasive power of storytelling to foster emotional engagement (e.g., Coplan, 2004; Hamby and Jones, 2021).

However, the use of first- vs. third-person POV did not significantly influence levels of empathy. This suggests that the narrative format itself, rather than the perspective adopted, might play the primary role in eliciting empathetic responses.

Contrary to expectations, psychological distance did not significantly affect empathy levels, with messages featuring animals dissimilar to humans (i.e., beetles, salamanders) eliciting empathy levels similar to those featuring animals more similar to humans (i.e., moose, bears). One explanation for this finding is that the portrayal of all animals as climate-change *victims* overrode the differentiating qualities of perceived intelligence, size, esthetic appeal, lack of harmfulness (Paulhus, 2023), or other human-animal similarities. Additionally, although temporary changes in how an event is construed can influence perceptions of psychological distance, extant literature on construal of climate change risk does not find consistent evidence that manipulating climate-risk messages to reduce psychological distance leads to long-term changes in climate-change perceptions and related adaptive or mitigative behaviors (Wang et al., 2021). Indeed, our results indicate limited influence of the psychological distance manipulation on empathy for the depicted non-human victims of climate change. Regardless, the Study 1 results underscored the importance of storytelling in fostering emotional connections with animals suffering from climate change.

Study 2

A follow-up study expanded on Study 1 findings by investigating how narratives that can elicit empathy and related emotions might also enhance intentions to engage in pro-environmental or mitigative behaviors through their influence on anticipated guilt.

In environmental advocacy, storytelling provides an opportunity to frame climate change as a personal and emotionally resonant issue (Bilandzic and Sukalla, 2019; Bloomfield and Manktelow, 2021; Moezzi et al., 2017). As shown in Study 1, narratives anthropomorphizing animals impacted by climate change can increase empathy for their plights, which in turn may foster intentions to act in their defense (James, 2019; Keen, 2011). Based on findings from past studies (including Study 1), we predicted:

H1: Messages presented in a narrative format featuring an animal harmed by climate change will elicit higher levels of empathy compared to similar non-narrative messages.

Empathy in guilt arousal. Empathy plays a central role in the impact of storytelling by emotionally connecting audiences with characters' experiences and allowing individuals to perceive others' suffering as personally relevant (Batson, 1981; Davis, 2006). Studies have shown that empathy-eliciting messages can also trigger feelings of anticipated guilt, which, in turn, can motivate prosocial action (Basil et al., 2008; Stanger et al., 2012). Anticipated guilt arises when individuals (1) perceive a future violation of their moral standards and (2) anticipate emotional consequences if they fail to take appropriate action (O'Keefe & Figgé, 1999).

When individuals are exposed to narratives that highlight the consequences of inaction, they may engage in self-referential thinking, evaluating their role in preventing harm (Basil et al., 2008). According to appraisal theory, emotions such as guilt emerge from cognitive evaluations (or appraisals) of events based on their relevance to an individual's goals, values, or well-being (Lazarus, 1991; Roseman, 2013). For example, a narrative depicting an animal's suffering due to human neglect may trigger an appraisal that frames the situation as morally significant, thus eliciting empathy. As empathy heightens the reader's emotional engagement, they might further appraise their own potential

responsibility in mitigating harm. If they perceive that their inaction could contribute to continued suffering, they may experience anticipated guilt, an emotion found to drive prosocial behavior (Erlandsson et al., 2016; Stanger et al., 2012). Thus, by fostering empathy and cognitive appraisals of personal responsibility, storytelling can heighten feelings of anticipated guilt. Thus, we predicted

H2: Empathy elicited by a depiction of an animal suffering from climate change will be positively associated with anticipated guilt.

Anticipated guilt and pro-environmental actions. Guilt-inducing persuasive messages can motivate pro-environmental and other prosocial behaviors (Brosch, 2021; Basil et al., 2008; Hurst and Sintov, 2022), as the action tendency associated with the emotion is to repair harm done or ameliorate consequences of past actions (Myrick and Conlin, 2021). Meta-analyses have identified medium effect sizes for the influence of guilt on behavior and medium-to-large effects on pro-environmental intentions (Bamberg and Möser, 2007; Shipley and van Riper, 2022). Some research indicates that messages that elicit *anticipated* guilt can be more motivating than those that elicit *reactive* guilt (experienced for past transgressive behaviors), as messages eliciting the former presumably trigger less defensiveness than those eliciting the latter (Renner et al., 2013). Because the stimulus stories used Study 2 did not reference a past transgression by the reader, it was expected that they would elicit anticipated (rather than reactive) guilt. Thus, we predicted:

H3: Message-elicited anticipated guilt will be positively associated with pro-environmental behavioral intentions.

Anticipated guilt as a mediator. Previous research has shown that empathy-eliciting narratives—particularly those evoking a sense of personal responsibility in the audience by emphasizing the impacts of an issue on others—are more likely to increase guilt, which in turn can foster prosocial behaviors (Basil et al., 2008). In the context of environmental advocacy, anticipated guilt may serve as a bridge between empathy elicited by storytelling and intentions to engage in pro-environmental behaviors. By highlighting the emotional consequences of inaction on vulnerable others, empathy-eliciting narratives could leverage anticipated guilt as a motivator for action.

H4: Anticipated guilt will mediate the relationship between empathy and pro-environmental behavioral intentions.

Serial mediation of narrative features. Narrative messages featuring animals suffering from climate change seem particularly well-suited to trigger a serial process, wherein empathy fosters anticipated guilt, which promotes pro-environmental behavioral intentions. The transformative potential of storytelling lies in its ability to integrate such emotional components, fostering a persuasive sequence that could move audiences from emotional engagement to actionable outcomes. Based on the rationale stated above, we expected:

H5: Empathy and anticipated guilt will serially mediate the relationship between message feature and pro-environmental behavioral intentions; that is, narrative stories will be positively associated with pro-environmental behavioral intentions through greater empathy and greater anticipated guilt.

Anger and sadness in narrative responses. Stories about the harmful effects of climate change can elicit a variety of negative emotions—beyond empathy and guilt—that motivate climate action (Davidson and Kecinski, 2022; Wong-Parodi and Feygina, 2021). Two such emotions are of interest in the current study

because of their relationship with empathy: anger and sadness (Batson, 1987; Hoffman, 1989; Weiner, 1995).

Depictions of animals suffering from human behaviors that harm the environment can trigger anger (e.g., Schwartz and Loewenstein, 2017), which can in turn motivate corrective actions (DiRusso and Myrick, 2021) and increase climate change policy support (Myers et al., 2023). Similarly, when we learn that those who need protection are harmed, empathic anger—a vicarious emotion in response to harmful *consequences* experienced by others (as opposed to moral outrage, which is anger about the wrongfulness of the deed itself)—may result and motivate observers to act to protect victims from further harm (Hechler and Kessler, 2018).

Learning about climate change and its impacts on animals can also elicit sadness (Davidson and Kecinski, 2022; Schwartz and Loewenstein, 2017), which can be associated with empathy because of increased moral awareness of others' suffering (Vitaglione and Barnett, 2003). Sadness, like empathy, can motivate prosocial actions, such as supporting environmental causes or policies (Chu and Yang, 2019; Swim and Bloodhart, 2014; Fu et al., 2022; Schwartz and Loewenstein, 2017). However, sadness can also have counterproductive effects via feelings of helplessness or resignation (Myrick and Conlin, 2021), with those who perceive an inability to enact a pro-environmental behavior (e.g., low self-efficacy) being less likely to act (Van Valkengoed et al., 2022).

Because anger and sadness might be elicited by our stories of animals suffering from climate change, they were also measured as potential outcomes and as mediators of message effects on behavioral intentions.²

RQ1: Do anger and sadness mediate the relationship between message feature and intention to take pro-environmental action?

Figure 1 graphically represents the various relationships examined in Study 2.

Study 2 methods

Stimuli and procedure. The online experiment employed a 2 (message feature: narrative vs. non-narrative stories) × 4 (animal type: same as Study 1) between-subjects design. Participants were randomly assigned to view a story about one of the four animals. Because Study 1 revealed no differences between first- or third-person POV narration on elicited levels of empathy, the POV manipulation was dropped for Study 2, with the all stories being presented from the third-person POV (per the approach most common to nonfictional, animal-based narratives such as *Planet Earth*, *Our Planet*). Therefore, the narrative stories in Study 2 were written from a third-person POV only. For example, in the narrative version, participants read: “Bella is a mommy brown bear who lives with her daughter Kylie in the forest,” and “Bella has to leave her children alone at home and travel many days to find food now.” In contrast, the non-narrative, more expository version read: “The American brown bear is a large animal, usually dark brown in color, though it can vary from a light creamy shade through to black,” and “Adult bears have to leave their cubs at their habitats and travel long distances to look for new habitats and food resources now.” Except for the narrative point of view, all other experimental stimuli remained the same as in Study 1 (see the OSF site for all experimental stimuli).

The study was approved by the Florida State University Institutional Review Board (IRB) prior to data collection. Participants first completed an online pretest questionnaire (measuring trait empathy, biospheric values, and participants' demographics); two days later they received a link to the main experiment that randomly assigned each to one of eight message conditions. After reading the narrative, participants completed

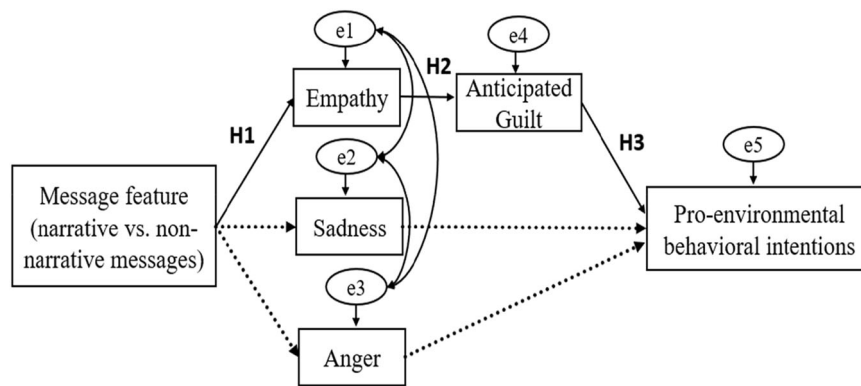


Fig. 1 Proposed path model. Note: H4: Empathy → Anticipated Guilt → Pro-environmental Behavioral Intentions. H5: Message Feature → Empathy → Anticipated Guilt → Pro-environmental Behavioral Intentions. Dotted lines represent relationships examined in RQ1.

the post-exposure questionnaire, which measured positive and negative emotions, state empathy, anticipated guilt, and pro-environmental behavioral intentions.

Participants. A total of 275 participants recruited from Prime Panels completed the pretest, but three failed an attention check (e.g., “Please select ‘strongly disagree’ to respond to this question”); their data were omitted from analyses. Among the 272 qualified participants, 259 completed the main experiment, but six failed a similar attention check; their data were also omitted. Twenty-nine outliers—identified as being more than 1.5 times the interquartile range above the third quartile or below the first quartile on the boxplot of each dependent variable—were also removed, resulting in a final sample of 224 participants. Due to the omitted cases, the final sample fell just short of the ideal sample size for the study ($N = 250$), calculated using Aberson’s “pwr2ppl” R package (Version 0.4.0), with Pearson correlation between each pair of variables set at $r = 0.25$ and power ($1 - \beta$) at 0.8 for the serial mediation effects. Nevertheless, a post-hoc power analysis indicated that the sample size of $N = 224$ achieved power of 0.89.

The final sample was fairly gender-balanced with 48.7% of participants identifying as male and 51.3% as female. Participants’ ages ranged from 18 to 71 ($M = 35.88$, $Mdn = 33.50$, $SD = 10.13$). The majority self-identified as White (70.5%), with 15.2% identifying as Black or African American, 11.6% as Hispanic/Latino, and as 9.8% Asian.

Pretest measures. See Appendix Table A2 and the OSF site for item wording, scale descriptives, and scale reliability indicators.

Trait empathy was measured with trait perspective-taking and trait empathetic concern subscales adapted from Davis (1983). This scale was chosen instead of the trait empathy measure used in Study 1 because it captures more dimensions of the empathy construct. Participants indicated how well several statements described them (0 = *does not describe me well* and 4 = *describes me very well*).

Biospheric values, which are commonly associated with pro-environmental concerns and behaviors, were measured in the pretest using four items from Schwartz (1992) to check the effectiveness of random assignment to research condition (i.e., we sought to confirm that any effects of research condition on the mediating or outcome variables were not due to overrepresentation of participants who valued environmental protection in one or more conditions). Participants rated the importance of each value as a guiding principle in their lives on a 9-point scale: $-1 =$ *opposed to my values*, $0 =$ *not important* to $7 =$ *extremely important*.

Mediating and dependent variables. *Anger* and *sadness* were measured using items (based on Bodenhausen et al., 1994) that asked how much participants felt each emotion while reading the story (0 = *not at all*, 7 = *a great deal*). Other emotions including joy, fear, and distress were included in the question block as distractors.

Anticipated guilt was adapted from a well-established scale in the environmental context (Carrus et al., 2008). Participants responded to this question stem: “If during the next two weeks you do not act pro-environmentally to help mitigate climate change and help the animal/insect in the story to survive, how much do you think you would feel guilty, remorse, sorry” along with three distractors “disappointed, unsatisfied, fearful.” (1 = *not feeling this way at all* to 7 = *feeling this way very strongly*).

Empathy for the animals described in the messages was measured with the same items used in Study 1.

Pro-environmental behavioral intentions were measured by asking participants to indicate how likely they were to perform the message-advocated behaviors within the next two weeks along with four distractor items (1 = *extremely unlikely* to 7 = *extremely likely*).

Study 2 results

Tests of group differences. Prior to hypothesis testing, a one-way ANOVA was conducted to ensure that feelings of empathy, sadness, anger, guilt, and pro-environmental behavioral intentions were not influenced by animal type (moose, bear, beetle, or salamander). Results indicated no main effects of animal type on empathy ($F_{3, 220} = 0.87$, $p = 0.46$), anticipated guilt ($F_{3, 220} = 1.68$, $p = 0.17$), sadness ($F_{3, 220} = 1.76$, $p = 0.16$), anger ($F_{3, 220} = 1.33$, $p = 0.27$), or behavioral intentions ($F_{3, 220} = 0.46$, $p = 0.71$). Consequently, the original eight experimental conditions were collapsed into two research conditions: narrative vs. non-narrative stories (see Table 2 for condition collapse).

Moreover, independent t -tests indicated that participants’ levels of trait empathy did not differ between the non-narrative ($M = 2.94$, $SD = 0.62$) or narrative conditions ($M = 2.98$, $SD = 0.72$), $t_{222} = -0.43$, $p = 0.67$ and that biospheric values did not differ between the narrative ($M = 4.61$, $SD = 1.21$) and non-narrative stories conditions ($M = 4.75$, $SD = 1.16$), $t_{222} = 0.86$, $p = 0.39$.

Hypothesis testing. To test the hypotheses and investigate the process by which narrative messages might influence pro-environmental behavioral intentions through potential mediating variables, a path analysis was conducted using AMOS 27.0 with maximum likelihood estimation (MLE)³. In the tested model (see Fig. 1), the predictor variable message feature was binary

coded as 0 = non-narrative stories, 1 = narrative stories. Error terms for empathy, sadness, and anger were allowed to covary, given their associations, as identified in the literature. Bivariate correlations and the final path model are shown in Table 3 and Fig. 2, respectively.

The first model did not fit the data well, $\chi^2(5) = 33.50$, $p < 0.001$, GFI = 0.95, CFI = 0.95, CMIN/DF = 6.70, and RMSEA = 0.16. The modification indices suggested fit could be improved by adding paths from sadness to anticipated guilt, anger to anticipated guilt, and a direct path from empathy to behavioral intentions. We respecified the model in stages, first adding the suggested path from sadness to anticipated guilt. This model

demonstrated improved, but not ideal fit, $\chi^2(4) = 21.14$, $p < 0.001$, GFI = 0.97, CFI = 0.97, CMIN/DF = 5.29, and RMSEA = 0.14. Modification indices again suggested a direct path from empathy to behavioral intentions but not from anger to anticipated guilt. Accordingly, the final model tested included a direct path from empathy to behavioral intentions and demonstrated good fit for the data, $\chi^2(3) = 5.19$, $p = 0.16$, GFI = 0.99, CFI = 0.98, CMIN/DF = 1.73, and RMSEA = 0.06. The model explained 48% of the variance in pro-environmental behavioral intentions.

In the final path model, message feature did not significantly predict empathy. Therefore, H1 was not supported, $\beta = 0.09$, SE = 0.07, C.R. = 1.32, $p = 0.19$, 95% CI [-0.05, 0.22]. However, H2 was supported, as empathy toward the suffering animal was positively associated with anticipated guilt: $\beta = 0.56$, SE = 0.06, C.R. = 9.08, $p < 0.001$, 95% CI [0.43, 0.68]. H3 was also supported, as anticipated guilt was positively associated with pro-environmental behavioral intentions: $\beta = 0.56$, SE = 0.07, C.R. = 8.05, $p < 0.001$, 95% CI [0.43, 0.69].

H4 predicted that anticipated guilt would mediate the relationship between empathy and pro-environmental behavioral intentions. Path analysis results supported this prediction: $\beta = 0.31$, $p < 0.01$, BootSE = 0.05, 95% CI [0.18, 0.36]. H5 predicted a sequential mediation process by which exposure to a narrative message about an animal or insect suffering from climate change would lead to greater intention to practice pro-environmental behavior via participants' feelings of empathy (M1), and then via greater anticipated guilt (M2). This hypothesized indirect effect was not supported, $\beta = 0.03$, $p = 0.16$, BootSE = 0.05, 95% CI [-0.03, 0.18], due to the non-significant association between message feature and empathy (see Table 4 for other direct and indirect path results).

RQ1 asked whether sadness and anger would mediate effects of message feature on behavioral intentions. Path analysis results indicated that exposure to the narrative was associated with greater anger ($\beta = 0.19$, SE = 0.07, C.R. = 2.84, $p < 0.01$, 95% CI [0.06, 0.31]) and sadness ($\beta = 0.13$, SE = 0.07, C.R. = 2.03, $p < 0.05$, 95% CI [0.001, 0.27]). Furthermore, sadness but not anger predicted anticipated guilt, $\beta = 0.22$, SE = 0.08, C.R. = 3.57, $p < 0.001$, 95% CI [0.07, 0.36]. Neither sadness ($\beta = -0.14$, SE = 0.08, C.R. = -1.85, $p = 0.06$, 95% CI [-0.29, 0.02]) nor anger ($\beta = -0.07$, SE = 0.07, C.R. = -1.08, $p = 0.28$, 95% CI [-0.20, 0.06]) directly predicted behavioral intentions. However, the indirect effect of message feature on intentions via sadness and guilt was significant, although weak, $\beta = 0.02$, $p = 0.02$, BootSE = 0.02, 95% CI [0.01, 0.11].

Table 2 Study 2 Names and labels for original and collapsed research conditions.

Original Condition	Collapsed condition
1: Bear narrative (n = 29)	Narrative stories (n = 110)
2: Moose narrative (n = 28)	
3: Beetle narrative (n = 26)	
4: Salamander narrative (n = 27)	
5: Bear non-narrative (n = 28)	Non-narrative messages (n = 114)
6: Moose non-narrative (n = 28)	
7: Beetle non-narrative (n = 27)	
8: Salamander non-narrative (n = 31)	
Total	N = 224

Table 3 Study 2 Bivariate correlations between all measured variables.

	1	2	3	4	5	6	7
1. Empathy	-	0.70**	0.57**	0.54**	0.64**	0.36**	0.43**
2. Anticipated Guilt		-	0.66**	0.50**	0.58**	0.35**	0.52**
3. PEBI			-	0.29**	0.34**	0.33**	0.54**
4. Anger				-	0.65**	0.14*	0.22**
5. Sadness					-	0.32**	0.34**
6. Trait Empathy						-	0.38**
7. Biospheric Values							-

PEBI pro-environmental behavioral intentions.
* $p < 0.05$, ** $p < 0.01$.

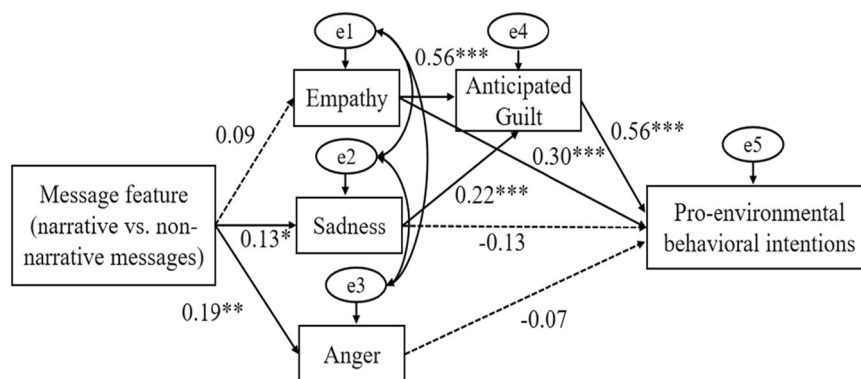


Fig. 2 Final Path Model Results. Note: Non-narrative stories were coded as 0 and narrative stories were coded as 1. Dotted lines indicate a non-significant effect. Standardized betas are reported. The residuals of empathy and sadness were positively correlated ($\beta = 0.64***$), as were sadness and anger ($\beta = 0.64***$), and empathy and anger ($\beta = 0.54***$). *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Table 4 Total, direct, and indirect effects among modeled variables.

Total, direct, and indirect effects	Pro-environmental behavioral intentions				
	Unstandardized	Standardized	Boot SE	Boot LLCI	Boot ULCI
Total and direct effects of X on Y					
Total effect of X on Y	0.05	-	0.15	-0.24	0.35
Direct effect of X on Y	-0.05	-	0.12	-0.28	0.19
Total indirect effect of X on Y	0.10	-	0.09	-0.09	0.28
Message →Empathy→Anticipated Guilt	0.17	0.05	0.13	-0.08	0.43
Message →Empathy→Anticipated Guilt →Intentions	0.07	0.03	0.05	-0.03	0.18
Message →Empathy →Intentions	0.06	0.03	0.05	-0.02	0.19
Message →Sadness →Anticipated Guilt	0.10	0.03	0.06	0.01	0.26
Message →Sadness →Anticipated Guilt →Intentions	0.04	0.02	0.02	0.01	0.11
Message →Sadness →Intentions	-0.04	-0.02	0.04	-0.17	0.003
Message→ Anger →Intentions	-0.03	-0.01	0.03	-0.12	0.02
Empathy →Anticipated Guilt →Intentions	0.26	0.31	0.05	0.18	0.36
Sadness →Anticipated Guilt →Intentions	0.10	0.12	0.04	0.03	0.17

Note. Standard errors (SE) and 95% confidence intervals (CI) for indirect effects were calculated using 5000 bootstrapped samples.

Table 5 Summary of study results.

Study	H/RQ	Description	Outcome
1	H1	Narrative messages elicit greater empathy than non-narrative messages	Supported
	H2	Empathy will differ based on psychological distance (animals similar vs. dissimilar to humans)	Unsupported
	RQ1	Do first-person vs. third-person narratives elicit different empathy levels?	No
2	H1	Narrative messages elicit greater empathy than non-narrative messages	Unsupported
	H2	Greater empathy predicts greater anticipated guilt	Supported
	H3	Greater anticipated guilt predicts greater pro-environmental intentions	Supported
	H4	Empathy indirectly influences intentions via anticipated guilt	Supported
	H5	Full serial mediation: Narrative→Empathy→Guilt→Intentions	Unsupported
	RQ1	Do sadness, anger mediate the effect of narrative on intentions?	Sadness? Yes Anger? No

The path from empathy to greater pro-environmental behavioral intentions (suggested by model modification indices) was also significant: greater empathy was directly and positively associated with behavioral intentions, $\beta = 0.30$, $SE = 0.08$, $C.R. = 4.03$, $p < 0.001$, $CI [0.15, 0.45]$.

Study 2 discussion

Study 2 investigated whether narrative messages featuring animals harmed by climate change could elicit higher levels of empathy and, in turn, influence pro-environmental behavioral intentions compared to non-narrative messages. The study also examined the potential mediating roles of anger, sadness, and anticipated guilt in this process.

Contrary to H1 and Study 1 findings, no significant differences in empathy levels were observed between readers of the narrative and non-narrative message formats. This unexpected result will be further considered in the general discussion. Despite the lack of differences in empathy between message conditions, findings supported the hypothesized relationships between empathy, anticipated guilt, and pro-environmental behavioral intentions (H2–H4). Specifically, participants who experienced higher levels of empathy for the animals in the messages were more likely to report anticipated guilt. In turn, anticipated guilt predicted greater pro-environmental behavioral intentions, providing additional evidence that empathy-induced guilt can motivate environmentally responsible behavior.

The hypothesized serial mediation effect from narrative, to empathy, to guilt, and then behavioral intentions (H5), however, was not supported. Given that empathy was proposed as the initial mediator in the pathway, the absence of significant differences in empathy between message formats limited the potential for the proposed full mediation effect. The test of RQ1

indicated that two emotions associated with empathy—anger and sadness—were also elicited by the narrative messages. Sadness mediated the relationship between narrative message exposure and anticipated guilt, which in turn predicted behavioral intentions. Further, sadness was sufficient to motivate behavioral intentions via anticipated guilt for not taking future action.

In contrast, anger was not associated with other variables in the model. Although anger can be elicited by messages depicting environmental harm, it can often be difficult for audiences to discern the cause of the harm, and such inability to clearly assign blame to a specific actor can limit anger’s common action tendency to retaliate or “right past wrongs” (Myrick and Conlin, 2021, p. 312). Perhaps because of such an inability to assign blame, felt anger in this study did not motivate intentions to act or to anticipate feeling guilty for not doing so.

General discussion

The two studies reported herein examined the effectiveness of storytelling in fostering empathy and pro-environmental behavioral intentions in the context of environmental advocacy messages. Across the studies, we explored how narrative features, psychological distance, and emotional pathways influenced audience responses to messages about animals harmed by climate change. Table 5 summarizes the findings from both studies, which offer several insights into the mechanisms of storytelling and narrative persuasion and their implications for environmental advocacy.

Narrative structure and empathy. Empathy arises when individuals perceive an issue or event, such as harm to others, as emotionally significant, prompting a response driven by compassion and concern (Batson, 1981; Davis, 2006). Past research

has consistently demonstrated the power of narratives to elicit empathy in audiences. We expected to observe the same in the two studies, with participants reading narrative or non-narrative stories about animals being harmed by climate change. Surprisingly, we found mixed results. As expected in Study 1, participants reading the story written in a narrative format reported higher levels of empathy for the animals than those reading the non-narrative messages. However, this was not the case in Study 2, as no differences were observed in elicited empathy levels between the narrative and non-narrative formats. Although we have no certain explanation for these mixed results, we think they are most likely due to differences between the study samples. Specifically, a post-hoc analysis revealed significant differences in trait empathy between the samples. As the reader may recall, trait empathy was measured slightly differently across the two studies. However, six items were common to both; we isolated and created an index of those items for a follow-up analysis. An independent-samples *t*-test indicated that participants in Study 1 ($M = 5.91$, $SD = 0.78$) reported significantly higher levels of trait empathy than those in Study 2 ($M = 3.04$, $SD = 1.15$) on the six trait empathy items common to both studies: $t(451) = 37.00$, $p < 0.001$, Cohen's $d = 0.83$. Thus, participants in Study 2 may have been less predisposed to empathize with the animals in the messages in general, regardless of the format in which they were presented.

Although the Study 2 findings were unexpected, they do not lead us to question the power of narratives to evoke empathy in audiences. But they should give environmental message creators pause, as a reminder that audiences are not emotionally monolithic. Dispositional differences across audiences matter, especially as they may be associated with barriers to persuasion (e.g., compassion fatigue, Lu, 2022; Dark Triad negatively associated with pro-environmental behavior; Mertens et al., 2021). As always, it is important to understand the characteristics of an intended audience for environmental messages and to tailor potential messaging strategies to that audience of interest (Goldberg et al., 2019).

Anthropomorphism and psychological distance. The project also sought to shed light on specific narrative features that might impact the emotional reactions to and persuasive efficacy of animal-based climate-change messaging: narration point of view (POV) and the perceived psychological distance between the animals depicted and humans. Past work suggested that (1) first- vs. third person POV narration might differentially impact anthropomorphism, which might subsequently impact levels of empathic response, and (2) animals with certain characteristics—more human-like, with more empathy-inducing features (Paulhus, 2023)—should reduce the psychological distance perceived between them and the reader, which should then evoke more empathy in readers. Our results offered no support for either claim. To be clear: The narratives (in Study 1) did elicit empathy, but the observed differences between empathy levels in the POV and psychological distance conditions were insignificant.

We interpret these results as indicating that the specific biological or social categorizations of the individual animals presented were of little consequence. What then evoked empathy? We contend that it was the broader issue of animal suffering due to climate change; that is, the audiences appeared to perceive all featured animals as victims of anthropogenic climate change within a shared spatial and moral context. Schultz (2000) demonstrated that instructing people to take the perspective of a distressed animal generated empathy. The narrative structure invited the readers of our stories to do the same. The voice

through which that message was delivered and the animal embodying the suffering were relatively inconsequential in light of the suffering itself. Thus, when it comes to environmental advocacy, a shared moral imperative to protect all living beings from harm may resonate more strongly with audiences than some other message factors. Further research is needed to provide further evidence for this claim.

Emotional pathways to pro-environmental behavioral intentions. The final major goal of the project was to explore the role of story-elicited empathy and related emotions in facilitating pro-environmental behavioral intentions. As expected, empathy levels following exposure to a depiction of an animal suffering from the effects of climate change were directly associated with increased intention to act in ways that benefit the environment.

Further, empathy was indirectly related to pro-environmental behavioral intentions via feelings of anticipated guilt. Anticipated guilt emerges when individuals appraise a future action as morally significant, where failure to act would violate ethical standards (Erlandsson et al., 2016; Tangney et al., 2007). Unlike reactive guilt, which often triggers defensive responses, anticipated guilt motivates action by emphasizing future-oriented moral responsibilities (Wang, 2011). In the current study, it appears that anticipated guilt acted as a moral motivator that encouraged pro-environmental behavioral intentions to avoid the negative emotional consequences of inaction, especially to the extent that participants felt empathy for the harmed animals. The finding that anticipated guilt mediated the impact of empathic concern on pro-environmental intentions is consistent with previous studies (e.g., Elgaied, 2012; Hurst and Sintov, 2022).

We also explored the possibility that two additional empathy-related emotions—sadness and anger—might also facilitate pro-environmental action. Anger did not. But sadness did, with higher levels of sadness associated with increased anticipated guilt and, in turn, greater behavioral intentions. Sadness is elicited by a sense of irrevocable loss or experienced negative consequences, such as species extinction (Böhm, 2003; Brosch, 2021). Although sadness is considered an inward-focused emotion that is less likely to lead to pro-environmental action than other negative emotions (e.g., anger, fear), scholars have called for more research on the implication of feeling sadness along with other emotions in response to information about environmental problems (e.g., Myrick and Conlin, 2021). Our findings suggest that to the extent that sadness elicited by information about another's suffering is associated with feelings of anticipated guilt for future inaction, it can lead indirectly to intentions to act. This finding suggests an interesting avenue for future research in environmental and prosocial advocacy messaging as well as in emotion in general. Together, these findings regarding the influences of sadness, empathy, and anticipated guilt point to multifaceted emotional mechanisms through which persuasive environmental messages may influence action.

Theoretical and practical implications. The studies reported here also make important theoretical contributions. First, they build on existing theories of narrative persuasion (e.g., Green and Brock, 2002; Hamby and Jones, 2021) by highlighting the significant role of moral emotions, such as empathy and guilt, in narratives advocating animal and environmental protection. Further, although previous studies have examined discrete emotions elicited in the context of environmental narratives (e.g., Davidson and Kecinski, 2022; Wong-Parodi and Feygina, 2021), this study expanded on that work by exploring how specific emotions, particularly sadness, anger, and anticipated guilt as responses to pro-environmental narratives, can influence

message-advocated behaviors. Additionally, although appraisal theory suggests that sadness will typically lead to more reflection rather than action, our findings suggest that message-elicited sadness can increase, rather than decrease, intended action via its association with anticipated guilt. Additional research should further investigate these relationships in response to narratives.

Second, the project suggests the need for further consideration of how perceived psychological distance (e.g., Chu and Yang, 2019; Trope and Liberman, 2010) can influence emotional engagement by examining a wider variety of animals affected by climate change than examined in previous, related studies (e.g., DiRusso and Myrick, 2021; Swim and Bloodhart, 2014). Our findings inform theoretical propositions regarding mental construal and tailoring of psychological distance in climate-change messages (Goldberg and Gustafson, 2025), suggesting it might not be necessary to depict non-human victims with less psychological distance in narrative or non-narrative messages. However, more research is surely needed in this area.

Additionally, our findings offer guidance for practitioners designing environmental advocacy campaigns. Messages could incorporate vivid depictions of vulnerable species and emphasize scenarios that elicit empathy as a moral concern to motivate action. Moreover, message features such as anthropomorphism (e.g., assigning names and human-like traits to animals) may further strengthen emotional connections and make non-human subjects more relatable (Keen, 2011).

Furthermore, eliciting anticipated guilt as a motivational tool can encourage pro-environmental behavioral intentions. By emphasizing future-oriented moral obligations, anticipated guilt can motivate audiences to take meaningful and impactful actions, thus enhancing the overall effectiveness of storytelling in environmental communication. However, when seeking to elicit anticipated guilt in advocacy and narrative messages, it can also be important to include information that enhances message receivers' perceived self-efficacy (ability) to take recommended protective actions, to mitigate potential defensive processing (i.e., psychological reactance) and rejection of those messages (Yan et al., 2024).

Conclusion and limitations. This work highlights the nuanced role of storytelling in environmental advocacy. Findings suggest that emotionally engaging stories depicting animals' harm from climate change can effectively elicit discrete and moral emotions and encourage message-advocated behaviors. However, findings should be interpreted in light of study limitations.

First, we focused on a limited range of animal types, which might have limited the diversity of emotional responses to different environmental risks and animals affected by them. For example, future studies could address these limitations by incorporating a wider variety of animal representations, particularly by systematically varying and measuring perceptions of depicted animals in terms of perceived "cuteness" or appeal, as previous studies suggest that animals perceived as more "cute" tend to elicit stronger empathy than those considered less cute (e.g., Phan et al., 2025; Zickfeld et al., 2018).

Second, we measured behavioral intentions to take corrective actions rather than actual behavior. It is important to acknowledge that intentions do not always translate into actual behavior (Ajzen, 2015; Sniehotta, et al., 2015), due to factors such as situational constraints, competing priorities, or habitual behaviors. However, intentions can significantly predict future action when actions are not too difficult or costly, such as those recommended to participants in messages in the current study (Yzer, 2013). It would have been useful to include a follow-up measure of behavior or behavioral intentions in the current study

to examine the durability and applicability of the effects identified here. Future studies could examine whether the empathy- and guilt-driven intentions lead to pro-environmental actions, which could inform interventions aimed at bridging the gap between intentions and behavior.

Third, while the adapted empathy scale demonstrated good reliability, further validation in animal contexts would strengthen future research. Future studies could also benefit from the use of multi-item scales to measure emotional responses, and the assessment of intentions to perform a broader set of pro-environmental actions.

Overall, these findings highlight the important role of narratives and emotional responses in shaping pro-environmental intentions and provide additional evidence that emotion-laden narratives can be effective tools for encouraging sustainable behaviors (e.g., Myrick and Conlin, 2022; Wong-Parodi and Feygina, 2021).

Data availability

The study materials, including experimental stimuli and measurement scales, are publicly available on the Open Science Framework (OSF) repository at: https://osf.io/ve7h9/?view_only=714c0c1b65c6468291b324eba5a53625. Due to Institutional Review Board (IRB) restrictions, the datasets generated during the current study are available from the corresponding author upon reasonable request.

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Notes

- 1 A two-way ANOVA examined the effect of animal type (moose or bear vs. beetle or salamander) as a replication factor within the psychological distance conditions. Results indicated no differences in empathy between animals perceived as similar (moose vs. bear; $F_{1,113} = 0.08, p = 0.78$) or dissimilar (beetle vs. salamander; $F_{1,112} = 0.04, p = 0.84$) to humans.
- 2 We did not specify direct paths from anger or sadness to guilt in the hypothesized model, due to the lack of empirical support for such relationships in the existing literature. However, based on theoretical rationales linking empathy, anger, and sadness, we were prepared to include these paths if suggested by modification indices generated by AMOS during model evaluation.
- 3 The serial mediation model tested in Study 2 was not pre-registered. However, all study materials, procedures, and measures are reported in the manuscript and are publicly available on the project's OSF site.

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Author contributions

Conceptualization, ZY, LA, and AR; methodology, ZY; formal analysis, ZY; data curation, ZY; writing—original draft preparation, ZY; writing—review and editing, ZY, LA, and AR. All authors reviewed the manuscript.

Competing interests

The authors declare no competing interests.

Ethical approval

This project was granted an exemption from ethics approval by the Institutional Review Board of Florida State University (Approval Reference: STUDY00003180). The study involved participants' responses to a short story about an animal and did not involve any sensitive topics or information. The IRB determined that the research met the criteria for exemption under federal regulations, specifically Exemption Category (3)(i)(B): Benign Behavioral Interventions (low risk). The risk level was no greater than minimal, and all participants were over 18 years of age and not considered part of a vulnerable population. Where applicable, the IRB also confirmed the protocol's qualification for approval in accordance with requirements for Limited IRB Review, effective May 5, 2022.

Informed consent

Informed consent was obtained from all participants through a written form prior to participation via the CloudResearch online survey platform, in accordance with the requirements of the Florida State University IRB. The consent process took place on September 20, 2023, and included a full explanation of the project's purpose, procedures, data use, and publication intentions. Participants were not drawn from any vulnerable populations. Given the non-interventional nature of the research, confidentiality and anonymity were assured. All identifying information was either anonymized or removed. The data collected were used exclusively for this research project. No personal information was disclosed at any stage of the study. Participants were provided with the researchers' contact information for any questions or concerns. All procedures complied with established ethical standards, and the study posed no more than minimal risk to participant.

Additional information

Supplementary information The online version contains supplementary material available at <https://doi.org/10.1057/s41599-026-06938-1>.

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