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Applying the Extended Parallel Process Model to Climate Change Communication

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APPLYING THE EXTENDED PARALLEL PROCESS MODEL TO CLIMATE CHANGE COMMUNICATION

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Capstone submitted in partial fulfillment of the requirements for graduation with

University Honors

with majors in
B.S. Conservation & Restoration Ecology and B.S. Communication Studies

in the Departments of Wildland Resources and Communication Studies & Philosophy

Approved:

Capstone Mentor Dr. Timothy Curran	**Departmental Honors Advisor** Dr. Kari Veblen

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Abstract:

Whereas over 99% of the scientific community believes in the concept of anthropogenic climate change, lay support is still lagging behind. I suggest three key factors to lagging lay support: 1) complexity, 2) manufactured scientific controversy, and 3) doom-and-gloom framing. Because of these factors, individuals are less willing believe in the prevalence of human-induced climate change, nonetheless do something about it. The Extended Parallel Process Model (EPPM), however, presents a model to assuage eco-anxiety and counter psychological distance from the problem. The EPPM, proposed by Kim Witte in the 1990s, combines appeals to threat and appeals to efficacy to contextualize fear as something manageable. Many studies demonstrate that efficacy appeals enhance the impact of fear appeals in changing individual behavior. While climate change requires collective action for mitigation, cultivating care and consciousness for individual carbon footprint through the EPPM is an important first step. The EPPM was originally applied to disease and chronic illness communication; however, the joined appeals to threat and efficacy present an opportunity to amend previous pitfalls of climate change messaging.

In a study administered on Amazon's Mechanical Turk through Qualtrics (n = 650) to individuals residing in the United States, I tested the effect of five different threat-efficacy combinations on participant self-efficacy, response efficacy, and behavioral intentions to reduce individual carbon footprint. The results reveal that participants exposed to no message ($M = 4.05 \pm 0.045$) had significantly higher perceived self-efficacy than 1) participants exposed to the low-threat, negative efficacy message ($M = 3.84 \pm 0.069$; $p = 0.015$), and 2) participants exposed to the high threat, positive efficacy message ($M = 3.86 \pm 0.063$; $p = 0.025$). These results indicate that saying nothing bolsters self-efficacy more than defeatist messaging, and that the participants, especially since they reside within a hyper-individualistic culture, may want to come to their own conclusions about their capacity to reduce their carbon footprint. I also found that both participants exposed to no message ($M = 3.87 \pm 0.059$) and to the low threat, positive efficacy message ($M = 3.89 \pm 0.067$) had significantly higher behavioral intentions to mitigate climate change than participants exposed to the low threat, negative efficacy message ($M = 3.66 \pm 0.077$; $p = 0.033$; $p = 0.019$. These results bolster the idea to avoid defeatist messaging and to consider whether threat, even with solutions, is too defeating with the broader context surrounding climate change. For future research, it is important to examine how presenting efficacy before threat may impact reception of climate change messages and to evaluate newer extensions of the EPPM with climate change messaging.

Keywords: EPPM, Climate Change, Self-efficacy, Response-efficacy, Behavioral Intention

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I am endlessly indebted to mentors throughout my education at Utah State University. More specifically, Dr. Tim Curran was the one of the initial people to openly believe in my capacity to succeed. In class, Tim expressed interest in pursuing a research experience together; knowing his expertise in health communication, I was excited to grow under his transformational leadership. I thank Tim for always treating me like a whole and capable person.

I also thank my departmental honors advisor, Dr. Kari Veblen. Kari was also a phenomenal professor in my education; she taught me the importance of designing and executing research with an attention to detail. She was the first individual I approached with the idea for this project, and she pushed me to step into this interdisciplinary venture. Thank you Kari for allowing me to grow as a student and as a researcher.

Without funding for my research, this project would not have been feasible. Throughout my undergraduate education, the Office of Undergraduate Research has supported me through the Undergraduate Research Fellows program; this allowed me to spend time networking with professors and working in their labs rather than working long hours at a part-time or full-time job. Alexa Sand and Athena Dupont were some of the first individuals to encourage me as a researcher; they believed in my abilities, even when I was confused as to which direction I wanted to take in my research. I also have to thank the members of the Undergraduate Research and Creative Opportunities grant board, the QCNR Undergraduate Research Fund board, and the Honors Program for providing the tools to execute my project.

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Applying the Extended Parallel Process Model to Climate Change Communication

Introduction

Knowledge of the anthropogenic links to climate change is commonplace among scientists; however, the broader populace is in disbelief, with just 62% of American citizens accepting the legitimacy of human-induced climate change (Lynas et al., 2021). This disparity between scientific consensus and general consensus is extraordinarily bleak when considering the current and future impacts of climate change. Currently, unprecedented climate change has significantly decreased crop yields (Molotoks et al., 2021; Zhao et al., 2017), displaced half of all species on Earth (Matthew et al., 2022; Pecl et al., 2017), and resulted in trillions of dollars in economic impact (Ignjacevic et al., 2021). These impacts are only projected to worsen if the global community continues to practice the same greenhouse gas (GHG) emission behaviors. In the 2021 annual Intergovernmental Panel on Climate Change report, scientists reaffirmed that a 2.5°C global average temperature rise by 2100 coincides with 0.90m sea level rise, heavy precipitation events, hydrological droughts, severe fires, ocean acidification, and coastal flooding. Where the impacts of anthropogenic climate change appear to be immensely unpromising, mitigation of emissions can help. Scientists have presented on the expansiveness and devastation of anthropogenic climate change time and time again; however, realistic presentations of the threat alone often do not instigate behavioral change in individuals and collective audiences (Feldman & Hart, 2021). Luckily, health risk models, like the Extended Parallel Process Model, provide salient messaging techniques for encouraging climate change mitigation behaviors without the crippling effect of eco-anxiety.

Review of Literature

A Brief History of Climate Change in the Anthropocene

The climate is always changing; however, the Anthropocene (i.e., the era of which human activity has severe implications on the environment) complicates natural fluctuations of climate. In the beginning of conceptualizing climate change, Joseph Fourier, a French mathematician, modeled the atmospheric trapping of heat with a glass box in the 1820s (Kaper, n.d.). Decades later, American scientist, Eunice Foote, predicted that carbon dioxide in the atmosphere would increase Earth's temperature; John Tyndall co-discovered the heat trapping capacity of greenhouse gases while controlling for solar radiation in his experimentation (Jackson, 2019; Thompson, 2019). After a series of discoveries following World War II, the scientific community held a heightened concern for the impact of greenhouse gas emissions. This led Charles Keeling to measure carbon dioxide fluxes from Mauna Kea and Antarctica in the late 1950s and early 1960s using his infrared absorption technology; he ultimately found a trend of increasing CO2 in the atmosphere (Vasquez, 2021). Since then, ice cores, like the two-kilometer core from central Antarctica, revealed correlations between atmospheric CO2 and temperature fluctuations over the past thousands of years (Weart, 2003). The disproportionate increases in carbon dioxide and other GHGs following the industrial revolution maintain a fear as to how the trapping of emissions and heat will impact the homeostasis of life on Earth.

Climate Change Messaging

Scientific consensus around anthropogenic climate change is strong in the 21st Century; however, lay support and belief is significantly lower. In my investigations as to this discrepancy, I suggest three key factors that inhibit people's belief in the legitimacy of human-induced climate change.

Barrier #1: Complexity of Climate Change.

A primary barrier to lay support for human-induced climate change is the complexity of the problem itself and of arriving at a mitigation solution. Linear problems can be tackled with expertise, heuristics, and scientific knowledge; the solutions to linear problems also receive widespread support from all stakeholders (Ross et al., 2022) Climate change, however, is categorized as a wicked problem. According to Rittel &Webber (1973), wicked problems cannot be solved with traditional methods; these issues are a cause and product of *many* other problems and do not have simple and supported solutions. While anthropogenic climate change coincides with the primary cause of unprecedented greenhouse gas emissions, the scale of reliance on these emissions for everyday functioning is complex, leading to difficulties for widescale mitigation support. Additionally, climate change impacts many aspects of the natural world, and these impacts are not always evenly distributed, creating psychological distance for individuals (Ross et al., 2022).

Barrier #2: Manufactured Scientific Controversy.

A second barrier to lay support for climate change is manufactured scientific controversy (i.e., sowing doubt in the scientific consensus of anthropogenic climate change). As previously mentioned, over 99% of scientists support the conclusions of anthropogenic climate change (Lynas et al., 2021). When individuals and media manufacture scientific controversy, they distort perceptions of consensus by drawing from industry claims.

One of the first instances of this occurred when the National Academy of Sciences produced a report in 1980 when scientists divided between mitigation of fossil fuel emissions and concern for economic impact (Oreskes & Conway, 2010).

Specifically, Thomas Schelling, an American economist posited that the effects of climate change will be so far off into the future that would be unimportant to address emissions impacts. This report, commissioned by William Nierenberg, a well-known and widely respected physicist from the Manhattan Project, became the foundational ammunition for conservative scientists and members of Washington to subvert the factual evidence for anthropogenic climate change (Oreskes & Conway, 2010).

The fossil fuel industry also jumpstarts controversy by suggesting that climate change research is incomplete, the researchers are biased, and the research methods are pseudoscience (Stocking & Holstein, 2009). Because traditionally "good" journalism emphasizes presenting all sides to a story, news outlets will draw from "lack-of-consensus" claims, despite their lack of scientific legitimacy (Imundo & Rapp, 2022). This presentation of controversy in media can trickle down to individual attitudes and behaviors towards climate change. If people think that climate change is not unanimously supported by experts, they are less likely to believe in its prevalence and threat, which subsequently stalls pro-environmental action.

Barrier #3: Doom & Gloom.

The impacts of human-induced climate change are not advantageous aspects of existence. The somber nature of climate change contributes to a prominent barrier to lay support for the subject, known as eco-anxiety. Recent studies show that news broadcasts on climate change often do not discuss problems and solutions in the same broadcast (Hart & Feldman, 2014). With rising pressure from scientists and activists to categorize climate change as an emergency and crisis discipline, it is common for fear appeals to

dominate media and for those appeals to subsequently disempower audiences (Feldman & Hart, 2021; O'Neill & Nicholson-Cole, 2009).

Glenn Albrecht, a former sustainability professor at Murdoch University, coined the term eco-anxiety to describe the chronic and crippling fear of environmental turmoil (2011). Preliminary studies suggest that exposure to fear-appeals without efficacy-appeals leads to eco-anxiety without pro-environmental behavior (Merkel et al., 2020; Feldman & Hart, 2021; O'Neill & Nicholson-Cole, 2009). Studies also demonstrate that different demographics may experience different levels of eco-anxiety. Particularly, younger and climate-displaced people are more likely to experience a reduced functioning as a result of eco-anxiety (Clayton & Karaszia, 2020; Pihkala, 2018). These disparities have tremendous implications, as younger generations and locally impacted communities are groups with the propensity to enact successful climate mitigation efforts. Overall, the eco-anxiety response makes one wonder if fear appeals are applicable to instigating behavioral changes in lay audiences. The next section suggests that fear appeals can be effective in changing behavioral intentions, but this effectiveness is contingent on the adjacent usage of other appeals.

Effective Climate Change Appeals

When sifting through the literature on climate change messaging, results tend to be mixed because of differences in methodology and sample demographics. Nonetheless, some metanalyses on climate change appeals have been fruitful. For example, Rode et al. (2021) examined 76 independent experiments measuring effects of different appeals on climate change attitudes. While all treatments had a significantly, positive effect on attitudes, appeals to emotions, reducing psychological distance (i.e., making climate change feel like a nearby and

personally impacting problem), and connoting pro-environmental behavior with religion had the largest net impact on attitudes towards climate change. This metanalysis unveils that many appeals work well independently; however, it is unclear how some of these appeals work in tandem.

Upon examining appeals to emotions further, majority of research tends to focus on fear appeals because of the devastating impacts of environmental turmoil (Reser & Bradley, 2017; Rode et al., 2021). One potent piece of research came from Tannenbaum et al. (2015), who found that fear appeals are effective in many different disciplines, and their impact is particularly effective when combined with efficacy statements (i.e., statements that reaffirm one's ability to produce a desired result). This indicates that the eco-anxiety response to fear appeals can be subverted when fear appeals are combined with efficacy appeals. This effect of efficacy has also been seen in climate change-specific studies, where the impact of fear appeals was greater when individuals believed in their own ability to act and in their behavior's effectiveness (Li, 2014; Chen, 2016). Even with these results, the impact of fear appeals in the environmental domain is still relatively understudied (Reser & Bradley, 2017).

Similarly, the effect of bridges to psychological distance on climate change attitudes and behavior is understudied and mixed in results (Rode et al., 2021). Some correlational studies demonstrated that feeling closer to the impacts of climate change has resulted in stronger attitudes towards the subject (Singh et al., 2017; Rode et al., 2021); however, other studies have shown opposite effects, potentially because the closer a problem feels, the more eco-anxiety is prevalent (McDonald et al., 2015; Brugger, 2020). Ultimately, while emotional appeals and bridges to psychological distance are impactful for changing attitudes, knowledge of how they operate together is still largely unknown.

The Extended Parallel Process Model

A knowledge gap exists regarding how a combination of appeals works to persuade people to mitigate climate change. The Extended Parallel Process Model (EPPM) may pose a bridge between emotional appeals and psychological distance. The EPPM was first proposed by Kim Witte in 1992. Witte wanted to reinstate fear as a central variable to health risk communication while simultaneously positing a link between threat and efficacy in message effectiveness (Witte, 1992). Her model (seen in **Figure 1**) suggests that messages will be rejected if a perceived threat is not met with perceived efficacy. Threat perceptions are weighed by two components: susceptibility and severity. For example, if a message receiver deems a threat as something that will personally affect them, then they perceive susceptibility; if a message receiver deems a threat as something that will personally affect them *greatly*, then they perceive severity. Efficacy perceptions are also weighed by two components: self-efficacy and response efficacy. Self-efficacy describes the belief in one's personal capacity to achieve a goal; whereas response efficacy describes the belief that the recommended response will adequately address the threat.

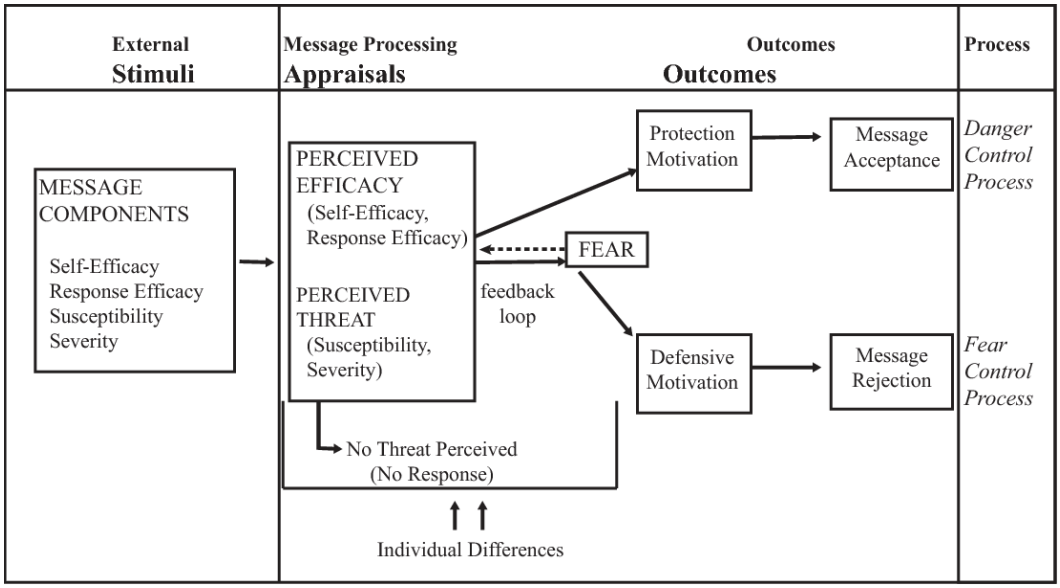

Figure 1: A conceptual diagram of the Extended Parallel Process Model (Witte, 1998).

Again, as seen in **Figure 1**, a message receiver processes the threat of a message first. If there is no severe or personally impactful threat, then the message receiver will have no response to the message. If the threat is deemed as significant then the message receiver will process the efficacy components of a message due to the emotion of fear. If there is an adequate threat, but inadequate efficacy, the message receiver will reject the message and work towards controlling the fear rather than controlling the danger. If there is an adequate threat *and* adequate efficacy, then the message receiver will accept the message and work towards controlling the danger. The danger control response is what social scientists and consultants work towards because it results in mitigation, which is an incredibly productive behavior change. In the topic of anthropogenic climate change, inaction through the fear-control process is what furthers the problem, so the danger control process is the only real choice we have to tackle the crisis discipline.

Since the EPPM arose around the same time anthropogenic climate change became a global concern, there have been some correlational studies on the EPPM's impact on climate change message reception. For instance, two prominent studies examined media invocations of the EPPM in Beijing and Taiwan and found that messages adequately conveying both threat and efficacy had greater reports of behavioral intention of mitigation (Xue et al., 2016; Li & Lin-Mei, 2019). Beyond these two studies, majority of EPPM correlational studies apply to other fields, such as epidemiology, chronic illnesses, and other health risks. Because of the lack of climate change communication through the EPPM with other demographics, it was important to design my own study to determine if correlations exist between EPPM message construction and message acceptance with individuals residing in the United States. To extend the scope of climate change communication literature, this project couches the EPPM as a gateway model in overcoming the undercurrents of public stagnation.

Research Questions

Q1: How does message exposure impact individual participant perceived self-efficacy for mitigating climate change?

Q2: How does message exposure impact individual participant perceived response efficacy for mitigating climate change?

Q3: How does message exposure impact individual participant behavioral intentions to mitigate climate change?

Methods

Overview

Due to constraints of ethics, space, and time in creating an experiment to causally test EPPM messaging and behavior, this study was done as a quantitative survey administered after exposure to one of five different treatments (i.e. high threat, positive efficacy message; high threat, negative efficacy message; low threat, negative efficacy message; low threat, positive efficacy message; and no message). The survey measures examined three main dependent variables: self-efficacy, response efficacy, and behavioral intention towards individual climate change mitigation behaviors.

Participants

Participants were reached via Amazon's Mechanical Turk (MTurk). This site provided a means to distribute a $1.00 monetary survey incentive to participants. Participants self-identified whether they fit the study's inclusion criteria. To be eligible for the survey, participants had to be over the age of 18, English speaking, and residing in the United States. After reading a short description of the study and consenting through the IRB-approved form, participants were randomly assigned to a message treatment and subsequent survey through Qualtrics. There was

no time limit for completing the survey; however, the participants were requested to spend at least a minute reviewing the message exposure before proceeding to the survey questions.

Message Exposures—Threat & Efficacy

As mentioned above, there were five different message treatments randomly divided among the survey participants. These treatments varied in the content components of threat and efficacy. Threat was modified in a high-low dichotomy (Xue et al., 2016). The high threat treatments indicated high severity and high susceptibility to climate change impacts through statements like:

- Severity: "Between now and 2050, climate change is projected to cause 250,000 additional deaths per year."
- Susceptibility: "The impacts of climate change threaten all communities across the globe, and no one is free from devastation."

Efficacy was modified in a positive-negative dichotomy (Hart & Feldman, 2016). The positive efficacy treatments reiterated the self-efficacy and response efficacy of the survey participants through statements like:

- Response Efficacy: "Writing to your representatives is a tremendously impactful way to see widescale efforts to limit human-induced climate change."
- Self-Efficacy: "You can use citizensclimatelobby.org to craft an impactful and personal message within minutes."

Each participant was exposed to one of the five treatments. To see each of the message treatments, see Appendix A. These messages were based on messages constructed in previous EPPM research (Popova, 2012). The efficacy portions of the messages were also broken down into four concrete individual action items: 1) saving energy at home, 2) using transportation

other than personal vehicles, 3) changing diet to more plant-based, and 4) writing to representatives.

Measures

Perceived Efficacy.

Perceived efficacy was divided into both self-efficacy measures and response efficacy measures because these were two significant variables to the EPPM's danger-control response (Witte, 1992). There were four statements for self-efficacy that were adapted from the New General Self-Efficacy (NGSES) Scale to apply to individual climate change mitigation actions (Chen et al., 2001). Self-efficacy was measured on a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*), where higher reports indicated higher perception of self-efficacy (a = 0.70, M = 3.93; SD = 0.67)

There were five statements for response efficacy that were adapted from various relevant studies (Bostrom et al., 2018; Hart & Feldman, 2016); these directly related to the direct individual action measures in the message treatments (i.e., saving energy at home, using transportation other than personal vehicles, changing diet to more plant-based, and writing to representatives). Response efficacy was measured on 5-point Likert scales (1 = *strongly disagree*, 5 = *strongly agree*), where the higher the response, the higher the individual perceived response efficacy (a = 0.77, M = 3.76; SD = 0.77).

Behavioral Intention.

Four measures were dedicated to behavioral intention and were also measured on 5-point Likert scales (Fishman et al., 2020), where the higher response, the more a participant intended to partake in climate change mitigation behaviors. Behavioral intention was selected to determine how different message treatments lead to climate

change mitigation behaviors; however, due to the nature of a single survey being distributed per participant, I was unable to determine behavior post-message-exposure directly, so behavioral intention served as a projection of future behavior. Behavioral intention was measured on 5-point Likert scales (1 = *strongly disagree*, 5 = *strongly agree*), where the higher the response, the higher the individual perceived response efficacy (a = 0.70, M = 3.77; SD = 0.76). Each efficacy and behavioral intention item is listed in **Appendix B.**

Ecological Worldviews.

Participants were evaluated on their ecological worldviews via the revised New Ecological Paradigm Scale (NEP-R). The NEP-R consists of 15 statements evaluated on a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*), evaluating different facets of ecological worldviews, such as balance of nature and eco-crisis (Xue et al., 2016; Dunlap et al., 2000). In this study, 10 NEP-R statements were selected to reflect the nature of the climate crisis. Five statements placed humans as the actors on the environment, whereas five other statements placed humans as subject to the environmental turmoil.

Demographics.

Participants were asked about their state/territory of residence, age, gender identity, political affiliation (5-point Likert scale, where 1 = *very conservative*, 5 = *very liberal*), and level of education. State/territory served as a check for the exclusion criteria of participants residing in the United States, whereas age, political affiliation, and level of education were used as means of distributing surveys to a representative population. For gender identity, 57.4% of participants identified as male and 42.2% of participants

identified as female. For ethnicity, 71.5% identified as Caucasian, 12.3% identified as Asian, 6.6% identified as Native American, 4.6% identified as Latino or Hispanic, and 3.1% identified as African American. For political ideology, 20.1% identified as very conservative, 29.8% identified as conservative, 17.8% identified as moderate, 20.6% identified as liberal, and 11.6% identified as very liberal. For highest level of education acquisition, 71% had a bachelor's degree, 18.3% had a master's degree, and 7.9% had a high school diploma.

Data Analysis

To analyze the data, the Qualtrics survey responses were examined using the Statistical Package for Social Sciences (SPSS). The survey questions were tested using multiple univariate analyses of variance (ANOVA). A univariate ANOVA was run for each continuous dependent variable (i.e., self-efficacy, response efficacy, and behavioral intention) against the message exposures (i.e. high threat, positive efficacy; low threat, positive efficacy; high threat, negative efficacy; low threat, negative efficacy; no message). If the univariate ANOVA produced statistically significant results, then Fisher's Least Significant Difference post-hoc test was run.

Results

Before running statistical tests on the data, the data were checked for meeting inclusion criteria and filtered out of analysis if the criteria were not met. Responses were filtered out if participants spent less than 80 seconds taking the survey or listed their location of residence as outside the United States, which yielded n = 650 participants.

Self-Efficacy

I found a significant difference in mean self-efficacy between the message exposures ($p = 0.039$; Table 1; Figure 2). Participants exposed to no message ($M = 4.05 \pm 0.045$) had

significantly higher perceived self-efficacy than participants exposed to the low threat/negative efficacy message (M = 3.84 ± 0.069; Tables 2 and 3; p = 0.015). Participants exposed to no message also had significantly higher perceived self-efficacy than participants exposed to the high threat/positive efficacy message (M = 3.86 ± 0.063; Tables 2 and 3; p = 0.025). There were no other significant differences in self-efficacy group means; however, the mean for the low threat/positive efficacy message (M = 3.99 ± 0.058) bordered having significantly higher perceived self-efficacy than the low threat/negative efficacy message (p = 0.082).

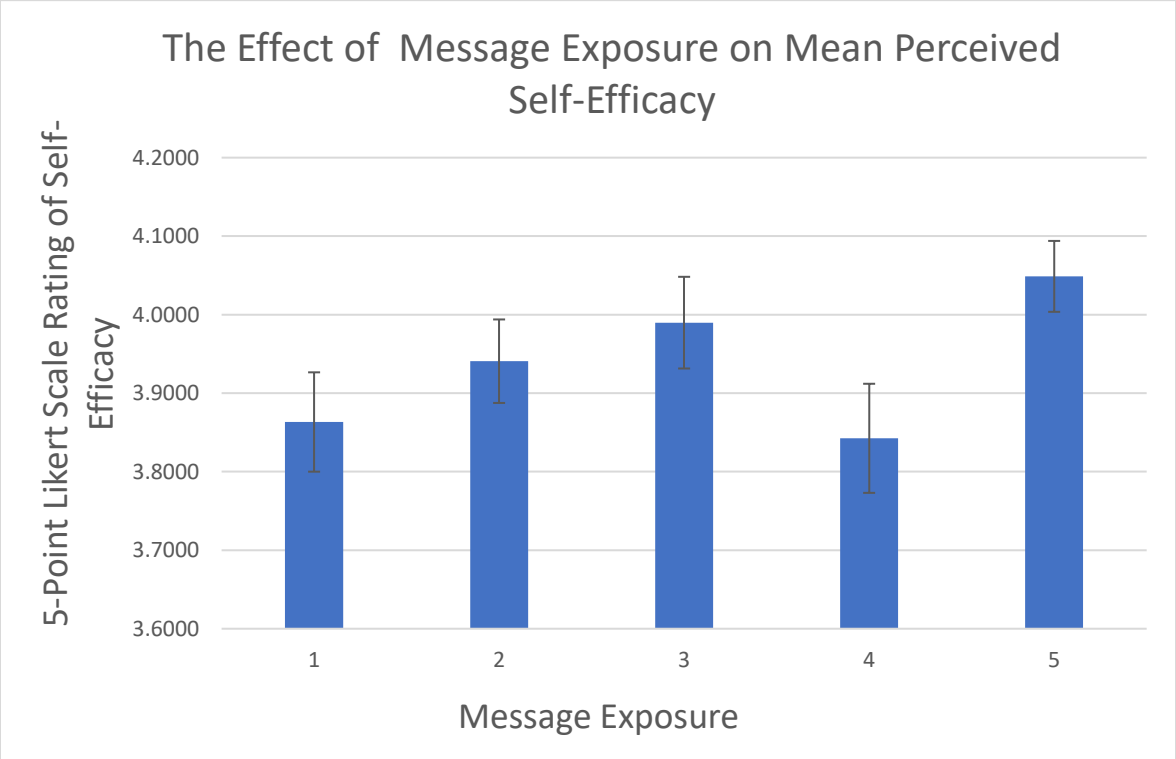

Figure 2: Results of Fisher's LSD Test for mean self-efficacy, where message 1 = high threat, positive efficacy, message 2 = high threat, negative efficacy, message 3 = low threat, positive efficacy, message 4 = low threat, negative efficacy, and message 5 = no message.

Response Efficacy

There was not a significant difference in mean response efficacy among the message exposures (p = 0.86, Table 1).

Behavioral Intention

There was a significant difference in mean behavioral intentions among the message exposures ($p = 0.036$, Table 1, Figure 3). Participants exposed to the low threat/positive efficacy message ($M = 3.89 \pm 0.067$) had significantly higher behavioral intentions to mitigate climate change than participants exposed to the low threat/negative efficacy message ($M = 3.66 \pm 0.077$; Tables 2 and 3; $p = 0.019$). Additionally, participants exposed to no message ($M = 3.87 \pm 0.059$) had higher behavioral intentions to mitigate climate change than participants exposed to the low threat/negative efficacy message (Tables 2 and 3; $p = 0.033$; Figure 3). There were no other significant differences in behavioral intention group means; however, the mean participant response for the low threat/positive efficacy message bordered having a significantly higher behavioral intention compared to the high threat/negative efficacy message ($M = 3.71 \pm 0.067$, $p = 0.058$); the mean participant response for no message also bordered having a significantly higher behavioral intention compared to the high threat/negative efficacy message ($p = 0.096$).

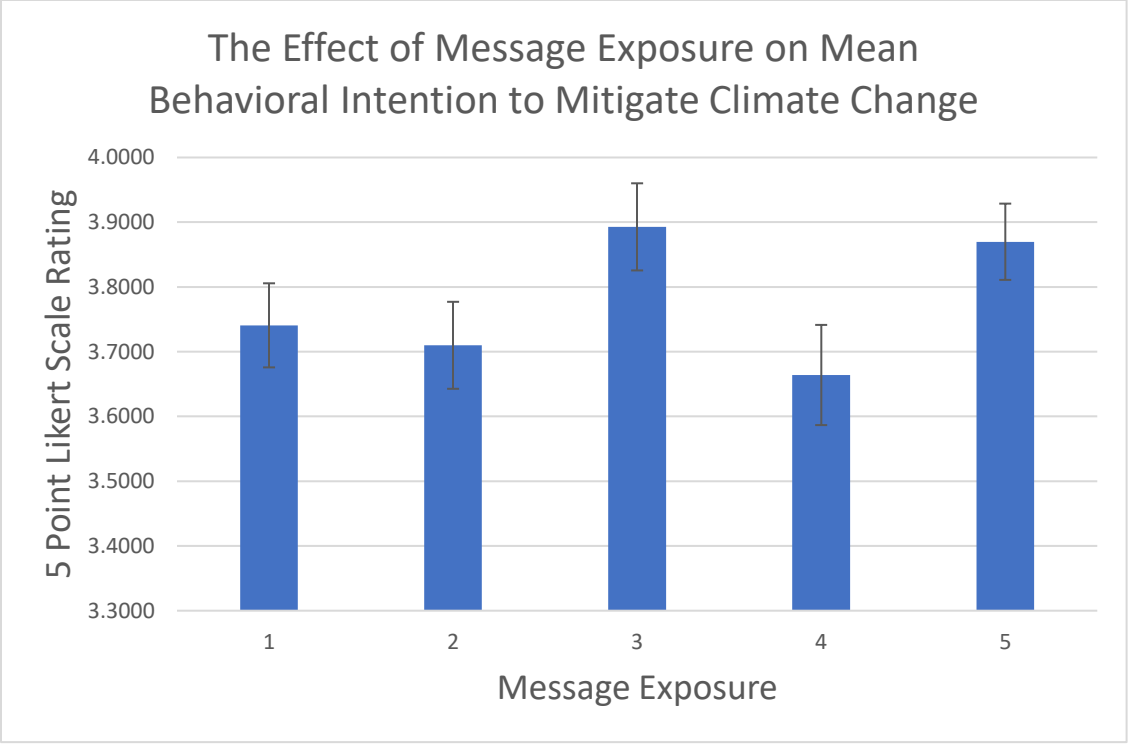

Figure 3: Results of Fisher's LSD Test for mean response efficacy, where message 1 = high threat, positive efficacy, message 2 = high threat, negative efficacy, message 3 = low threat, positive efficacy, message 4 = low threat, negative efficacy, and message 5 = no message.

Table 1: One-Way ANOVA Results

		Sum of Squares	df	Mean Square	F	**Sig.**
Self-Efficacy	Between Groups	3.767	4	.942	2.107	**.039**
	Within Groups	286.911	642	.447		
	Total	290.679	646			
Response Efficacy	Between Groups	3.770	4	.942	1.604	.086
	Within Groups	368.393	627	.588		
	Total	372.163	631			
Behavioral Intention	Between Groups	5.024	4	1.256	2.168	**.036**
	Within Groups	364.417	629	.579		
	Total	369.441	633			

Table 2: Fisher's LSD Test

Dependent Variable			Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
Self-Efficacy	1	2	0.338	-0.2361	0.0812
		3	0.127	-0.2890	0.0360
		4	0.800	-0.1404	0.1819
		5	**0.025**	-0.3480	-0.0230
	2	1	0.338	-0.0812	0.2361
		3	0.556	-0.2127	0.1145
		4	0.235	-0.0641	0.2605
		5	0.195	-0.2717	0.0556
	3	1	0.127	-0.0360	0.2890
		2	0.556	-0.1145	0.2127
		4	**0.082**	-0.0188	0.3134
		5	0.490	-0.2263	0.1084
	4	1	0.800	-0.1819	0.1404
		2	0.235	-0.2605	0.0641
		3	0.082	-0.3134	0.0188
		5	**0.015**	-0.3723	-0.0402
	5	1	0.025	0.0230	0.3480
		2	0.195	-0.0556	0.2717
		3	0.490	-0.1084	0.2263
		4	0.015	0.0402	0.3723
Behavioral Intention	1	2	0.741	-0.1525	0.2141
		3	0.112	-0.3401	0.0358
		4	0.414	-0.1077	0.2611
		5	0.176	-0.3162	0.0580
	2	1	0.741	-0.2141	0.1525
		3	**0.058**	-0.3722	0.0064

		4	0.628	-0.1399	0.2316
		5	**0.096**	-0.3484	0.0286
	3	1	0.112	-0.0358	0.3401
		2	0.058	-0.0064	0.3722
		4	**0.019**	0.0385	0.4191
		5	0.815	-0.1700	0.2160
	4	1	0.414	-0.2611	0.1077
		2	0.628	-0.2316	0.1399
		3	0.019	-0.4191	-0.0385
		5	**0.033**	-0.3953	-0.0162
	5	1	0.176	-0.0580	0.3162
		2	0.096	-0.0286	0.3484
		3	0.815	-0.2160	0.1700
		4	0.033	0.0162	0.3953

Note: *Yellow highlights indicate significance level below 0.05 and orange highlights indicate borderline significance*

Table 3: Dependent Variable Descriptive Statistics

		N	Mean	Std. Error
Self- Efficacy	1	139	**3.8633**	**0.06327**
	2	135	3.9407	0.05317
	3	123	**3.9898**	**0.05840**
	4	127	**3.8425**	**0.06947**
	5	123	**4.0488**	**0.04514**
	Total	647	3.9347	0.02637
Response Efficacy	1	138	3.7783	0.06279
	2	130	3.6985	0.07075
	3	118	3.8373	0.06364
	4	126	3.6556	0.07954
	5	120	3.8583	0.06169
	Total	632	3.7636	0.03055
Behavioral Intention	1	135	3.7407	0.06494
	2	131	**3.7099**	**0.06718**

	3	119	**3.8929**	**0.06728**
	4	128	**3.6641**	**0.07737**
	5	121	**3.8698**	**0.05891**
	Total	634	3.7721	0.03034

Note: *Yellow highlights indicate significance level below 0.05 and orange highlights indicate borderline significance*

Discussion

Self-Efficacy

The first question pertained to the impact different EPPM message exposures had on individual perceived self-efficacy (i.e., the belief that oneself is able to address and act on a problem). I found that individuals perceived higher self-efficacy when exposed to no message than when exposed to the high threat/positive efficacy message or the low threat/negative efficacy message. Where many studies on the EPPM and climate change only had two levels of message exposures (i.e., high threat/positive efficacy and high threat/negative efficacy), this result is counter to the findings of these studies. For instance, Xue et al. (2016) found that participants exposed to high threat/positive efficacy messages had significantly higher self-efficacy than participants exposed to the high threat/negative efficacy message. No message yielding higher self-efficacy than the high threat/positive efficacy message demonstrates that people are more likely to believe in their personal ability to mitigate climate change when arriving to believe in themselves on their own fruition rather than being delivered a lengthy message appealing to fears and solutions. It is possible that the broader context surrounding climate change as a gargantuan problem requiring collective action yields an exhausted audience to messaging; the more people hear about the doom-and-gloom of climate change, even when coupled with solutions, only furthers a sense of helplessness.

No message yielding higher self-efficacy than the low threat/negative efficacy message demonstrates that people are more likely to believe in their ability to mitigate climate change

when the message is not defeatist. In other words, individuals would rather receive no information if the message indicates that climate change is not a problem, and that individual action is futile. This result supports the core positionality of the EPPM; however, the significantly lower self-efficacy from the high threat/positive efficacy message questions how EPPM messages are constructed. Perhaps the level of detail (i.e., a couple of paragraphs with high threat first and positive efficacy second) and medium (i.e., a written message that needs to be read) hinders the reception and actualization of individual's self-efficacy.

Response Efficacy

Response efficacy has tremendous implications for whether or not individuals actually pursue solutions to problems; if there is low response efficacy, then the solution is not widely accepted by society. This study did not reveal a significant effect of EPPM message construction on response efficacy, which means that any mean differences between treatment levels may have occurred due to random chance. Additionally, the survey items measuring response efficacy paralleled the four distinct behaviors (i.e., changing transportation habits, reducing household emissions, eating plant-based diets, and writing to legislators). Because these behaviors are so distinct from one another, people's belief in the behaviors as solutions may have varied widely from individual to individual and from behavior to behavior. This should be acknowledged for future EPPM message constructions where response efficacy is being examined as a conglomerate response variable of multiple different behaviors as solutions.

Behavioral Intention

Behavioral intentions are the closest proxy to actual future behavior for survey-based studies. While perceived efficacy is an important starting point for promoting danger-control

responses, behavioral intentions demonstrate what individuals actually plan to do to address problems.

The first significant result was that individuals had higher behavioral intentions to pursue climate change mitigation actions when exposed to the low threat/positive efficacy message than when exposed to the low threat/negative efficacy message. This shows that providing a sense of efficacy is more effective at producing a danger-control response than providing a defeatist message; the fact that significantly more individuals intended to pursue danger-control response after being exposed to messages with a solution, even if the threat was low, questions the weight of fear in the EPPM. Other studies support this finding, where high perceptions of severity have been correlated with higher fear-control responses rather than danger-control responses (Ooms et al., 2015; Yoon et al., 2022) The EPPM was originally constructed to place fear back into persuasion for issues like chronic illness and disease; however, it is possible that the greater cultural context of climate change hinders the ability for fear to be effective. Every output about climate change is bleak—the Intergovernmental Panel on Climate Change projects horrendous outcomes on the current track—outcomes that have implications for the survival of the entire world. Anthropogenic climate change is a crisis, and the nature of the crisis should not be downplayed; however, the crisis nature of climate change is exactly why it is imperative to consider how to incite change now. It is possible that weighing positive efficacy in EPPM messages is more fruitful than weighing high threat.

I also found that individuals had higher behavioral intentions to mitigate climate change when exposed to no message than when exposed to the low threat/negative efficacy message. This result indicates that relaying nothing is often better at producing a danger-control response than relaying a defeatist message. The EPPM is supported by this result because a low

threat/negative efficacy message is projected to result in a fear-control response, where nothing is done to address the external problem. When articulating messages using the EPPM, it is important to consider the construct validity of the components. If the threat communicated does not meet a threshold for audiences to perceive fear and the efficacy communicated does not meet a threshold for audiences to perceive efficacy, then the danger-control response will not result from the message exposure.

Limitations

A prevailing limitation of a survey-based study design is that it is impossible to determine causality of the EPPM in climate change message reception there are many factors that cannot be controlled. For instance, it is impossible to determine if the respondents' behavioral intentions from the survey results actually mirror climate change mitigation behaviors. A controlled experiment, however, can yield ideas of causality between variables.

Additionally, the outlet of survey distribution has shown to have varying effects on data quality. A study by Peer et al. (2022) evaluated participant comprehension, attention, reliability, and honesty between Amazon's Mechanical Turk, CloudResearch, and Prolific. They found that, with data quality filters, only Prolific had high quality results; without the filters, only Prolific and CloudResearch had high quality results. This finding calls into question the use of Amazon's Mechanical Turk for data collection, especially when many participants often use it as a main source of income while only spending a few hours a week.

Future Research

To further explore resulting perceived self-efficacy from exposure to EPPM messages, it is important to check confounding factors to the EPPM being well-received. For instance, researchers should examine how the ordering of EPPM components in the message construction

influences perceptions of self-efficacy; perhaps people prefer to be addressed with solutions first and threats second, which could impact results. Popova (2011) states that Witte's assumption of threat appraisal occurring before efficacy appraisal is an unfounded, and it may be more accurate that efficacy appraisal can occur before or even simultaneously to threat appraisal.

It is also necessary to consider the broader cultural context surrounding climate change when constructing message treatments in future studies. For example, Hart & Feldman (2014) suggested that the EPPM should be expanded to incorporate perceived likelihood of political action influencing political change and perceived response efficacy in political action reducing climate change. Beyond Hart & Feldman's introduction of political efficacy, Stenhouse (2015) posited that there should be a third construct in the EPPM for collective identification. While Stenhouse could not prove causality between collective identification and danger-control responses, he did find strong associations between collective action and political action. When applying the EPPM to climate change mitigation, it is important to include these research extensions to evaluate how to precipitate collective action.

Reflection

Tackling an undergraduate thesis project comes with a dedication to achieving learning objectives. The first objective was to create a capstone experience for my undergraduate research experience. While the journey to my final product was fruitful and fun, it was also bumpy and exhausting. To fully conceptualize how I created this experience with the help of my mentors, I need to take you back to the beginning.

In the August of 2019, my parents loaded up their minivan to haul me up to Utah State University; this was entirely new territory for me—I had no family in Utah, nor any friends. There is nothing quite like the first time I was left alone as a young, autonomous adult; as soon as my parents left, waves of pressure pounded my brain. I remember thinking to myself: "Holy shit, I have to pave my own way now." This pressure lingered through my first year of college because I was desperate to find ways to extend my college education beyond classes.

When first arriving at USU, I had one declared major in the Quinney College of Natural Resources. Because of my ties to the college, I emailed every single professor in the college, asking each of them if they had volunteer work to do for their ongoing research. I did not have a lot of tact in talking to potential mentors; most of them saw my desperation for an extracurricular and turned me away. However, eventually, I was funneled into a professor's lab to identify species from a graduate student's camera trapping study. I spent long afternoons in a windowless room, hunched over an ancient computer, clicking through photos of moving grass and occasional mule deer. Becoming a bit stir crazy with data management, I turned to volunteer for USU's Cougar Project, where I trudged through mud and snow to set-up camera traps along the urban-wildland gradient of Cache County. This field work was extraordinarily engaging for me; I got to hang out with newfound friends and escape from the confinements of the valley.

The Cougar Project was a hand-me-down project from a graduated natural resources student. By the time I got involved, the next generation of leadership was getting ready to graduate, so as a regular volunteer, they passed in onto me and two other undergraduate students. Running the project was a whole new ballgame; suddenly, I was in charge of facilitating Memorandums of Understanding (MOUs) with the United States Forest Service and private landowners, speaking in classes of hundreds of students about noninvasive wildlife tagging methods, and training dozens of volunteers. All the while, the COVID-19 pandemic was in full swing, and while my co-leads and I loved being outside for the field work, we were not as equipped, nor motivated, to tackle data management and analysis. We also did not have strong or active ties to the professors who were mentoring the project, which ultimately led to the project's collapse. To this day, I have thousands of photographs on SD cards waiting to be unraveled, but I have not found another undergraduate student with the passion to take on the project. As a leader of this project, I ultimately failed to facilitate its longevity, which still bothers me; however, I came out of the experience knowing that, in order to succeed, I needed to create my own passion project and to cultivate strong relationships with mentors.

So, I took a step back for a while, only occasionally analyzing data from a professor or graduate student. My routine by the beginning of my junior year consisted of going to class, playing tennis, and raiding Somebody's Attic with roommates. By just existing in the present moment, I allowed my passions to build and form closer relationships with professors and friends. The content of my courses during my junior year was immensely thought-provoking, seeing as I had crossed disciplines to take communication studies courses. In Tim Curran's health communication class, he introduced a couple different health risk communication models, including the Extended Parallel Process Model (EPPM). In other courses, I was receiving mixed

messages about the effectiveness of fear appeals in mitigating environmental crises. I had a desire to further contextualize fear appeals in environmental communication, so I built my capstone project around this desire.

A second goal of the honors capstone experience is to have meaningful mentor relationships, and I definitely cultivated that with Tim Curran and Kari Veblen. My first pitch of the capstone project was to Tim, who introduced the EPPM to me; I mentioned this in my acknowledgements, but Tim squashed my imposter syndrome from day one. When proposing the project and asking him to be my mentor, he did not even hesitate to express his admiration for the research idea. Soon after, I approached Kari Veblen, my departmental honors advisor from QCNR; I was more nervous about this meeting, not because Kari is not supportive, but because my project was in the social sciences rather than strictly in ecology. Kari also gave me a nod of support, which was all I needed to throw myself into the weeds of an independent research project.

When in the capstone preparation class during the Spring of my junior year, I really unraveled the story surrounding climate change communication research. In articulating my research questions and goals, Tim recommended evaluating source material, paying close attention to the survey item scales in the methodology sections and the gaps-in-the-knowledge within the discussion sections. Sorting through the abundant peer-reviewed research on environmental communication is not an easy task; to fully comprehend the articles, I had to read them from start to finish, and I looked at dozens, if not hundreds of publications. With every search though, I was able to narrow in the scope of my research and learn how to articulate the "why" to my project; every publication, even the metanalyses had gaps in understanding; these were what I used to form my own questions and objectives.

Another goal of an honors capstone project is to contribute to future endeavors. During the summer of intermission between my junior and senior year, I worked as a park ranger at Timpanogos Cave National Monument. This experience really solidified another passion of mine, which is teaching, especially science teaching. Because so many science topics have been hijacked by partisan politics, science communication is something that requires immense tact and training. My project is an extension of this passion of science communication because it directly informs how I talk to the public about geologic time periods and evolution and climate change; it also informs my science communicator friends how to appeal to diverse, and sometimes polarized audiences. Following graduation, I will continue my park ranger journey, and this capstone project taught me true diligence and strategies for my interpretation of science.

One of the most difficult phases of this project was making it a reality. For over a semester, I theorized and built excitement over the project, but actually making it happen was intimidating, especially as a full-time student with a job and extracurricular obligations. During the fall semester of my senior year, I spent hours poring over grant proposals to be able to incentivize people to take my survey. As a writing center tutor, I helped many other students with grant proposals; however, writing one of my own was a gargantuan task. Suddenly, I had to rationalize the real-world implications and the broader significance of my project. As a researcher with a small team, it had felt life our own little passion project, but now I had to make it everyone's passion project. This requesting funding stage, while trying at times, was also incredibly beneficial, because it made me realize that research without application is not worth pursuing, especially if the research pertains to crisis disciplines, like climate change. After writing three different asks for funding, all I could do was hope for the best.

In this stage of limbo, I took the time to request IRB approval. This was also something out of my wheelhouse; even though my project fit the category of "exempt review," I was not sure how much detail was necessary in the documents I submitted to the IRB board. In the end, I had to submit many iterations of the consent form and rationalizations for ethics. Around the same time, some of the grant reviewers reached out, asking me to resubmit with revisions. As someone who has a fear of failure, I initially perceived these requests for resubmission as personal attacks on my capacity to do the project. Quickly though, through conversations with Tim, I realized that resubmission comments are the heart of academia; if no one looked at my work with a critical lens, then I would miss so many meaningful perspectives and considerations.

Once acquiring the funding and the IRB approval, we opened up the survey at the beginning of 2023; within a day, we received over 800 participants, which was really surreal. After conceptualizing the project for over a year, finally having data to comb through was relieving. The data analysis portion was a journey in itself; I had never used SPSS before for analyzing data; however, Tim and online tutorials walked me through the nitty gritty of SPSS. After running the one-way ANOVAs on the entire dataset, we noticed that none of the results were statistically significant. This was not a big deal at first; however, I noticed that some of individual responses were a bit wonky. For instance, some individuals spent less than a minute taking the survey, despite it requiring at least three minutes of time; other individuals listed their place of residence as outside the United States, which indicated that they did not meet the exclusion criteria for the study. So, I went back into SPSS and sorted participants who met the criteria for the study from the participants who did not. Running the data analysis again, two out of the three dependent variables yielded significant results! Critically thinking about the raw data led to beneficial outcomes, even if I had to work longer to solve the problem.

In the most recent portion of my project, I worked on deliverables. In February of 2023, I presented at Utah's Conference of Undergraduate Research; this was a really fun way to share my research with other social scientists and learn from their interpretations. One member of my audience for the presentation asked me: "How has this project changed how you talk about climate change with individuals?" I had not thought about this a lot, but in reality, the results have changed everything about my approach to science communication. Instead of placing emphasis on the threat, I usually place emphasis on the solutions; somehow solutions are less politically charged that the threat, which seems to facilitate more mitigation actions in individuals. I anticipated this written deliverable to be painful; however, because I had completed a literature review and method section for my funding proposals, the written portion was not difficult to manage, especially since I was excited to share results with others.

Ultimately, this project was an interdisciplinary venture to combine interests from both of my majors (i.e., ecology and communication studies). Because I was not afraid to cross disciplines, I ended up receiving tremendous advice and results. I am really proud of the work I have done, even though the round to the end was not smooth. If any future capstone authors are reading this, I want you to hear a couple things: 1. You are a whole person that needs breaks and balance. As a conventionally high achiever, it is really difficult to take time for myself; however, without the quiet moments spent recuperating, I would not have made it this far. Treat yourself kindly; when it is difficult to do that for yourself, surround yourself with people that lift you up rather than tear you down. 2. Do not let criticism distract you from the meaning of the project. In academia, there are so many hollowed out and corroded professors. You will likely get people who disapprove of your approach to your capstone project. Some criticism is certainly constructive, but other criticism stems from people wanting to fuel their soddened egos; know

what to carry with you and what to let go. 3. Do not be afraid to cross disciplines. When all of my formal and informal mentors had very specific niches for their research, I felt pressure to do a project branching from their research. Do not do this unless you are eager about the subject matter. If you are an engineer, but you love mixed media art, find a way to combine the two areas of interest. The project will be long and agonizing if you dedicate your time to someone else's passions.

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Appendices

Appendix A: Message Exposures

Instructions: Participants will be randomly exposed to one of the five messages (including the control group). They will be asked to spend at least 5 minutes reading through the content before moving on to the next part of the survey.

Message #1: High Threat/Positive Efficacy Message:

Human-induced climate change is leading to extreme weather events, severe coastal flooding, and significantly less food production. Between now and 2050, climate change is projected to cause 250,000 additional deaths per year. The impacts of climate change threaten all communities across the globe, and no one is free from its impacts.

Fortunately, not all hope is lost. Everyone can help limit climate change. From the way we travel, to the electricity we use and the food we eat, we can make a difference. Start with these four actions to help tackle the climate crisis.

1. **Saving energy at home**: Much of our electricity and heat are powered by coal, oil, and gas. Use less energy by lowering your heating and cooling, switching to LED light bulbs and energy-efficient electric appliances, washing your laundry with cold water, or hanging things to dry instead of using a dryer.
2. **Walk, bike, or take public transport:** The world's roadways are clogged with vehicles, most of them burning diesel or gasoline. Walking or riding a bike instead of driving will reduce greenhouse gas emissions — and help your health and fitness. For longer distances, consider taking a train or bus. And carpool whenever possible.
3. **Eat more vegetables**: Eating more vegetables, fruits, whole grains, legumes, nuts, and seeds, and less meat and dairy, can significantly lower your environmental impact. Producing plant-based foods generally results in fewer greenhouse gas emissions and requires less energy, land, and water.
4. **Write to your representative**: Limiting your own impact is beneficial, but you can also make a difference in how your representatives write and vote on climate change legislation. You can use citizensclimatelobby.org to craft an impactful and personal message within minutes.

Message #2: High Threat/Negative Efficacy Message:

Human-induced climate change is leading to extreme weather events, severe coastal flooding, and significantly less food production. Between now and 2050, climate change is projected to cause 250,000 additional deaths per year. The impacts of climate change threaten all communities across the globe, and no one is free from its impacts.

Unfortunately, while we are on an greenhouse gas emissions trajectory that is irreversible, even if you made environmentally-conscious decisions, like saving energy at home, taking cleaner transportation, eating plant-based diets, and writing to your representatives, it would only have a limited impact on human-induced climate change. The problem is quite large and will also require many others to make a real impact.

Message #3: Low Threat/Positive Efficacy Message:

Human-induced climate change has impacted the planet; however, the local impacts are predictable, and we are currently moving on a trajectory where sustainable emissions will prevent

devastating impacts, like extreme weather events, severe coastal flooding, and less food production.

To keep on this beneficial trajectory, everyone can help limit climate change. From the way we travel, to the electricity we use and the food we eat, we can make a difference. Start with these four actions to help tackle the climate crisis.

1. **Saving energy at home**: Much of our electricity and heat are powered by coal, oil, and gas. Use less energy by lowering your heating and cooling, switching to LED light bulbs and energy-efficient electric appliances, washing your laundry with cold water, or hanging things to dry instead of using a dryer.
2. **Walk, bike, or take public transport**: The world's roadways are clogged with vehicles, most of them burning diesel or gasoline. Walking or riding a bike instead of driving will reduce greenhouse gas emissions — and help your health and fitness. For longer distances, consider taking a train or bus. And carpool whenever possible.
3. **Eat more vegetables**: Eating more vegetables, fruits, whole grains, legumes, nuts, and seeds, and less meat and dairy, can significantly lower your environmental impact. Producing plant-based foods generally results in fewer greenhouse gas emissions and requires less energy, land, and water.
4. **Write to your representative:** Limiting your own impact is beneficial, but you can also make a difference in how your representatives write and vote on climate change legislation. You can use citizensclimatelobby.org to craft an impactful and personal message within minutes.

Message #4: Low Threat/Negative Efficacy Message:

Human-induced climate change has impacted the planet; however, the local impacts are predictable and we are currently moving on a trajectory where sustainable emissions will prevent devastating impacts, like extreme weather events, severe coastal flooding, and less food production.

Because of this beneficial trajectory, people shouldn't worry too much about their individual habits. Even if you made environmentally conscious decisions, like saving energy at home, taking cleaner transportation, eating plant-based diets, and writing to your representatives, it would only have a limited impact on human-induced climate change.

Message #5: No Message

**Participants will move start with demographic and ecological worldview questions

Appendix B: Survey Items

Efficacy & Behavioral Intention Questions:

The following items will be evaluated on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree).

Self-Efficacy Items

1. In general, I think that I can reduce my personal impact on climate change.
2. I believe I can succeed at reducing my personal impact on climate change.

3. I am confident that I can perform effectively on many different climate change mitigation tasks, like saving energy at home, using public transportation, eating plant-based, and writing to my representatives.
4. Even when things are tough, I can perform individual tasks to reduce my carbon footprint.

Response Efficacy Items

1. In general, I believe that taking individual actions to reduce my personal impact on climate change will make a big difference.
2. I believe that saving energy at home will help reduce human-induced climate change
3. I believe that using public transportation, biking, carpooling, and walking instead of driving personal vehicles will help reduce human-induced climate change.
4. I believe that eating more vegetables and consuming less meat will help reduce human-induced climate change
5. I believe that writing to my representatives will lead to legislation to reduce human-induced climate change.

Behavioral Intention Items

1. I intend to save energy at home to reduce my carbon footprint.
2. I intend to use public transportation, bike, carpool, and walk to reduce my carbon footprint.
3. I intend to eat a more plant-based diet to reduce my carbon footprint.
4. I intend to write to my representatives about supporting legislation to reduce human-induced climate change.

Ecological Worldviews (NEP-R)

The following items will be evaluated on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree).

1. When humans interfere with nature it often produces disastrous consequences.
2. Humans' ingenuity will ensure that we make the Earth livable.
3. Humans are seriously abusing the environment.
4. The Earth has plenty of natural resources if we just learn how to develop them.
5. The balance of nature is strong enough to cope with the impacts of modern industrial nations.
6. Despite our special abilities, humans are still subject to the laws of nature.
7. The so-called "ecological crisis" facing humankind has been greatly exaggerated.
8. The balance of nature is very delicate and easily upset.
9. Humans will eventually learn enough about how nature works to be able to control it.
10. If things continue on their present course, we will soon experience a major ecological catastrophe.

Demographics

1. What is your age?
2. Where is your current residence?
3. What gender do you identify as?

   a. Female
   b. Male
   c. Gender nonconforming
   d. Prefer not to say
4. Please specify your ethnicity.
   a. African American
   b. Asian
   c. Caucasian
   d. Latino or Hispanic
   e. Native American
   f. Native Hawaiian or Pacific Islander
   g. Two or More
   h. Other
   i. Prefer not to say
5. What is your political ideology?
   a. Very conservative
   b. Conservative
   c. Moderate
   d. Liberal
   e. Very Liberal
6. What is the highest degree or level of education you have completed?
   a. Some High School
   b. High School
   c. Bachelor's Degree
   d. Master's Degree
   e. Ph.D. or equivalent
   f. Trade School
   g. Prefer not to say

Author Biography

Mikenna DeBruin graduated with B.S. Conservation and Restoration Ecology and a B.S. Communication Studies in the Spring of 2023. In her time at Utah State University, she co-led Utah State University's Cougar Project, volunteered for USU's Gleaning Team, and worked as a writing tutor for the Science Writing Center and as a teaching assistant for a public speaking class. In her summers away from school, she served as a National Park Service (NPS) interpretive ranger; she will continue her dedication to science communication by working seasonally with the NPS and by pursuing jobs as a Geographic Information Science (GIS) technician.