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Changing the Communication for a Changing Climate: Effects of Climate Change Communication on Identity, Emotions, and Mobilization

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0. Abstract

What are the most constructive emotions to evoke in climate change communication for diverse groups of people in a way that encourages pro-environmental behavior? A specific communication style and subsequent emotional response may best mobilize people interested in efforts to address climate change compared to people who are less invested in the issue. In this study, 927 valid participants surveyed were randomly assigned to one of three groups: a "fear" condition, a "hope" condition, and a control condition. All participants were asked a series of questions about their demographics, identities, perceptions, values, and environmental attitudes. Following these experimental tasks, they watched a brief video to induce the corresponding treatment emotion. Finally, they indicated their likelihood of doing a range of self-reported behaviors related to tackling climate change. Participants who had higher levels of climate change belief, concern, and motivation were expected to respond with increased pro-environmental behavior under the fear condition. Conversely, those with lower levels were expected to be more likely to respond with pro-environmental behavior under the hope condition. However, with my treatments and sample, only the *hope condition* seemed to mobilize participants in statistically significant ways. Another important discovery was that when examining public versus private pro-environmental behaviors, distinct indicators used to measure levels of environmental attitudes and identity predicted different classifications of behaviors. Qualitative analyses were also conducted on responses to two open-ended survey questions using a grounded theory approach. My results suggest that scientists, politicians, and other messengers must differentiate between various levels of climate change belief, concern, and motivation within peoples' identities when communicating the need for action. Finally, I point out some barriers to effective climate change communication and potential interpretations of how people

can better harness the power of communication to mobilize the actions necessary to mitigate and adapt to climate change.

1. Introduction

"It is much, much worse than you think," wrote author David Wallace-Wells (2019) on the future impacts of climate change. Critics have both denounced his book for fear-mongering and praised it for telling the situation as it is. When reading this book, I began to wonder what is the best approach to climate change communication. After all, climate change is arguably the most pressing existential crisis of our time, yet our planet has not yet addressed it in any substantial way. Climate change will affect every single person because we all call Earth our only home. For over 50 years, scientists have sounded alarms that the burning of fossil fuels is causing changes to the Earth's climate, and that failure to take action on climate change will have devastating consequences. Despite this urgency, CO2 emissions (and global temperatures) continue to climb. Progress on mitigating climate change is slowed by the stubborn persistence of climate skepticism, as well as a failure of nonskeptics to translate their concern about climate change into meaningful action. Communication practices have sometimes been blamed for this lack of response, so it follows there is a robust body of literature examining climate change communication in depth. There are increasing calls for boundary crossings to improve the interactions between communication science and practice, which should include intended audiences (Moser, 2016).

Previous research has documented that distinct groups of people have different emotional responses to varying styles of climate change communication and that one's level of mobilization is impacted by their identity and what emotions are elicited. However, there is a gap in the literature exploring the interactions between one's environmental attitudes/identities and the most

constructive emotions to evoke in climate change communication in a way that encourages pro-environmental behavior. For instance, a specific messaging style and subsequent emotional response may best mobilize environmentalists or people who otherwise care about climate change. Alternatively, there may be a different messaging style and subsequent emotional response that works better to mobilize people who aren't as invested in climate change work. Since individuals who believe climate change is a problem are often also the ones who communicate about climate change, they may use the communication style they find effective for people like them when interacting with others. This may occur even if that communication style has a different effect on people outside of those groups.

Our contribution fills the gap in the existing literature by combining various important themes implicated in climate change communication and advancing the investigation into the interactions between identity, emotions, and mobilization in order to illuminate how to best communicate about climate change. While communicators cannot completely control the emotions experienced by the viewer, the message and underlying emotional appeal matter. Therefore, the importance of determining which style of messaging (hopeful or fearful) works most effectively cannot be understated. We, as a society, need to find a way to communicate about climate change in a way that inspires people to take action at individual, collective, and political levels. Audiences' emotional and behavioral responses need to be considered when they encounter information about climate change and how that response is influenced by their attitudes and identities. My study attempts to accomplish the goal of elucidating how certain kinds of messaging and related emotions affect whether diverse individuals and groups will take action, which will assist in efforts to combat climate change more broadly.

2. Literature Review

In the field of climate change communication research, I observed four emergent themes based on my approach to this project. These primary themes in this body of literature are communication, emotions, identity/values, and mobilization. These themes are discussed in further detail below, but it is important to highlight why these bodies of literature are implicated in the present study to the exclusion of others. First, communication is currently used as a primary strategy for changing individuals' and groups' ideas and behaviors. Some criticize climate change communication for continually conveying the same message without providing evidence of the situation worsening or improving. Additionally, how an issue is framed is vital to how that message is received and what the response is. Another consideration is the inclusion of an efficacy statement (how actions matter) to increase the likelihood of the desired outcome. Second, engaging with material about climate change invokes many discrete emotions in people. For example, some audiences may respond with hope, fear, guilt, anxiety, shame, anger, or doubt. Many studies compare many distinct emotions and the effect they have on behavior. The present study closely explores hope versus fear because they have both repeatedly been shown to be important drivers of action and thus require further scholarship. Third, one's identities and values operate as screens through which information is filtered and often influence ensuing decisions. Blanket messages have been proven to be ineffective at mobilizing pervasive action. Fourth, mobilization and pro-environmental behavior in particular are typically the objective when communicating about climate change. Widespread, collective action is needed to effectively mitigate and adapt to its impacts. Improving our communication practices is a necessary response if we are to rise to the challenge of addressing climate change.

2.1 Communication

When designing public messages, there is a tendency for communicators to focus on the content of the message. But in many contexts—and particularly in highly polarized, intergroup environments—the source of the message can be just as important. Bergquist and colleagues (2022) tested whether information about the human causes of global warming influences Americans' beliefs and concerns about global warming and support for climate policies. They found that communicating information about the human causes of global warming increases public understanding that global warming is human-caused (Bergquist et al., 2022). This suggests that when informed about climate change causes, impacts, and solutions, most Americans can update their own climate change beliefs, risk perceptions, and policy support. To understand if the frequency of messaging impacts participants' behavioral responses, Kesenheimer and Greitemeyer (2020) tested whether daily messaging intervention increases participants' pro-environmental behavior. They compared an egoistic appeal to an ecological appeal and discovered that neither of the appeals affected participants' behaviors. Overall, their results do not provide support for the effectiveness of a daily messaging technique (Kesenheimer & Greitemeyer, 2020). This is a useful finding because it could mean that less frequent communication may work to achieve similar positive outcomes.

Traditional pro-environmental communication often either encourages desired behaviors or discourages undesired behaviors. Kronrod and colleagues (2023) argue these two approaches are limited in their ability to elicit perceptions of informativeness and therefore they may not be effective enough in the context of new pro-environmental behaviors, because of the profound need to educate the public about these new behaviors. They found that compared with communication that separately uses an encouraging or a discouraging message, a combined

message that integrates both approaches elicits higher engagement with new pro-environmental behaviors (Kronrod et al., 2023). In contrast, Marquina and colleagues (2022) examined whether messages about watershed protection that emphasize instrumental, intrinsic, or relational values (as opposed to the information-only control message) resulted in differing support for policies or behavioral intentions related to watershed conservation. Their study revealed that participants' characteristics had a stronger effect on conservation beliefs than the way values were framed. These results demonstrate that one's identities interact with how the importance of conservation is framed in complex ways and that practitioners might improve the effectiveness of their communications by incorporating relational values and tailoring messages to different audiences (Marquina et al., 2022). Researchers are increasingly calling for a more nuanced approach to communication named "message tailoring," in which a better understanding of people's natural responses to climate change can be used to design messages that best meet different individuals' particular emotional, informational, and decision-making needs.

Climate change is an issue that elicits low engagement, even among concerned segments of the public. While research suggests that the presentation of factual information (e.g., scientific consensus) can be persuasive to some audiences, there is also empirical evidence indicating that it may also increase resistance in others. To empirically explore this question, Morris and colleagues (2019) investigated whether climate change narratives structured as stories are better than informational narratives at promoting pro-environmental behavior in diverse audiences. They propose that narratives structured as stories facilitate experiential processing, heightening affective engagement and emotional arousal, which serve as an impetus for action-taking. They found that stories are more effective than informational narratives at promoting pro-environmental behavior (Morris et al., 2019). Importantly, embedding information within the

story structure influences pro-environmental behavior. Täuber and colleagues (2014) identify another serious problem for communicators regarding the framing of climate issues in public discourse, namely that moralizing such an issue can motivate individuals while at the same time defensively leading them to avoid solving the problem. Thus, moralization is a double-edged sword: It provides people with a powerful motivation to act for a cause they believe in, yet people often cope with moral threats in defensive ways. Possible solutions involve the non-moral framing of persuasive messages as a means to avoid defensive responses and promoting coping mechanisms that do not reflect defensiveness (Täuber et al., 2014). The media should play a key role in promoting, among common individuals, the adoption of new and more sustainable practices, yet the media seems to be failing to effectively address the climate crisis. Tavares and colleagues (2020) analyzed news articles and discovered that media tends to report climate change by using distant (e.g., future-focused) and outcome (e.g., threatening messages) framings, based on non-resilient, scientific, and political narratives, whilst overlooking the role of civil society in adapting to climate change. These results demonstrate that instead of promoting society's climate action, the media may be contributing to widespread social apathy about the climate and the disengagement of individuals regarding environment-related matters.

Moser (2010) notes that communicators face several challenges in trying to convey the issue of climate change, including invisibility of causes, distant impacts, lack of immediacy and direct experience of the impacts, lack of gratification for taking mitigative actions, disbelief in human global influence, complexity and uncertainty, inadequate signals indicating the need for change, and perceptual limits and self-interest. Many different aspects involved in the communication process largely determine the response, such as the purpose and scope of the communication, audience, framing, messages, messengers, modes and channels of

communication, and assessing the outcomes and effectiveness of the communication (Moser, 2010). Despite the important progress made in research on climate change communication, persistent challenges remain. These include a superficial public understanding of climate change, transitioning from awareness and concern to action, communicating in deeply politicized and polarized environments, and dealing with the growing sense of overwhelm and hopelessness (Moser, 2016). Interestingly, Nerlich and colleagues (2009) posit that there is no such thing as an effective communication *per se*, in the sense of communication strategies developed in a vacuum ahead of time. A crucial need to improve the interaction between climate communication research and practice is emerging. Regarding other problems with climate change communication, van der Linden (2014) outlined how public campaigns do not usually pay sufficient attention to the psychological determinants of the behaviors that they are trying to change and often fail to make the climate change context explicit. To address this, van der Linden and colleagues (2014) compared three approaches to communicating the scientific consensus, namely: (a) descriptive text, (b) a pie chart, and (c) metaphorical representations. Their results indicate that while all three approaches can significantly increase public understanding of the degree of scientific consensus, the pie chart and simple text have superior recall and are most effective across political party lines (van der Linden et al., 2014). Similarly, Yoshimura-Rank (2013) suggests that an educational-based statement may be more effective on behavior than an emotional statement.

2.1.1 Framing

Anspach and Draguljić (2019) tested motivational, economic, and personal frames to see the extent to which efficacy, psychological proximity, and emotion-mediated environmental frames' affect support for an environmental campaign. Their results point to the conclusion that

motivational frames are unable to elicit efficacy in the target audience, thus proving ineffective at influencing attitudes or behaviors. Economic and personal frames are more successful, aligning the audience's attitudes with the message and operating through psychological proximity, sadness, and anger to induce behavioral support for the environmental campaign (Anspach & Dragulјić, 2019). To further explore the impact of framing, Armbruster and colleagues (2022) investigated how goal frames (gain, non-loss, loss) either with or without efficacy statements affect consumers' support for climate-change policy. Aligning with fear appeal theory, their study revealed that a more threatening loss frame paired with an efficacy statement produced the strongest pro-policy attitudes and the greatest willingness-to-pay by successfully balancing fear/threat with hope/efficacy and by producing deeper message processing (Armbruster et al., 2022). Gain and loss frames are two of the many competing strategies used in climate change communication. Baek and Yoon (2017) examined how two negative emotions—guilt and shame—influence responses to environmental advertisement messages framed as gains or losses. Their findings provide converging evidence for the interplay between negative emotions and message framing (Baek & Yoon, 2017). Advancing the exploration of the interaction between emotions and message framing, Bilandzic and colleagues (2017) explored discrete emotions (guilt, fear, hope) as mediators for the effects of goal framing on the perceived threat of climate change and willingness to sacrifice. Their study tested the distinction between gain-positive frames, gain-negative frames, and loss frames. Their findings indicate that gain-negative frames increase perceived threat and willingness to sacrifice, while loss frames increase them through guilt and fear. A gain-positive frame increases hope but subsequently lowers both outcomes (Bilandzic et al., 2017). Michelson and DeMora (2021) found consistent evidence that framing

those messages in negative terms (e.g., stop dirty energy) is more effective than framing them positively (e.g., promote clean energy).

Citizens are increasingly polarized on climate change, making universal persuasive communication on the issue rarely effective. Bertolotti and colleagues (2021) sought to investigate how individuals with different climate change beliefs evaluated gain and loss-framed messages on the environmental and economic impact of a related policy. Their research showed that the evaluation of the messages depended on receivers' prior beliefs on the existence and severity of climate change and the type of argument used to describe the expected consequences of the policy (Bertolotti et al., 2021). Dedman and Lee (2023) also looked at the influence of different identities and gain- versus loss-framed messaging upon motivations for pro-environmental behavior. Their findings suggested interaction effects between social identity and message frames on activism, support for environmental policy, and enactment measures. Additionally, gain-framed messages were dominant in enhancing private sustainable behaviors, while loss-frames were dominant in enhancing political behaviors. Negative versus positive framing statements were compared by Dickinson and colleagues (2013). They found evidence that highlighting the positive collective impacts of small behavioral changes also increased participants' interest in taking personal action. Ropret Homar and Knežević Cvelbar (2021) found support for a loss aversion hypothesis where loss framing was found to be more or equally effective when examining behavior and intentions, though gain framing was more successful, where the choices taken required lower commitment, namely attitudes. To look beyond only these frames, Klein and colleagues (2022) compared framing pro-environmental behavior as beneficial for others against it as just beneficial for the environment. They reported that social framing further increases pro-environmental behavior in comparison to purely environmental

framing (Klein et al., 2022). Finally, Wang and colleagues (2022) examined the effects and psychological processes of different types of messaging intended to promote pro-environmental behaviors. When matched with loss framing, an environmental appeal indirectly generated a stronger positive impact by stimulating an individual's environmental risk perception. However, when monetary incentives are matched with loss framing, individual pro-environmental identity is weakened, thereby inhibiting a pro-environmental behavioral response (Wang et al., 2022).

2.1.2 Efficacy

Perceptions of efficacy have been shown again and again to impact the likelihood of action. Choi and Hart (2021) examined how different efficacy constructs— self-efficacy, personal outcome expectancy, collective efficacy, and collective outcome expectancy– independently influence willingness to engage in personal energy conservation behavior and support for policies to address climate change. Their results demonstrated that self-efficacy, personal outcome expectancy, and collective outcome expectancy were all positively associated with both behavioral intention and policy support. Results regarding collective efficacy were unstable because different experimental manipulations led to different outcomes, and these differences were challenging to explicate (Choi & Hart, 2021). This study highlights the need to distinguish between the different types of efficacy and treat them as independent variables. Feldman and Hart (2015) went past just efficacy and also tested the effects of communicating using political efficacy messages on two types of climate-related political participation via the discrete emotions of hope, fear, and anger and compared these effects across ideological groups. For them, efficacy influences different emotions differently and efficacy messages are conceptualized as a message-level variable rather than an individual-level variable. They discussed positive versus negative appeals and found only hope and fear but not anger, which are

significant predictors (Feldman & Hart, 2015). Importantly, exposure to efficacy information indirectly increases participation, and the effects were found to vary by ideology. In another, subsequent study, Hart and Feldman (2016) looked at how changing the type and valence of efficacy information in news stories discussing global climate change may impact intended political participation through the mediators of perceived internal, external, and response efficacy. All three types of perceived efficacy examined there–internal, external, and response–have unique, significant positive associations with intentions to become politically engaged on the issue of global climate change (Hart & Feldman, 2016). These results are further evidence that individuals' feelings about various efficacy constructs matter in communication and can heavily influence audiences' behavioral responses. Therefore, communication efforts may benefit not only by focusing on the possible effects of different policy responses to climate change but also by describing specific steps that interested members of the public may take to make a difference.

Jugert and colleagues (2016) investigated the difference between self-efficacy and collective efficacy to clarify the role of collective and self-efficacy beliefs in motivating pro-environmental intentions. To accomplish this, they experimentally tested whether manipulations of collective efficacy enhance, reduce, or are unrelated to perceptions of self-efficacy. This study found collective efficacy manipulations can increase pro-environmental intentions by increasing perceptions of efficacy at the collective and individual levels (Jugert et al., 2016). Despite these efforts to explore self-efficacy and collective efficacy as independent of each other to investigate how they operate, it is important to note that collective and self-efficacy are interrelated and interact in complex ways. To discover other factors related to efficacy, Kellstedt and colleagues (2008) added public informedness, public confidence in climate

scientists, and the role of personal efficacy in affecting global warming outcomes to their analysis. They particularly examined self-efficacy as a dependent variable based on informedness and public confidence. They found that more informed participants both feel less personally responsible for global warming and also show less concern for global warming. Moreover, confidence in scientists has unexpected effects: participants with high confidence in scientists feel less responsible for global warming, and also show less concern for global warming (Kellstedt et al., 2008). Further still, Valentino and colleagues (2008) suggest that political behavior is triggered by the presence of a variety of material and cognitive resources, including political efficacy. The dominant view conceptualizes efficacy as capital, used to overcome obstacles to participation. They found that internal efficacy boosts participation in part by facilitating anger, but not fear, in response to policy threats. This partial mediating effect operates primarily among younger citizens who are in the process of developing the habit of participation. Finally, external efficacy is not causally linked to participation via emotions and internal efficacy is enhanced by successful participation in politics.

2.2 Emotions

There has been an ongoing trend in research examining the most effective emotions to elicit in climate change communication. It can be difficult for climate communicators to communicate about climate change in emotionless ways due to all of the explicit and implicit meanings associated with the topic. Therefore, studying the emotions in climate change communication has been a central theme in this body of research. Furthermore, the inducement of emotion utilizing different communication techniques is encouraged as a means of mobilizing the public. Rather than treating emotions as simple levers to be pulled to promote desired outcomes, emotions should be viewed as one integral component of a cognitive feedback system

guiding responses to challenging decision-making problems (Chapman et al., 2017). A focus on emotion in purely instrumental terms risks overlooking the multifaceted ways in which emotion is used in communication (Graminius, 2022).

Various studies have explored emotions in different ways. Feldman and Hart (2017) tested the effects of variations in text and imagery on discrete emotions (i.e., hope, fear, and anger) and, indirectly, on support for climate mitigation policies. They found that hope and fear increase support for climate policies for all ideological groups, particularly conservatives, whereas anger polarizes the opinions of both liberals and conservatives (Feldman & Hart, 2017). Kleres and Wettergren (2017) looked at fear, hope, anger, and guilt specifically in climate activism. Their argument builds on the theoretical premise that emotions energize and orient all actions. Their analysis shows that fear motivates action by raising awareness of the threat of climate catastrophe and hope propels action while (collective) action generates hope and manages fear (Kleres & Wettergren, 2017). Finally, they found evidence that anger is to be treated cautiously as an emotion to be pacified/transformed, which requires additional effort, and guilt/blaming is largely rejected too (Kleres & Wettergren, 2017). Russell and Ashkanasy (2021) investigated whether the emotional framing (sadness, fear, anger, contentment, and hope) of climate change communication can influence workplace pro-environmental behavior. This study showed that displayed emotion significantly affected pro-environmental behavior and that high-arousal negative emotions such as anger and fear led to more pro-environmental behavior than the low-arousal negative emotion of sadness (Russell & Ashkanasy, 2021). However, the findings revealed no significant differences between the emotions of anger and fear. These articles show hope and fear as two of the main emotions to study in climate change communication, while anger and guilt are seen as less influential.

A study conducted by Bain and colleagues (2012) suggests that climate change deniers don't respond to eliciting negative emotions, but that positive appeals can change their views. Their research shows that appeals to fear can be effective under specific conditions, but that they can also easily backfire. Bain and colleagues (2012) investigated a different framing tactic, based more on hopes than fears. Although what worked in the laboratory might not work outside it, there is good reason to expect that such framing might have the desired outcome. Brosch (2021) notes that affective responses people experience toward climate change are consistently found to be among the strongest predictors of risk perceptions, mitigation behavior, adaptation behavior, policy support, and technology acceptance. Importantly, the emotions people experience at a given moment as well as the emotions they anticipate experiencing after a behavior may be important drivers of action. Nabi and Prestin (2016) examined the interaction between emotions and efficacy. Their results indicated a significant interaction that emotionally consistent presentations (fear/low efficacy; hope/high efficacy) boosted intentions to engage in protective actions relative to emotionally inconsistent, sensationalized presentations (fear/high efficacy, hope/low efficacy). These effects were moderated by perceived knowledge about the issue.

2.2.1 Fear

Despite some evidence suggesting that fear may not be a constructive emotion to appeal to in climate change communication, other studies indicate that it is motivating for certain groups and identities. Chen (2015) examined the impact of various degrees of fear appeals of climate change on an individual's intention to engage in pro-environmental behavior. The results indicate that the participants who read the low-fear appeal text exhibit more evoked fearful emotion and have more intentions to engage in pro-environmental behavior than those who read the high-fear appeal text (Chen, 2015). Crucially, an individual's perceived collective efficacy should be

enhanced, especially when they are under the high-fear appeal condition. These results indicate the need to study the intensity of emotions, rather than assuming that emotions of the same valence have similar effects. As seen later, I respond to this by including a salience measure in my study. To further explore the interaction between fear and efficacy, Sarrina Li and Huang (2020) found that the perceived threat and perceived efficacy of the fear appeals were significantly correlated with participants' use of a systematic mode of information processing and there were interactive effects of perceived threat and perceived efficacy with the high-threat/high-efficacy group being the only group achieved persuasive outcomes. Nabi and Myrick (2018) assert that while the threat component of fear appeals is associated with fear responses, a fear appeals' efficacy component is likely associated with a different emotional experience: hope. This is further evidence calling for hope and fear to be explored in more detail. Nabi and colleagues (2018) heeded that call and investigated the role of emotion, fear and hope specifically, in the gain/loss framing of environmental policy initiatives. Their results further supported the value of sequencing emotional experiences to enhance persuasive effect. When specifically looking at news headlines, Feldman and Hart (2021) discovered that both climate engagement and news perceptions were more consistently affected by the focus of the stories: news about climate impacts increased fear, decreased efficacy beliefs and hope, and reduced news credibility compared to news about climate actions.

News is a medium where many people encounter information about climate change. Scharks (2016) examined the use of threats and efficacy messages in news organizations. They found about half of all ads contained a mention of a threat, but, different from many other studies of persuasive public communications, threats were frequently paired with efficacy messages. Additionally, Scharks (2016) explored the role of psychological distance (how closely climate

change is perceived) and collective efficacy (the belief everyone can work together) on climate change mitigation policy support in a message with a fear appeal. Skurka and colleagues (2023) point out that despite a wealth of scholarship on threat-based climate change messages, most research has examined the effects of a single exposure to them. To fill this hole, they investigated whether psychological responses (e.g., emotions, issue salience) intensify or wane with repeated exposure to threatening messages about climate change multiple days in a row. Their research revealed that fear intensity did not dissipate upon repeated exposures to different threatening articles, hope was not consistently affected by message exposure, and issue salience was uniformly high (Skurka et al., 2023). They also found that fear and intentions increased initially but plateaued around six exposures whereas personal issue salience and personal efficacy increased linearly (Skurka et al., 2023). Stollberg and Jonas (2021) posit that climate threat furthermore promotes palliative responses, such as ingroup defense, identification with nature, or salient common humanity. Here, collective responses seem to reduce anxiety, and when combined with pro-environmental norms, even promote pro-environmental action. One active debate in the literature is the extent to which traditional climate change messages—messages designed to arouse fear and concern—are causing people to retreat into a passive state of avoidance, denial, and/or helplessness. The push to focus on more positive messages around climate change—celebrating wins and gearing toward optimism—has crossed over from academia. Efficacy perceptions are positively correlated with negative emotions around climate change (e.g., fear and anxiety) but share negligible relationships with emotions such as hope. This is one reason the present study examines these aspects of emotions and efficacy in more detail.

2.2.2 Hope

Many standard communication strategies that rely on fear and scientific authority alone—rather than comprehensive explanations that include solutions—can leave audiences feeling overwhelmed and disengaged, instead of hopeful and motivated to act. Communication models that involve the head (understanding of climate change), heart (hope through agency and efficacy), and hands (intentions to participate in community action) further engagement in climate change conversations. Bonanno and colleagues (2021) lay out a framework/toolkit for climate change communication by providing an alternative method to the information deficit model of communicating about divisive socio political topics. The framing techniques they describe have been shown to increase understanding of the mechanisms of climate change—which is critical for connecting appropriate solutions and increasing a sense of hope and motivation to act. To this point, Marlon and colleagues (2019) looked at what makes individuals hopeful—or in contrast, doubtful—that humanity can respond to climate change, or how hope relates to activism. They concluded that an interaction exists between constructive hope and doubt in predicting political behavioral intentions, which suggests that having hope that humans will reduce climate change, along with the recognition that humans are not doing enough may also be constructive and motivate political action (Marlon et al., 2019). Climate change communicators might consider focusing on constructive hope (e.g., human progress, the rise of clean energy), coupled with elements of constructive doubt (e.g., the reality of the threat, the need for more action), to mobilize action on climate change. Finally, Ojala (2012) explored if hope concerning climate change has a significant relation to pro-environmental behavior as well as an impact on behavior when controlling for already well-known predictors such as values, social influence, knowledge, and gender. Hope is not only a pleasant feeling but could also work

as a motivational force if one controls denial (Ojala, 2012). One positive way to evoke hope about climate change is positive reappraisal, containing more specific sources of hope about focusing on positive news and a view that the awareness about climate change has increased.

2.3 Identity and Values

2.3.1 Six Americas

Audience segmentation – a process of identifying coherent groups within a population – can be used to improve the effectiveness of public engagement campaigns. Global Warming's Six Americas is a well-established segmentation of Americans based on climate change beliefs, attitudes, and behaviors. The Six Americas categories from highest to lowest levels of belief, concern, and motivation related to climate change are: Alarmed, Concerned, Cautious, Disengaged, Doubtful, and Dismissive. The original Six Americas model requires a 36 question-screener and although there is increasing interest in using these segments to guide education and outreach efforts, the number of survey items required is a deterrent. Chryst and colleagues (2018) developed a shorter version of the instrument to address this problem. The four items cover participants' global warming risk perceptions, worry, expected harm to future generations, and personal importance of the issue. Risk perception, worry, and personal importance have long been identified as important predictors of climate change engagement and policy support (Chryst et al., 2018). Another study on audience segmentation examined how unique audience segments within the population think and act toward climate change, and explores whether and how the level of audience engagement moderates the effect of various messages on support for climate policy (Martel-Morin & Lachapelle, 2022). They also explored how each segment responds to different messages about carbon pricing in Canada. In addition to highlighting the importance of tailoring and targeting messages for differently engaged

segments, these results suggest that communicating around the specific consequences of carbon taxes for the prices of some goods may be a fruitful way to enhance support for carbon taxes among relatively less engaged audiences. Finally, Martel-Morin and Lachapelle (2022) looked at how the separate models of four, five, or six segments compare to each other in terms of face validity. From this point of view, the five-class model offered the most informative and practical results. On the one hand, the four-segment model omitted the distinction between the Doubtful and the Dismissive groups, which masks some nuance, as results from their five-segment model make evident. On the other hand, the additional group created in the six-segment model is very similar to the Concerned segment already in the five-segment model and thus generated confusion while not substantially contributing to a better understanding of how motivations, behaviors, and preferred societal responses differ across groups.

Next, it is important to explain the characteristics that define each category. The Alarmed are convinced global warming is happening, human-caused, an urgent threat, and they strongly support climate policies. Most, however, do not know what they or others can do to solve the problem. The Concerned think human-caused global warming is happening, is a serious threat, and supports climate policies. However, they tend to believe that climate impacts are still distant in time and space, thus climate change remains a lower-priority issue. The Cautious haven't yet made up their minds: Is global warming happening? Is it human-caused? Is it serious? The Disengaged know little about global warming. They rarely or never hear about it in the media. The Doubtful do not think global warming is happening or they believe it is just a natural cycle. They do not think much about the issue or consider it a serious risk. The Dismissive believe global warming is not happening, human-caused, or a threat, and most endorse conspiracy theories (e.g., "global warming is a hoax"). Americans supported a broad range of policies and

personal actions to reduce global warming, although there was wide variation among the six identified audiences. To enhance the impact of campaigns, government agencies, non-profit organizations, and businesses seeking to engage the public can selectively target one or more of these audiences rather than address an undifferentiated general population (Maibach et al., 2011).

2.3.2 Environmental Attitudes

Environmental attitudes can be measured in many distinct ways and, given that, many unique instruments have been developed. Amerigo and colleagues (2012) proposed a theoretically integrated structure made up of four dimensions of environmental concern: apathy, anthropocentrism, connectedness, and emotional affinity. Their main findings indicate that a high level of inclusion of nature in the self is expressed through high scores for connectedness and emotional affinity, whereas the relationships are inverted in the case of anthropocentrism and environmental apathy. A similar pattern is observed concerning pro-environmental behavior (Amerigo et al., 2012). Bravo and Farjam (2022) note that the relationship between environmental attitudes and behavior is known to be weak, especially when these variables are measured as self-report items in surveys. To better explore the attitude-behavior gap in the context of environmental policies, they examined four key variables – environmental attitudes, self-reported environmental behavior, observed environmental behavior (in the form of carbon-offset credit purchase), and partisan identity – were measured, and their interactions in promoting pro-environmental behavior were analyzed. The researchers found that self-reported and real behavior is almost uncorrelated and partisan identity mainly predicted self-reported not actual environmental behavior. Additionally, self-identity as an environmental activist is positively correlated with participation, especially when intrinsic and explicit (Brick & Lai, 2018). Further investigating the topic of identity, suggest that attitudes toward nature,

connectedness with nature, and self-esteem form a balanced triadic structure of implicit environmental identity. We can extend the understanding of connectedness with nature, by integrating it into a broader framework that links connectedness, attitudes, and self-esteem as a triadic form of environmental identity (Bruni et al., 2021).

The environmental identity (EID) scale was developed to measure individual differences in a stable sense of interdependence and connectedness with nature. Since then, it has been reliably correlated with measures of environmental behavior and concern (Clayton et al., 2021). This research also gives me greater confidence that the EID construct is meaningful across different cultural contexts. Faccioli and colleagues (2020) explored the influence of general environmental attitudes and place identity perceptions on willingness to pay. Their results show that people with more positive environmental attitudes and greater attachment to their spatial location tend to display a higher willingness to pay and increased support for ecological remediation (Faccioli et al., 2020). Although attitudes are relatively good predictors of behavior and are relatively easy to change, they only help explain specific behaviors (Gatersleben et al., 2012). Given that, there is a need to study the role of values and identities in explaining individual pro-environmental behaviors. McCright and Dunlap (2008) examined the effects of environmental movement identity on several characteristics of environmental problem belief systems within the general public. They found that the environmental problem belief systems of self-identified active participants in the environmental movement exhibit greater consistency, greater consensus, and less position extremity than do those of individuals unsympathetic to the environmental movement. In other words, environmental attitudes matter. To that end, Milfont and Duckitt (2010) designed the Environmental Attitudes Inventory with twelve specific scales that capture the main facets measured by previous research. The twelve factors were established

through confirmatory factor analyses, and the EAI scales are shown to be unidimensional scales with high internal consistency, homogeneity, and high test-retest reliability, and also to be largely free from social desirability. Pro-environmental behaviors are crucial to reducing environmental degradation, and much research has focused on two key psychological antecedents: pro-environmental attitudes and efficacy beliefs. Miller and colleagues (2022) looked at relationships among environmental attitudes, efficacy, and pro-environmental behaviors. They found evidence that overall environmental attitudes are a strong predictor of pro-environmental behaviors, while efficacy has a small direct and non-significant moderation effect.

Another measure of environmental attitudes is the Connectedness to Nature scale which represents the relationship of the Self with the natural environment. The Connectedness to Nature scale correlated consistently with the Inclusion of Nature in Self scale and environmental beliefs (Olivos et al., 2011). Environmental concern is a highly relevant concept in the context of environmental change and increasing demand for political regulation of environmental protection. Schaffrin (2011) demonstrated that environmental concern is not only a distinct concept excluding behavior and knowledge but is also rather complex addressing geographical as well as temporal issues. Sparks and colleagues (2020) compared the New Ecological Paradigm, the Connectedness to Nature Scale, self-reported strength of environmentalist identity, environmental movement identity, and the cultural cognition scales in a single sample. Their data suggest that Connectedness to Nature and environmentalist identity were the strongest predictors of pro-environmental behavior in their sample, and my findings also suggested a difference in private versus public behaviors. Environmentalist identity was slightly stronger than the Connectedness to Nature in predicting public behaviors, while Connectedness to Nature was the strongest predictor of private behaviors (Sparks et al., 2020). Tam (2013) argues that on the one

hand, recognizing the commonalities among the various concepts and measures allows one to integrate existing research findings. However, on the other hand, identifying the distinctiveness of some concepts and measures reveals that certain ways of conceptualizing connection to nature (e.g., a multidimensional framework) are promising. Importantly, political elite stances strongly influence people's attitudes about climate policy, beyond people's ideology, concern about climate change, and other individual differences. Van Boven and Sherman (2021) attribute political elite influence to perceived social norms; elite influence depends on people's inference that their political ingroups will follow elites. Additionally, communication from political elites can elicit anger and affective polarization on divisive topics like climate policy (Van Boven & Sherman, 2021).

2.4 Mobilization

News reports of climate change have the opportunity to benefit society by shaping the public's collective cognition regarding climate change, transforming their mitigating behaviors, and encouraging them to adopt climate change-related behaviors. Chen (2019) indicated four factors for social representations of climate change, namely emerging climate change risk, media coverage and influence, psychological distance, and pro-environmental behavior intentions. Results from this study suggest the social representation of emerging climate change risk is a vital determinant for predicting the public's pro-environmental behavior intentions (Chen, 2019). These findings imply that when people perceive that climate change may pose a risk to humans and other species and admit that it is an increasing trend and is occurring now, they exhibit increased pro-environmental behavior intentions. Empirical research suggests that emotions may affect different groups of people in distinct ways, but experimental evidence remains scant. Through a double-blind experiment conducted by Lamprianou and Ellinas (2018), this study

investigated the degree to which emotions (shame and anger) motivate people with different levels of political sophistication to be more politically active. They found an interaction between shame and sophistication, not with anger. Additionally, anger interacts with low political involvement to yield behavioral change (Lamprianou & Ellinas, 2018). Their evidence shows that different emotions might display different patterns of interaction with sophistication.

Vasi and Macy (2003) point out that collective action can be problematic for two reasons—we may get little or no additional benefit from our efforts should we choose to contribute (the "efficacy problem"), yet we will enjoy the benefits of others' efforts even if we fail to contribute (the "free-rider problem"). The authors argue that crisis messages tend to undermine belief in the efficacy of collective action, especially when conditions are improving unless coupled with messages that reinforce a sense of efficacy. Additionally, a positive social identity then amplifies the effect of coupling crisis with empowerment messages. Finally, a one-sided emphasis on the need for action can be counterproductive unless coupled with messages that call attention to occasional progress (Vasi & Macy, 2003). Some have advocated in favor of using a doom-and-gloom messaging style in climate communications (i.e., inducing negative emotions) as a way to stimulate climate mitigation behaviors. Others have warned that this messaging may have no impact on behavior or, worse, that it may depress and demoralize the public into inaction. Vlasceanu and colleagues (2024) tested 11 expert-crowdsourced interventions on four climate mitigation outcomes: beliefs, policy support, information-sharing intention, and an effortful tree-planting behavioral task. The effects of each intervention differed depending on people's initial climate beliefs. Their findings suggest that the impact of behavioral climate interventions varies across audiences and target behaviors. While negative emotion messaging was highly effective at stimulating climate information-sharing intentions (a relatively

low-effort behavior), the negative emotion induction intervention appeared to backfire on policy support among participants with low initial climate beliefs. The results indicate that the impact of the interventions on each outcome depends on peoples' pre-existing belief in climate change, supporting the claim that interventions need to be tailored to the characteristics of their audience (Vlasceanu et al., 2024).

It is important to better understand what triggers one's decision to join collective action and why. Castiglione (2020) showed that affective involvement is shown to relate to environmental activism participation via feelings like fear of the consequences of climate change, outrage, anger, sadness, and guilt; while these seem to be tightly related to participation, the lack of affective involvement regarding climate change that is common to many people may be due to a reduced perception of the risks. Additionally, self-efficacy may help us overcome the paralyzing fear of climate change consequences, it is higher for specific actions than for general goals, it may be a successful neutralizer of the free-riding effect (by making us feel a necessary component of successful action), and is fueled by successful outcomes. Furthermore, collective efficacy strongly correlates with participation. It may be boosted by greater identification with the group, together with high faith in the reciprocal participation of other community members, and trust in institutions (Castiglione, 2020). Chung and Lapinski (2023) investigated the influence of dynamic norms messages on behavioral intention via perceived future descriptive norms for two different pro-environmental behaviors and tests for the moderating role of group identity in the relationship between dynamic norms and behavior. They discovered that when the reference group in a message is viewed as an in-group member and similar to oneself, dynamic norms messages are more influential than conventional low descriptive norms messages; on the other hand, when the reference group is perceived as an out-group and dissimilar to oneself,

conventional low descriptive norms messages are more influential than dynamic norms messages (Chung & Lapinski, 2023). Prinzing (2020) argues that although awareness and concern about climate change are widespread, rates of pro-environmental behavior are low. This is partly due to how pro-environmental behavior is framed—as a sacrifice or burden that individuals bear for the planet and future generations. This framing elicits well-known cognitive biases, discouraging what we should be encouraging. Prinzing (2020) makes the case to abandon self-sacrifice framing, and instead frame pro-environmental behavior as intrinsically desirable.

2.4.1 Pro-Environmental Behavior

Pro-environmental behavior in addressing climate change is influenced by multi-dimensional factors—knowledge, values, intention, and sociodemographic background. Ahmat Zainuri and colleagues (2022) determined the environmental values and pro-environmental behavior that are easy or difficult to embrace as well as identified the extent pro-environmental behavior is triggered by environmental values by people with low socioeconomic backgrounds. The participants had difficulty in associating themselves with biospheric values however readily demonstrated consideration toward altruistic values, especially related to concerns for future generations. In terms of environmental conservation behavior, the participants were not willing to relinquish comfort or convenience easily (Ahmat Zainuri et al., 2022). The potential of pro-environmental behavior interventions to affect other pro-environmental behaviors not initially targeted by the intervention has been a focus of recent inquiry. Truelove and colleagues (2014) report that the evidence evaluating these spillover effects has been mixed, with some studies finding evidence for positive spillover (i.e., one pro-environmental behavior increases the likelihood of performing additional pro-environmental behaviors) and others finding negative spillover (i.e., one pro-environmental behavior decreases the likelihood of additional

pro-environmental behaviors). Importantly, the attribution of the initial pro-environmental behavior to either an external motivator (e.g., a price signal) or an internal motivator (e.g., self-identity) also matters (Truelove et al., 2014). Bimonte and colleagues (2019) took this research thread further and analyzed the impact of priming on environmental and ethical attitudes and willingness to pay for environmental protection. They found that while priming does make pro-environmental attitudes more salient, its frame affects the probability of willingness to pay a premium for environment-friendly goods and the size of the premium (Bimonte et al., 2019).

When looking at behavior change interventions and pro-environmental behavior nudging, Byerly and colleagues (2018) suggest that social influence and simple adjustments to decision settings can influence pro-environmental decisions. Chatelain and colleagues (2018) wondered if people use mental bookkeeping of past behaviors, allowing them to limit pro-environmental behaviors after having performed similar ones, and investigated the role of affect in this context. They revealed that participants indicated a smaller willingness to act pro-environmentally if the behaviors were similar. Positive affect increased the likelihood of showing subsequent behaviors and mitigated negative spillover driven by behavioral similarity (Chatelain et al., 2018). Davis and colleagues (2011) examined the connection between individuals' relationships with the natural environment and their environmental behaviors with a focus on commitment to the environment, defined as psychological attachment and long-term orientation to the natural world. They discovered that individuals who are satisfied with and invested in the natural world are likely to be committed to the environment and act with the well-being of the environment in mind (Davis et al., 2011).

Ernst and colleagues (2015) investigated four predictors of adult environmental behavior (environmental attitudes, locus of control, sense of personal responsibility, and intention) to explore their predictability of environmental action and intention toward future involvement in environmental action. They found that changes in levels of environmental attitudes significantly predicted environmental action, with an increase in environmental attitudes being associated with a decrease in environmental action. Another study by Díaz and colleagues (2020) provides estimations of the effect of internal factors, such as sociodemographic variables, and four psychological dimensions (climate change knowledge, environmental attitudes, self-efficacy, and trust in sources of environmental information) on pro-environmental behaviors. Another possible intervention is increasing concern for collectives (e.g., humankind, future generations) rather than just for individuals. Fritsche and colleagues (2018) propose that ingroup identification, ingroup norms and goals, and collective efficacy determine environmental appraisals as well as both private and public sphere environmental action. These processes are driven by personal and collective emotions and motivations that arise from environmental appraisal and operate on both a deliberate and automatic processing level.

How people get their information is crucial for whether they perform pro-environmental behaviors. Individuals' exposure and attention to global warming media coverage have positive direct effects on three types of pro-environmental behavior, including accommodating, promotional, and proactive behavior. Environmental beliefs and self-efficacy also have indirect effects on all types of environmental behavior through media use (Huang, 2016). It is necessary to point out that the question of what shapes pro-environmental behavior is such a complex one that it cannot be visualized through one single framework or diagram (Kollmuss & Agyeman, 2002). Therefore, developing a model that incorporates all the factors behind pro-environmental

behavior might neither be feasible nor useful. Kollmuss and Agyeman (2002) propose environmental knowledge, values, and attitudes, together with emotional involvement as making up a complex they call “pro-environmental consciousness.” In terms of measuring pro-environmental behavior, self-reported measures of pro-environmental behavior have been questioned. However, all other things being equal, an individual with a high propensity to engage in pro-environmental behavior can be expected to indicate a higher likelihood of pro-environmental behavior than an individual with a low propensity (Lange & Dewitte, 2019). A study by Li and Tseng (2018) aimed to explore if one person sending their pro-environmental behavior to a friend affects the friend’s future pro-environmental behavior. They discovered that receiving a message of pro-environmental behavior didn’t promote the receiver’s behavior, but reinforced the sender’s continued behavior (Li & Tseng, 2018). Social norms are powerful motivators for pro-environmental behavior. Liao and colleagues (2015) found that people’s attention to pro-environmental media messages is simultaneously associated with their perceptions of others’ attention to similar media messages and their belief that others are influenced by these messages. Looking closer at the role of media in influencing action, Liu and Li's (2021) findings show that media exposure to environmental-related messages positively predicts environmental concern and perceived personal responsibility, and perceived personal responsibility mediates the relationship between environmental concern and pro-environmental behavior.

Mancha and Yoder (2015) examined the effects of identity, operationalized as independent and interdependent self-construal, on green behavioral intentions. Their results indicate that how we define ourselves has a substantial impact on our intent to protect the environment (Mancha & Yoder, 2015). Relatedly, Nakano and Hondo (2023) examined the

different methods by which providing narrative and logical information on climate change affects pro-environmental behavior. They concluded that narrative evokes stronger emotions, such as anxiety and fear, and leads to higher behavioral intentions and policy acceptance of climate change than logical information. They further infer that this tendency is more pronounced when the participants tend to be absorbed into narratives or have little interest in climate change (Nakano & Hondo, 2023). Panno and colleagues (2015) studied whether an emotion-regulation strategy (i.e., cognitive reappraisal) predicted both climate change perception and pro-environmental behavior. According to their research, individuals with a stronger tendency for habitual use of cognitive reappraisal showed both increased global climate change perception and a greater extent of pro-environmental behavior compared with individuals with a lower such tendency. As expected, their results also showed the mediating role of climate change perception in the relationship between people's habitual use of cognitive reappraisal and pro-environmental behavior (Panno et al., 2015). Bringing another aspect into the discussion, Tam and Chan (2018) argue that individuals who are concerned about environmental problems feel reluctant to contribute because they fear being exploited by free riders. Additionally, their work showed that generalized trust can temper this fear because it allows people to expect others to contribute (Tam & Chan, 2018).

A society's relationship with its environment often can be revealed through mass media. Terracina-Hartman and colleagues (2014) explored whether framing spurs environmental activism and engagement in addition to how perceived efficacy and fear affect behavioral intent toward environmental action. Their results show people are motivated to act when frightened or threatened, and responses exist that could alleviate those threats (Terracina-Hartman et al., 2014). Going deeper into the impact of emotions on pro-environmental behavior, Verplanken and Roy

(2013) found that habitual ecological worrying was associated with pro-environmental attitudes and behaviors, and with a personality structure characterized by imagination and an appreciation for new ideas. Yang and colleagues (2014) indicated that perceived issue salience triggered negative affect and information insufficiency, which led to greater policy support and a stronger intention to adopt more pro-environmental behaviors. The moment when an audience encounters a message also plays an important role in whether pro-environmental behaviors are adopted. Zimmermann and colleagues (2021) point out that digital nudges that predominantly operate after an action show positive effects on changes in pro-environmental behavior. Personality traits also must be considered when looking at pro-environmental behavior interventions, especially when examining emotions as well. Yu and Yu (2017) found support for four interaction effects of personality traits and the related latent variables of environmental attitude, including sustainability value, social norms, environmental concern, and perceived risk. Plus, the impact of individuals' environmental attitudes was moderated by personality traits.

3. Methods

3.1 Data Source

Here, I am utilizing a mixed-methods survey experimental research design that allowed for analyses of the relationships between and among variables in an objective and controlled fashion so that precision was maximized and specific conclusions could be drawn regarding hypothesis statements. The source of the data for the present study employs an online social and behavioral science research participant recruitment service called *CloudResearch Connect*. Operating as a marketplace, Connect facilitates interactions between researchers and participants, enabling the deployment of surveys and experiments constructed via third-party tools, such as

SurveyMonkey as was used in the present study. Participants receive email or text message notifications when new studies are launched, and can see all studies available to them on their participant dashboard. Participants can then preview the studies and choose whether or not to participate. Based on the participants' performance, researchers can then choose whether to approve or reject their submission. An important feature of Connect is that participants are compensated regardless of whether their responses are included in the final dataset. Put another way, there is a guarantee participants are compensated fairly for their time and effort. Researchers must pay participants a minimum of $6 per hour, but at least $7.50 is recommended as a starting point. Participants can get paid through various methods including PayPal, bank transfers, and Amazon gift cards. Additionally, researchers can set quotas for various demographics and apply census matching to ensure the research is more representative, replicable, and reliable. These include basic demographics, such as age, race, gender, education, income, and employment status. Researchers select the demographics they're interested in (e.g., political identity), and what percent of participants they want to fall under each category. *CloudResearch* then sends the survey out to participants who are more difficult to target first, for faster data collection. Another one of the key factors in improving the reliability and replicability of studies is the range of people participating, so *CloudReserach* employs census-matching to ensure a nationally representative crowdsourced sample. Participants on Connect are currently restricted to the U.S. and must be at least 18 years old. By integrating advanced screening methods, continuous monitoring, and feedback mechanisms, the platform guarantees that researchers receive attentive, engaged, and high-quality responses from participants (Hartman et al., 2023).

3.2 Analytic Tools

The quantitative analytical tools used in this study were primarily either linear or logistic regression analyses, depending on the dependent variables being studied. A deeper discussion of which variables were used in each type of regression analysis can be found in the findings and analysis section. Linear regression was used to examine if a set of predictor variables does a good job of predicting a dependent variable and to show which variables in particular are significant predictors of the dependent variable, and in what way they impact the dependent variable. These regression estimates are used to explain the relationship between one dependent variable and one or more independent variables. Logistic regression was used when the dependent variable was binary or otherwise non-linear in its distribution. Logistic regression helped describe the data and explained the relationship between one dependent binary variable and one or more nominal, ordinal, or interval independent variables. I also explored the statistical coefficient relationships to determine how a change in one variable was accounted for by variations in other variables. When using logistic regression, odds ratios were established to investigate the proportional odds that a change in one variable was associated with a change in another variable. These different types of analyses showed how each statistical variable related to each of the control variables.

The qualitative analysis for both open-ended survey questions was conducted through the platform NVivo. NVivo allows researchers to organize, analyze, and visualize data, revealing the patterns it contains. I followed an inductive grounded theory approach to qualitative analysis. Grounded theory sets out to discover or construct theory from data, systematically obtained and analyzed using comparative analysis. Beginning with the data and through a high-level analysis of cases, researchers formulate a tentative definition of their concept. An explanation for the

created constructs is later crafted based on this case analysis. According to an explanation from Tie and colleagues (2019), coding is an analytical process used to identify concepts, similarities, and conceptual recurrences in data. Coding is the pivotal link between collecting or generating data and developing a theory that explains the data. Following the data collection stage in the process, 12 anchor codes were formulated based on the existing literature and anticipated participant responses to each specific open-ended question. The anchor codes can be found in Appendix 7.1. Following that point, each response was carefully read and one or more codes were assigned. Throughout the initial coding process, the author kept handwritten, analog notes describing emergent themes. Once each response was read, analyzed, and assigned a code, the author returned to the codebook to merge, split, or eliminate codes by consulting the literature, notestaken during the initial coding stage, and further contemplation of emergent themes to further clarify each conceptualization. The second-round codes can be found in Appendix 7.2. After that step enhanced the codebook, each response was read, analyzed, and re-coded in a second round of coding. This second round also reduced coding errors and increased reliability. Finally, three primary objectives were examined in detail: the overall incidence of themes, the relationships between and among themes, and an exploration of the distribution of themes across the sample.

3.3 Data Collection

A pilot survey was conducted to accurately assess the average duration of time for survey completion, to ensure each constructed measure's validity, to run factorial analyses to determine questions to omit, and to verify the survey instrument operated as intended.[1] The pilot launched

[1]The items included in the instrument loaded onto four separate constructs - one overall (all attitude measures), the single environmental ID (no alpha since it is one item), the EIDR (.78) and the SIXAM (.74).

on August 2, 2023, and was 100 cases. The pilot consisted of seventeen single-item questions, seven multiple-item 7-point Likert scales made up of between four and ten questions each, followed by one of three treatment videos that lasted roughly one minute and 45 seconds, a treatment attention check and treatment impactfulness rating, thirteen behavioral intention indicators, one open-ended question, two check-all-that-apply questions, and lastly two multiple-item 7-point Likert scales made up of either five or two questions. The pilot took approximately 15-18 minutes to complete. Factor analyses were then conducted to determine how items related to each other and measured similar constructs to shorten the length of the survey. Ten questions relating to environmental attitudes were eliminated and an additional open-ended question was included before sending out the final survey. The initial wave of participants who took the finalized, full survey was on August 23, 2023, and brought the total to 738 completed responses. Following this, the last wave oversampled for conservative individuals was on October 19, 2023, and comprised 281 additional complete responses. The last wave only accepted responses from conservative-identifying participants due to lower-than-average participation from that group in general (Best & Krueger, 2005). The final sample size, controlling for attention checks, was 927 valid responses. For a closer look at the final survey, see the instrument section below and Appendix 7.6.

Since the present study involved human subjects, the authors received approval from the Hamline University Institutional Review Board (IRB). This research proposed no more than minimal risk to participants, did not involve any vulnerable populations (i.e., children, prisoners, individuals with impaired decision-making capacity, and/or economically or educationally disadvantaged persons), and involved research on individual or group characteristics or behavior. Thus, an Expedited Review Process was followed. Following the initial submission for review,

the IRB recommended conditional approval pending three revisions: (1) modify the consent form for use with an online survey; (2) add the draft survey questions to the supporting materials folder for the protocol, and update them with final survey questions before the survey goes out; (3) explain how the mental health resources list will be made available to participants after they click past the consent form. The research protocol was approved on July 20, 2023, with the approval number 2023-5-245ET. For the approved informed consent document, see Appendix 7.4. Finally, the authors will submit a Closure Report form to notify the IRB when the study has been completed.

3.4 Instrument

In this study, 927 valid participants surveyed were randomly assigned to one of three groups: one condition that received a "fear" treatment video, one condition that received a "hope" treatment video, and a control condition that received a neutral treatment video. A device with audio capabilities was required to take the survey to ensure each participant heard the subliminal instrumental music in addition to reading the slide text. Each treatment condition video played a different tune in line with the intended emotion to evoke. These videos were created by Ettinger and colleagues (2021) for use in a similar study (see Appendix 7.5). All participants were asked a series of questions about their demographics, such as age, gender, race/ethnicity, education level, geographic location, population density, political ideology, political party, employment status, income, voting status, voting participation, and evangelicalism. A justification for each of these characteristics is included in Appendix 7.3. Notably, various religions have different perspectives on humans concerning the environment, and one's religion may influence feelings about climate change (Deckman et al., 2021), so participants' religious affiliation was ascertained. They were also asked a question to see how

close attention they pay to information about what's going on in government and politics because as Krupnikov and Ryan (2022) argue, Americans are divided by their level of involvement in politics, and individuals who are more involved are more likely to encounter information about climate change more frequently than those who are less involved. Climate change messaging often comes from scientific sources, so any communication about climate change might prove ineffective at mobilizing a response if the participants are prejudiced against trusting in science. Therefore, a question on how much they trust in science (Nadelson et al., 2014) was included. After that, a series of questions on perceptions of efficacy were used to determine their level of self-efficacy, personal outcome efficacy, collective efficacy, and collective outcome efficacy (Choi & Hart, 2021). Personality may influence how emotions are experienced and responded to, so participants completed the Ten-Item Personality Inventory (Ehrhart et al., 2009). participants' orientation to conspiracism (Kay & Slovic, 2023) was measured before the treatment as well as after the treatment to explore how each treatment influenced a change in conspiracism. Importantly, the effects of climate change are not experienced uniformly across the globe nor proportionally across groups, so views of equality versus dominance of groups and nature may be proxies for climate change attitudes and behavior (Jylhä & Akrami, 2015). Given that, a measurement of social dominance orientation (Pratto et al., 2013) was inserted. Understanding how collective identities among rural Americans drive environmental policy preferences in distinct ways from urban Americans is a valuable distinction to make (Diamond, 2021). Thus, rural resentment (Munis, 2020) was also measured.

The authors relied on three different measures of environmental attitudes and identity: the Revised Environmental Identity Scale (EIDR), the Six Americas Super Short Survey (SIXAM), and identification as an environmentalist (ENID). Clayton and colleagues (2021) initially

developed the Environmental Identity Scale in 2003 to measure individual differences in a stable sense of interdependence and connectedness with nature. Since then, it has been reliably correlated with measures of environmental behavior and concern. Moreover, the EID construct is meaningful across different cultural contexts, so the revised version is recommended as a replacement for the original version (Clayton et al., 2021). Maibach and colleagues (2011) and the Yale Program on Climate Change Communication identified six distinct segments ranging in size from 7 to 33% of the population by subjecting multiple measures of global warming beliefs, behaviors, policy preferences, and issue engagement to latent class analysis. Certain behaviors and policy preferences varied greatly across these audiences, while others did not. Then, using discriminant analysis, Maibach and colleagues (2011) subsequently developed a 36-item instrument that can be used to categorize participants with 91% accuracy. Chryst and colleagues (2018) have since identified a subset of four questions from the original 36 that accurately segment survey participants into the Six Americas categories. My faculty collaborator made a decision to eliminate the "Don't know" response option on the four-item Six Americas instrument from Chryst and colleagues (2018). This suppressed the proportion of "Disengaged," which left my distribution substantially different from the national distribution.[2]

Finally, Sparks and colleagues (2020) asked whether individuals considered themselves environmentalists and found a strong correlation between this question and pro-environmental behavior. Immediately after the participants completed each environmental attitude measure, they watched the brief treatment video intended to experimentally induce one of the desired treatment emotions (hope, fear, or control). Crucially, participants were able to rate how impactful they found the video. Then, they indicated their likelihood of doing a range of

[2] The adjustments made with proxy measures to re-assign participants into a disengaged category produced substantively similar analytical results to those presented here.

self-reported behaviors related to minimizing climate change. Some additional questions on the survey were about what source they rely most on when considering the issue of climate change, what emotions they experience when encountering climate change information, and their level of commitment to democracy and degree of antidemocratic values (Jardina & Mickey, 2022). Finally, they were asked two open-ended questions on what they consider to be barriers to effective communication about climate change and what themes and information are important to include in messages about climate change. It was important to include both of these because it allowed for participants to share their thoughts on how to communicate better about climate change. At various points throughout the survey,
participants were asked to complete attention checks, including once after the treatment video to ensure they were aware of which treatment message they received. This was done with the intention to ensure high data quality. The N of 927 includes only those who did not fail any attention checks and anyone who did not correctly report the emotional valence of the treatment were also removed from any analysis including treatment variables.

3.5 Hypotheses

The primary objective of this study was to determine how different groups of people respond behaviorally to distinct emotions. When first conceptualizing this project, initial explorations of the literature and anecdotal evidence suggested that people who have high levels of belief, concern, and motivation regarding climate change may respond better to fear. Alternatively, those with lower levels of belief, concern, and motivation may respond better to hope. The authors were interested in whether the effect of condition on behavior varied across levels of environmental attitudes and identity (ENID, EIDR, SIXAM).

H_1: Participants with higher levels of environmental attitudes and identity (measured by each ENID, EIDR, and SIXAM) will be more likely to respond with pro-environmental behavior, regardless of treatment condition.

H_2: Participants with higher levels of environmental attitudes and identity (measured by each ENID, EIDR, and SIXAM) will be more likely to respond with pro-environmental behavior under the fear condition relative to the control condition.

H_3: Participants with lower levels of environmental attitudes and identity (measured by each ENID, EIDR, and SIXAM) will be more likely to respond with pro-environmental behavior under the hope condition relative to the control condition.

There was an early indication that the specific intended behavioral items differed based on the level of one's environmental attitudes and identity as measured by each of the constructs used. There is an important distinction between public and private pro-environmental behaviors.[3] From the 13-item pro-environmental scale used in this study, there were seven behaviors that were private in nature (e.g. avoid using certain products that harm the environment; try to use less water in your household; buy some product specifically because you think it is better for the environment than competing products; voluntarily recycle newspapers, glass, aluminum, motor oil, or other items; reduce your household's use of energy; buy or sell stocks based on the environmental record of the companies; and contribute money to an environmental, conservation, or wildlife preservation group) and six that were public in nature (e.g. be active in a group or organization that works to protect the environment; vote for or work for candidates because of their position on environmental issues; contact a public official about an

[3] This distinction was confirmed by factor analysis, which revealed three total factors- the first (all of them together) and the other two lists loaded uniquely onto distinct factors (public alpha 0.82; private alpha 0.88).

environmental issue; contact a business to complain about its products or policies because they harm the environment; sign a petition supporting an environmental group or some environmental protection effort; and attend a meeting concerning the environment). Additionally, appealing to hope is often seen as a way to motivate individual/private behaviors. Conversely, a more negative emotion such as fear may work better to encourage collective/public actions.

> **H_4:** Participants with higher levels of environmental attitudes and identity (measured by each ENID, EIDR, and SIXAM) will be more likely to respond with different pro-environmental behavior items than participants with lower levels of environmental attitudes and identity (measured by each ENID, EIDR, and SIXAM).
>
> **H_5:** Participants will have higher odds of responding with public pro-environmental behavior under the hope condition relative to the control.
>
> **H_6:** Participants will have higher odds of responding with private pro-environmental behavior under the fear condition relative to the control.

Measures of efficacy appeared repeatedly in the literature on climate change communication because if participants believe that nothing they or their country does matters concerning climate change, they may be less likely to take action regardless of any message. Choi and Hart (2021) describe four efficacy constructs: self-efficacy is an individual's belief in their capabilities to engage in various behaviors that are intended to mitigate climate change; personal outcome expectancy is the belief that a particular course of action will contribute to eliciting certain desired consequences; collective efficacy is an individual's belief in the combined impacts of members of their group's individual actions ultimately affects broader society; and collective outcome expectancy is an individual's belief about the likely consequences their group will experience as a result of the group's performance. There is currently a debate in the literature

over how large of an influence efficacy has on pro-environmental behaviors. Some researchers suggest analyzing individual/private behaviors independently from collective/public behaviors, particularly when considering the different types of efficacy. One of the goals of this project was to address this uncertainty.

H_7: Participants with high Self-efficacy and Personal Outcome Efficacy will have higher odds of responding with private pro-environmental behavior.

H_8: Participants with high Collective Efficacy and Collective Outcome Efficacy will have higher odds of responding with public pro-environmental behavior.

Following the treatment, participants were asked to indicate each of the following feelings they often experienced when encountering information about climate change (check all that apply). They were then asked to select which of the following feelings they were most likely to experience when encountering information about climate change (select just one). The feelings they could choose from were: anger, happiness, doubt, sadness, hopefulness, fear, apathy, pride, powerlessness, anticipation, anxiety, frustration, shame, despair, satisfaction, guilt, vulnerability, none of the above, or other. During the analysis stage, these feelings were further broken down into six separate categories. Happiness, satisfaction, and pride made up "Contentment." Despair, sadness, and powerlessness made up "Despair." Fear, frustration, anxiety, and vulnerability made up "Threatened." Hopefulness and anticipation made up "Hopeful." Guilt and shame made up "Remorse." Apathy and doubt made up "Uncertainty." Therefore, it is important to assess how participants responded to this series of questions following receiving the treatment and whether their responses differed based on which treatment condition they were randomly assigned to. The treatment condition they received may have had a priming effect.

H_9: Participants who received the fear message will respond that they are more likely to experience negative emotions (despair, uncertainty, remorse, threat) when encountering information about climate change.

H_{10}: Participants who received the hope message will respond that they are more likely to experience positive emotions (contentment and hopefulness) when encountering information about climate change.

In addition to being conscious of which emotions arise in their audiences, climate change communicators need to assess the intensity of those emotions as well. Asking participants to rate on a scale of 0-100 how impactful they found the treatment video they viewed allowed for a basic measure of the intensity of their reaction in order to compare intended behavioral responses between those who found their treatment video more or less impactful.

H_{11}: Participants who reported high treatment salience will have higher odds of responding with pro-environmental behavior, regardless of treatment condition.

Since participants' orientation to conspiracism was measured before and after they received the treatment, the authors were able to conduct a unique analysis comparing pre- and post-treatment conspiracism among and between different levels of environmental attitudes and identity. The emotional appeal of each treatment condition also added another dimension to this analysis.

H_{12}: Participants' pre-treatment conspiracism scores will be different from their post-treatment conspiracism scores among lower levels of environmental attitudes and identity (measured by each ENID, EIDR, and SIXAM). This difference will be greater under the fear condition relative to the control.

4. Results

To reiterate the purpose of the present study, a focus was placed on studying the interactions between one's environmental attitudes/identities and the most constructive emotions to evoke in climate change communication in a way that encourages pro-environmental behaviors. Due to the mixed-methods approach to data collection and analysis, I make a separation between qualitative and quantitative work. That said, this is primarily done to maintain clarity, and importantly, the findings that emerged from each research method iteratively informed both the analysis and the results that became evident through this process. Further still, many of my interpretations (see Discussion) connect both methodologies and rely on the other to help provide possible explanations for the trends and themes my data show. My data are weighted to nationally representative standards on a range of key demographics. In other words, my sample looks proportionally similar to the country. Conservative and Republican are the highest ranges in the political variables. Doctorate or other terminal degree and $150,000 or more are the highest ranges in the education and income variables, respectively. For a full set of descriptive statistics, see Appendix 7.7.

Variable	Observed	Mean	Std. Dev.	Minimum	Maximum
Education	927	4.04	1.47	1	7
White	927	0.74	0.44	0	1
Man	927	0.51	0.5	0	1
Age	927	53	9	18	89
Income	927	2.74	1.5	1	6
Political Ideology	927	3.7	1.83	1	7
Party Identity	927	3.85	1.88	1	7

Figure 4.1

4.1 Quantitative Findings

A linear regression model constructed a coefficient plot, which then was used to test H_1 regarding whether participants with higher levels of environmental attitudes and identity

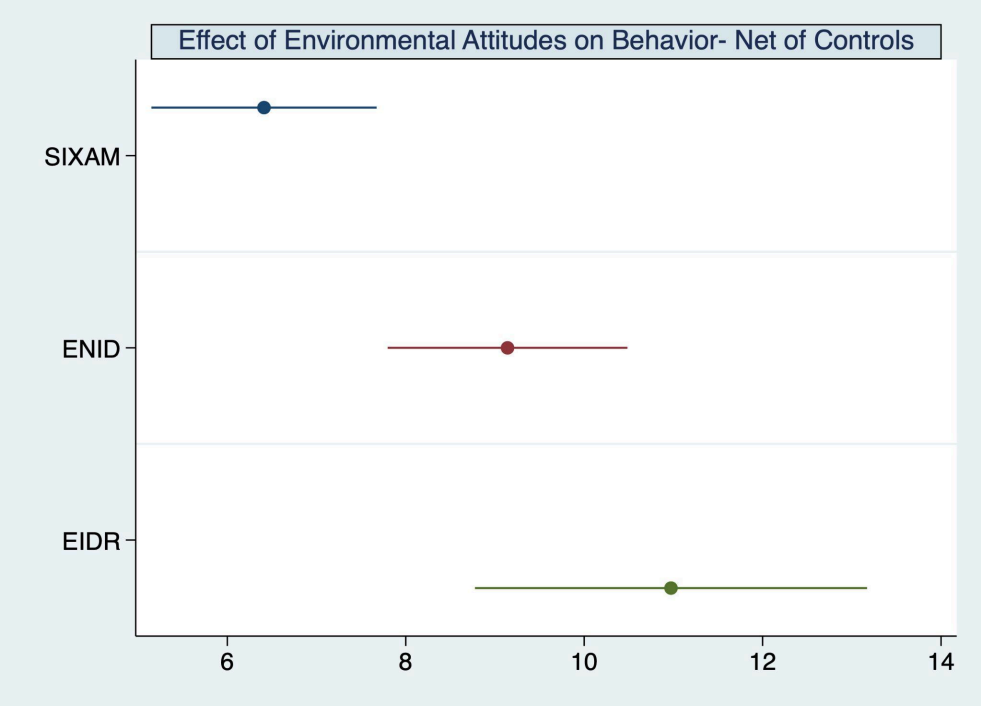

Figure 4.2

(independent variables) were more likely to respond with pro-environmental behavior (dependent variable), regardless of treatment condition. I found evidence in support of this hypothesis as each construct (ENID, EIDR, and SIXAM), net of controls, was associated with an intention to engage in pro-environmental behaviors; these effects also are independent of one another (as shown in Figure 4.2). In other words, the effect of one construct takes the others into account (along with the controls).

When including treatment conditions in the analysis, a slightly different picture appears. Specifically turning to H_2 and H_3, an Ordinary Least Squares regression (OLS) helped estimate the coefficients of a linear regression model which describes the relationship between one or

more independent quantitative variables and a dependent variable. I hypothesized that participants with higher levels of environmental attitudes and identity would be more likely to respond with pro-environmental behavior under the fear condition (H_2). In contrast, participants with lower levels of environmental attitudes and identity will be more likely to respond with pro-environmental behavior under the hope condition (H_3). Firstly, although the data suggests that each indicator is strongly correlated with pro- environmental behavior, ENID (6.6) is the

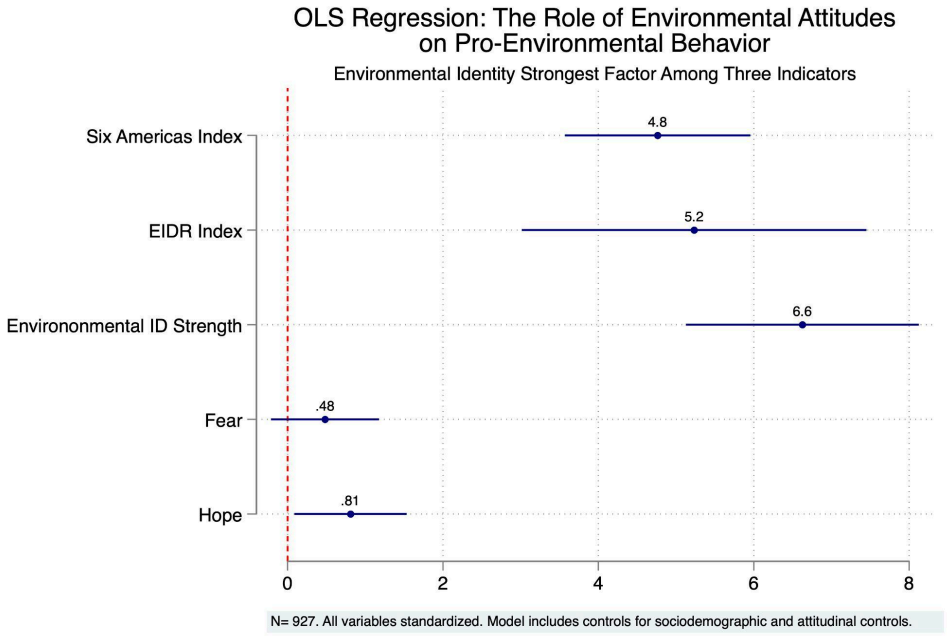

Figure 4.3

strongest predictor of pro-environmental behavior among the three indicators, followed by EIDR (5.2) and SIXAM (4.8). This allows me to say with confidence that I found further evidence in support of H_1. However, counter to my expectations, I did not find support for a fear message influencing pro-environmental behavior within *any* group in a statistically significant way.[4] Additionally, the data indicate that only a *hope* message appeal had a statistically significant

[4] We modeled interaction effects which were not presented and did not find evidence of group/level specific effects in those models (thus their exclusion).

impact on pro-environmental behavior. From this, I fully reject H_2 and note that the data suggest mixed findings regarding H_3. See Figure 4.3 for more details.

Now to look particularly at the SIXAM measure in order to differentiate between each

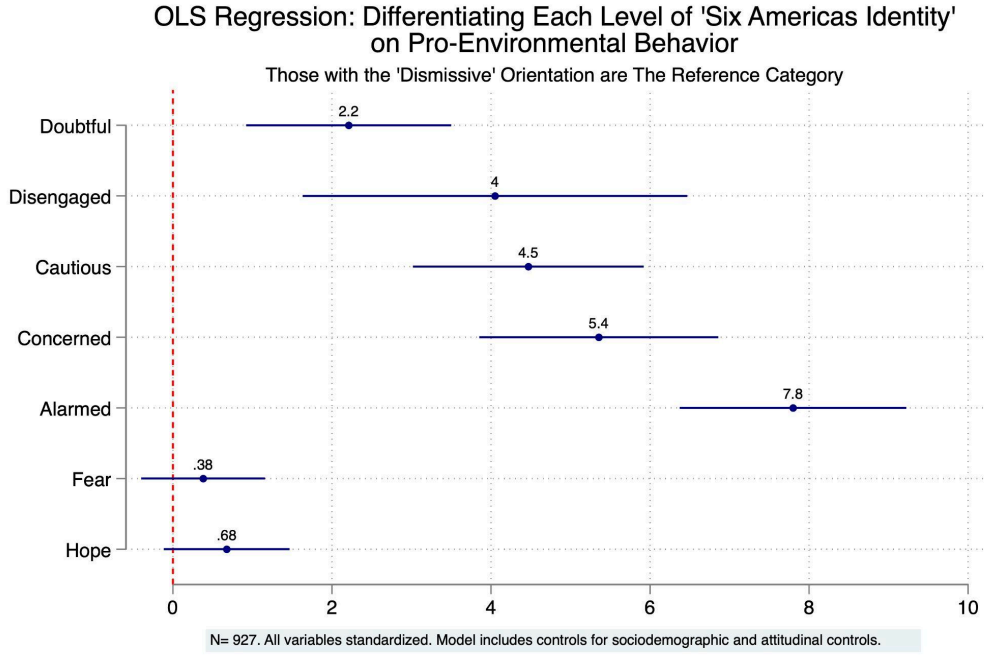

Figure 4.4

orientation level of belief, concern, and motivation related to climate change (alarmed, concerned, cautious, disengaged, doubtful, dismissive). An OLS model was generated using the Dismissive orientation as the reference category. In this analysis, any effect of treatment conditions on pro-environmental behavior disappeared. Furthermore, I found evidence to suggest that relative to those in the dismissive category, those in every other SIXAM category are significantly more likely to engage in pro environmental behavior, and this pattern is generally linear. See Figure 4.4 for more details.

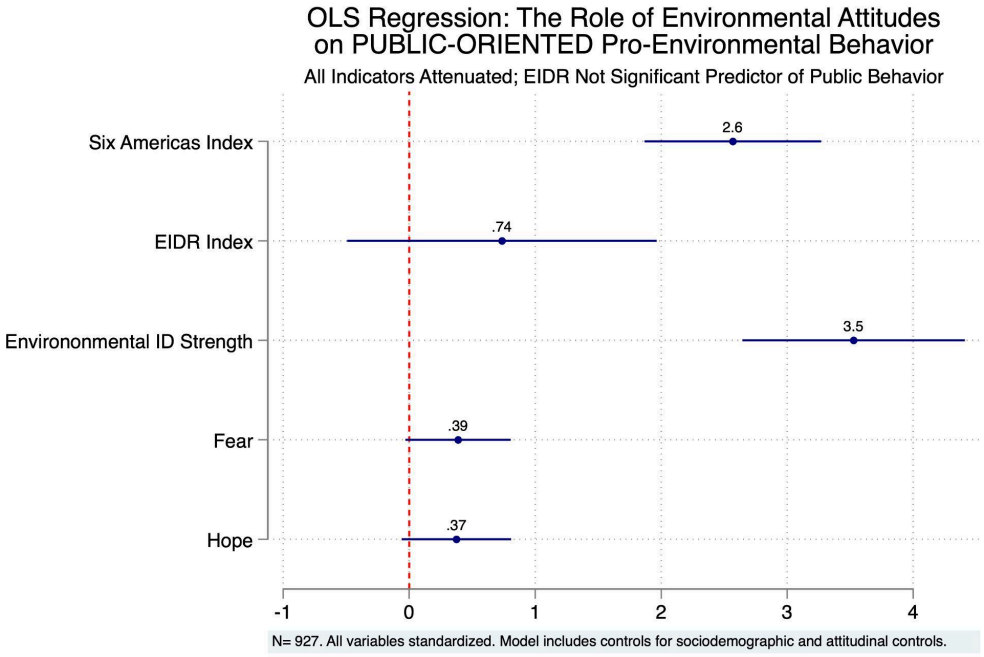

Figure 4.5

When examining public- and private-oriented behaviors separately, yet another story emerges. H_4 postulated that participants with higher levels of environmental attitudes and identity will be more likely to respond with different pro-environmental behavior items than participants with lower levels of environmental attitudes and identity. The data suggest that only ENID (3.5) and SIXAM (2.6) are significant predictors of *public* behavior, while EIDR (0.74) is not (see figure 4.5). On the other hand, I found evidence to suggest that EIDR (4.5) is a stronger predictor of *private* behavior than both ENID (3.1) and SIXAM (2.2), although all indicators were found to be significant (see figure 4.6). This analysis depicts a mixed finding and highlights the importance of treating each environmental attitude and identity indicator as distinct.

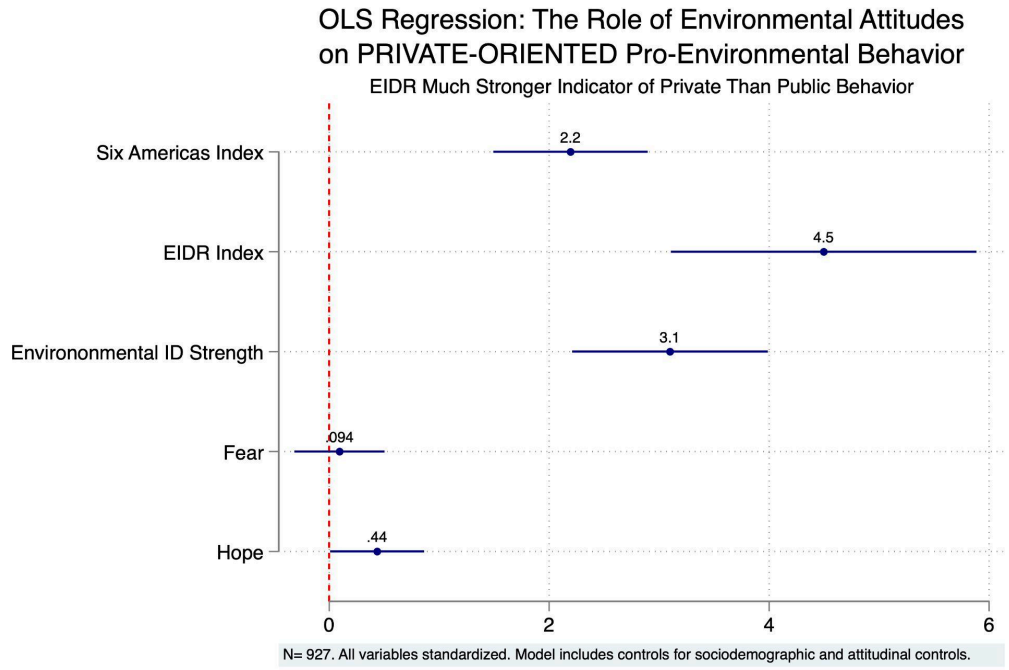

Figure 4.6

Similarly, H_5 and H_6 propose that participants will have higher odds of responding with *public* pro-environmental behavior under the fear condition (H_5) and higher odds of responding

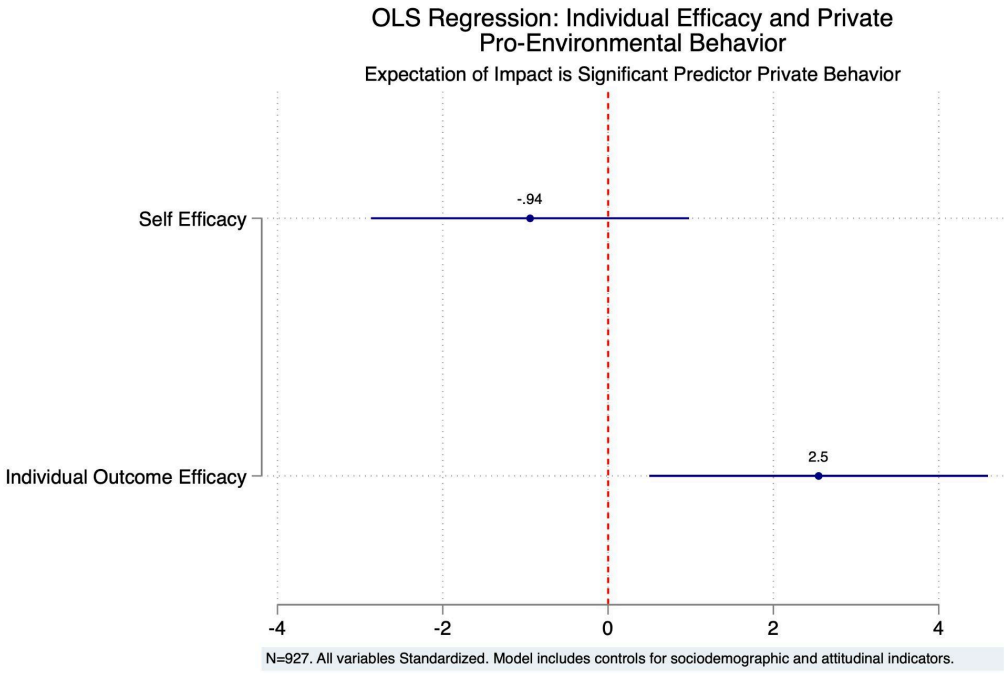

Figure 4.7

with *private* pro-environmental behavior under the hope condition (H_6). See Figure 4.5 for a closer look at *public* behaviors and Figure 4.6 for a closer look at *private* behaviors. I fail to find support for H_5 since neither treatment condition was found to be related to *public* behavior with statistical significance. However, the evidence supports H_6 as the hope condition statistically significantly correlates with *private* behaviors but the fear condition does not.

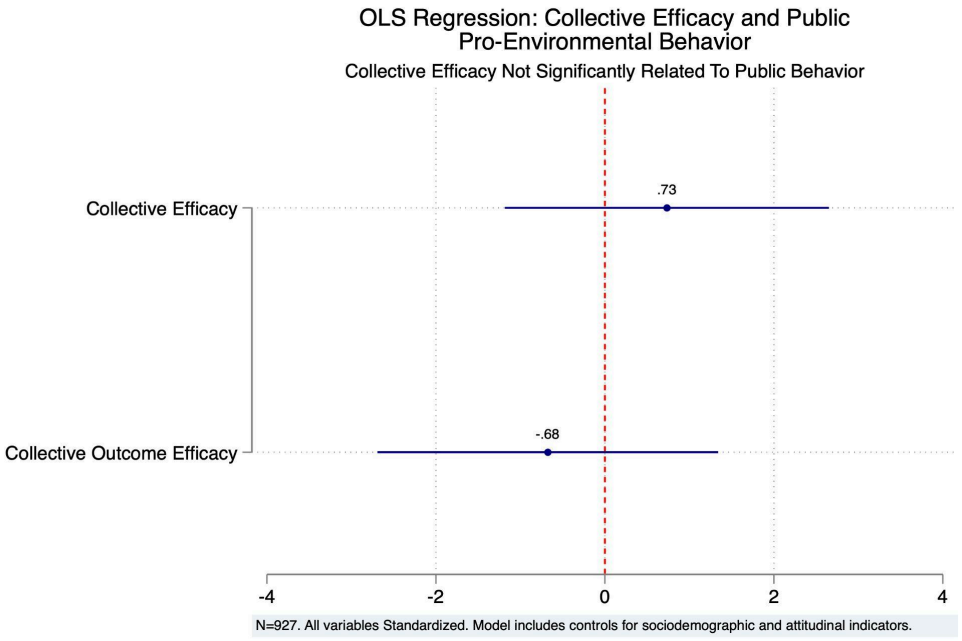

Figure 4.8

Considering different efficacy perceptions was also central to my analyses. I tested H_7 regarding whether participants with high self-efficacy and personal outcome efficacy had higher odds of responding with *private* pro-environmental behavior. I found evidence to suggest that personal outcome efficacy, or expectation of impact, was a significant predictor of *private* behavior. However, there was no evidence indicating that self-efficacy was associated with *private* behavior. Therefore, my analysis yielded mixed results related to H_7. See Figure 4.7 for a closer look at this analysis. Comparatively, H_8 speculated that participants with high collective efficacy and collective outcome efficacy would have higher odds of responding with *public*

pro-environmental behavior. Contrary to my expectations, the data suggest that neither collective efficacy nor collective outcome efficacy was significantly related to *public* behaviors. Given that, I reject H_8. See Figure 4.8 for a closer look at this analysis.

To dive deeper into an exploration of emotional responses, H_9 and H_{10} hypothesize that participants who received the fear message will respond that they are more likely to experience negative emotions (H_9) and participants who received the hope message will respond that they are more likely to experience positive emotions (H_{10}) when encountering information about climate change. Using a logistic regression model, the data indicate that participants who received the fear condition only responded with "Remorse" (1.6) as the primary emotion they experienced in a statistically significant way. No other negative emotion experimental treatment effects with statistical significance were found for either hope or fear. This finding provides

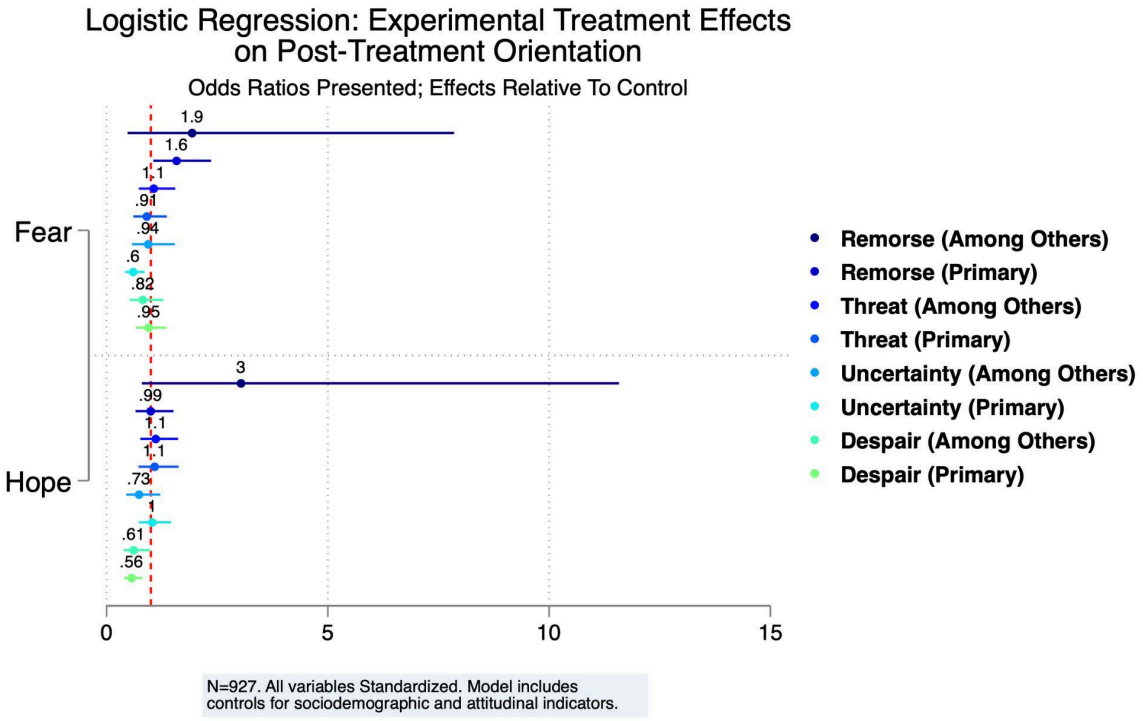

Figure 4.9

partial evidence in support of H_9. See Figure 4.9 for an expanded view of each negative emotions. Now analyzing the experimental treatment effects of positive emotions, I found evidence to suggest that participants who received the hope condition were more likely to indicate a hopeful response both as the primary emotional response and when selecting all

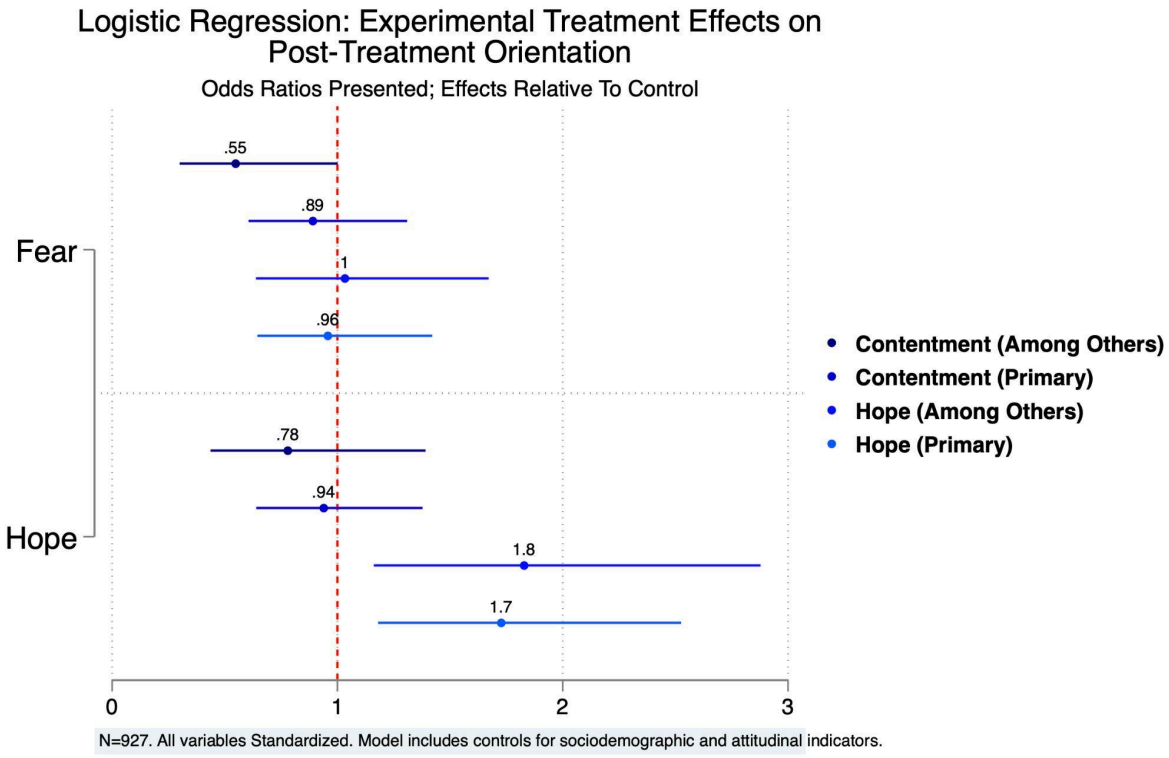

Figure 4.10

applicable emotions. I did not find statistically significant evidence for participants responding with "Contentment" under the hope treatment or a significant effect on either of the positive emotions under the fear treatment. Therefore, the evidence provides partial support for both H_9 and H_{10}. See Figure 4.10 for an expanded view of each positive emotion.

The intensity level is another important consideration when studying emotions, so subjective, or self-reported, treatment salience was used as a straightforward way to measure the intensity of participants' reactions to the treatment. In a three-way analysis, the data indicated

that higher levels of reported treatment salience affected the relationship to higher levels of pro-environmental behavior intentions. Additionally, the Fear condition most motivated those who had a strong reaction, but the relative differences were not found to be significant. Thus, I did not find evidence to support H_{11} and reject that hypothesis. See Figure 4.11 for more details.

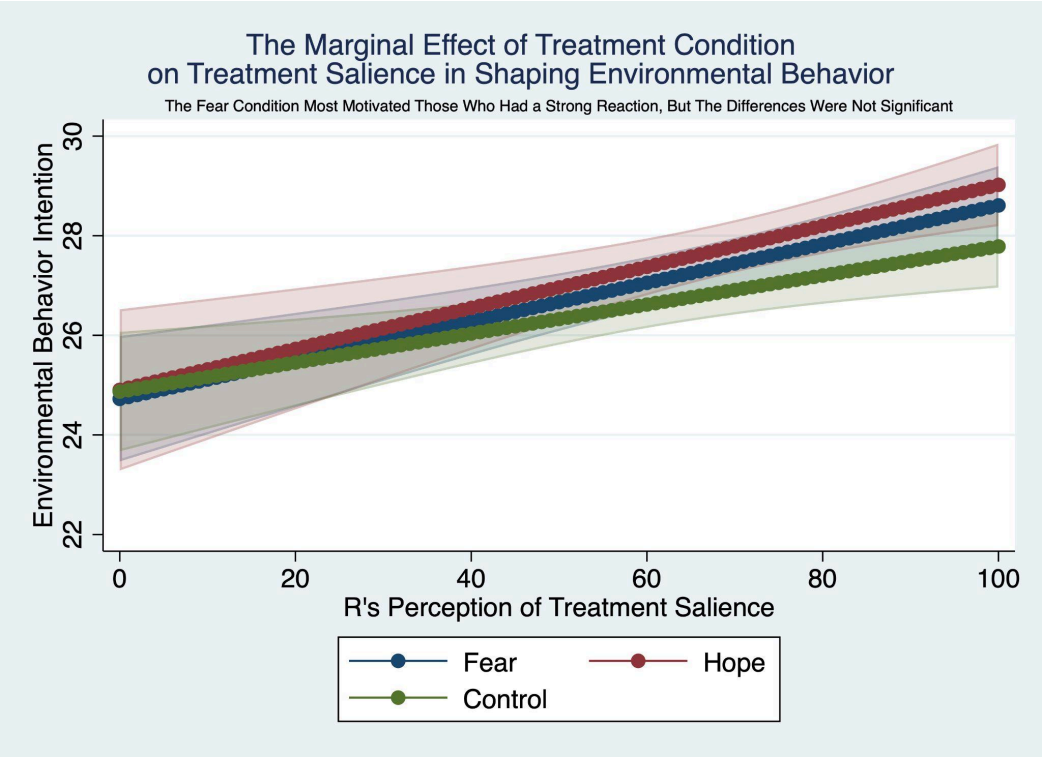

Figure 4.11

We measured orientation to conspiracism before and after participants received the treatment, and this allowed me to compare treatment effects on levels of conspiracism. H_{12} inferred a change in conspiracism would occur among lower levels of environmental attitudes and identity and the difference would be greater under the fear condition. I found evidence to support the claim that of the three indicators of environmental attitudes and identity, the only significant effects were with EIDR. Moreover, although both the hope and fear conditions were more likely than the control condition to stop or slow an increase in levels of participants' orientation to conspiracism at higher levels of EIDR, only the hope condition was found to be

significantly distinct. Thus, the data fully supports the rejection of H_{12} and rather indicates that hope is more effective at diminishing conspiratorial thinking. For further details, see Figure 4.12.

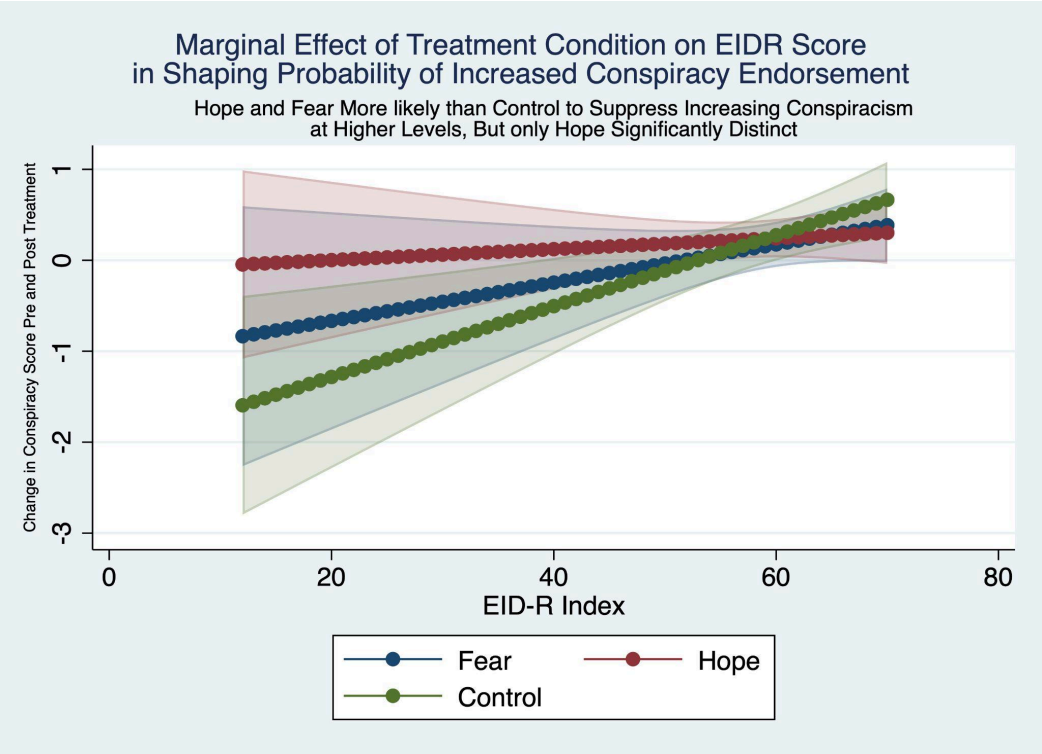

Figure 4.12

4.2 Qualitative Findings

The inclusion of two open-ended questions in the survey allowed for enhanced analyses. Both open-ended questions allowed us to directly collect vital information on the participants' opinions regarding the issue of climate change communication and what they thought might work. Essentially, I wanted to know how people would like to engage with climate change communication. The quality, depth, and detail of these open-ended responses were remarkably high among similar surveys of this scope. The first open-ended question (themes) asked, "What kinds of themes and information are important to include in messages about climate change?" The second open-ended question (barriers) asked, "What do you consider to be barriers to effective communication about climate change?" For a full explanation of the qualitative analysis

process, see section 3.2 Analytic Tools. Each participant could only respond once to each of the two open-ended questions. Due to the type of study, the fact that there were a very large number of participants, and only two open-ended questions, each of the below quotes are from different people. All of the names seen below are pseudonyms and generated by Chat GPT. In climate change messaging, there is often either an absence of attention to identity or an absence of attention to emotion. The present study attempts to address these gaps and advance the relevant scholarship. To that end, the open-ended responses I gathered and subsequent qualitative work assisted in illuminating key trends and points of emphasis from my data that may be applied to designing future climate change messages. For a more in-depth exposition of what this means for climate change communicators, see the Discussion section.

As stated in the above sections, the impetus for this particular research agenda was to determine the most constructive emotions (hope vs. fear vs. control) to evoke in climate change communication in a way that promotes pro-environmental behavior. People understand that emotions play a large role in reactions to any message, especially about climate change. One response alludes to this idea succinctly:

> *"The only real barriers I see to effective communication are messages that do not engage a person's emotions."* (Michael Johnson)

In the same vein, another participant suggested that a proper balance exists between emphasizing hope and despair, but we need to find it in order for effective communication to take place:

> *"Expressing the right balance between hope and despair [is important]. If people feel it's too late, they seem to lose interest."* (Emily Smith)

We found consistent evidence that fear appeals in messaging largely fail to motivate action in a significant way, except under particular circumstances (covered in 5. Discussion). Based on my

open-ended data, participants seemed to already intuitively understand this key finding. Indeed, many research participants noted that fear or "doom and gloom" appeals are not effective ways to convey a message intended to encourage certain behaviors and discourage others. One participant who fell in the Dismissive SIXAM category put it this way:

> *"Fear and doom and gloom are not as powerful motivators as people seem to think."* (Juan Martinez)

Similarly, another participant also from the Dismissive SIXAM category appeared to agree with the above statement and even provided some elaboration.

> *"[Communicators] need to be more upbeat about the climate and [use] less of a doomsday scenario [message] which tends to frighten people and make them shrug their shoulders and give up because it is going to happen and nothing can be done immediately to stop it."* (Sarah Brown)

They also highlighted employing a more "upbeat" message as a way to grapple with the barriers that fear messaging might erect. A different participant on the other end of the SIXAM categorical distribution (Alarmed) argued for a reason why one may include hope in climate change communication while also identifying a problem with a "doom-and-gloom" framing.

> *"I think the most important thing to include in messages about climate change is the idea that hope is not lost. The conversation around climate change is often framed in doom-and-gloom terms, but if combating climate change is to be a meaningful possibility, hope must be a part of the message, so that people are motivated to enact change."* (James Wilson)

However, emotions are not easily separated from each other and it is sometimes difficult to determine what a certain message will elicit in the audience. Moreover, most communication

relies on several distinct emotions and it can be challenging to discern the main emotion one will experience. Messages often contain both positive and negative emotions. While most participants indicated they prefer hopeful messages, in line with conventional wisdom, some participants believed fear is a "powerful motivator," despite little evidence to support that claim:

> *"People need to be scared at this point. Otherwise, they do not seem to care."* (Linda Taylor)

Still, others desired "clear, precise, and emotionless messages." In contrast, people know that perceptions of efficacy are a crucial part of the message and that certain emotions can increase or decrease the belief that positive differences can be made:

> *"The barriers are the negative talk. When I hear negative talk, I feel powerless and that nothing I do can change anything. Whereas, positive messaging is always effective."* (Robert Anderson)

Now, we switch gears to covering the thematic framework that emerged from my grounded theory analytical approach. Many responses identified various problems they had encountered in climate change communication. Others proposed solutions to either address communication shortcomings or climate change more broadly. One such solution was just "sticking to the facts." Another idea that was brought up often was seeking ways for everyday citizens to make a difference and be a part of the solution. Additionally, a common theme that became apparent was using messages to stress the pervasiveness of climate change's impacts and how our actions (or lack of action) now will affect the present and future of humanity and the planet. Finally, some participants' answers only provided information or desired change to be made through providing information. For the full thematic framework I developed, see Appendix 7.2. Returning to problem identification, the next four quotations from various participants provide insights into

what people believe are salient problems, namely misinformation/disinformation; political polarization; calling out hypocrisy; and a closed-minded reception, respectively.

> *"Misinformation and disinformation are widespread on the issue of climate change – and they are a huge problem and stand in the way of any progress in handling the climate crisis."* (Maria Hernandez)
>
> *"I think it has been made a political issue rather than a morality issue. Many people have their opinions shaped by the talking points of their political party. Also, the polarization of ideological/partisan groups and their unwillingness to listen to each other."* (William Jones)
>
> *"Hypocrisy from those scolding regular people"* (David Moore)
>
> *"Getting people to listen and remain open-minded to the evidence is most difficult since much of the public can possess a stubborn mindset that disregards current evidence since it conflicts with their personal thoughts on the subject."* (Elizabeth Garcia)

One problem deserves more attention, namely a low level of trust in scientific institutions. The following two quotations are related to this phenomenon. The former defines the problem and the latter appends this definition to include a potential reason why a lack of trust has appeared.

> *"[There is a] lack of trust [in] the scientific community but more so the news sources that display those findings."* (Patricia Miller)
>
> *"I believe the constant changing of 'the science' has closed peoples' minds to the issue of climate change. Studies are done which don't explore the long-term ramifications or gloss over problems in the decided outcome."* (Joseph Davis)

When looking at the solutions that participants proposed, I saw two divergent answers. Some focused on policies that would address climate change itself, such as:

> *"Put trash in its place. Use your vehicle less often. Shut lights off when not in use. Pick trash up at a park or trash located near a trash can. Recycle, Recycle, Recycle Be nice to Mother Nature and the animals that live in it."* (Jennifer Lee)

Others emphasized the human aspect of how to create change. Increasing scientific literacy through education came up as a commonly suggested intervention as exemplified by the below quote.

> *"Being too 'sciency' as using big words tends to bore people, even if they're significant and accurate. You basically have to dumb things down to a sub-average IQ level to communicate effectively."* (Charles Harris)

Lastly, within this theme and throughout the sample, problem identification was often paired with a solution proposal. To me this indicated that people can sometimes articulate problems and then formulate solutions to those problems. A prime example of this is regarding getting and keeping audiences' attention.

> *"A lot of messages on climate change don't grab the attention span of most people due to being desensitized to social media, some need constant attention-grabbing things to even pay attention to a short video. Most videos and messages on climate change are considered boring to most people, so I think making the messages eye-catching and engaging would help eliminate the barrier and have people pay attention to the message more."* (Barbara White)

A particular type of solution proposal referred to participants calling for communicators to only include the facts without alluding to politics or other "unnecessary" information. Political messages were overall a large turnoff for people in my sample. They indicated that apolitical messages would probably be more effective.

"No politics, people just need reliable sources to follow on the subject that present the facts and only the facts." (Thomas Clark)

Another participant suggested that the problem could be some form of elitism. Using science to inform the public of the real facts while trusting everyday people will be able to harness this information to reach decisions on how to exist in the world might address some individual's hesitancy towards science.

"Real facts. Presuming that the public isn't smart enough to understand the science and then avoiding the facts makes science unbelievable. Reduces credibility." (Susan Lewis)

One final type of solution that came up was wanting to make change by putting out more information. Again, the issue of scientific literacy appeared and how crucial it was to personalize or localize information in communication. These points are displayed in the next three quotes.

"To make people understand, meaning we need to dumb the language down from scientific words to normal everyday words so people all over the planet are able to understand together as well." (Christopher Allen)

"It is important to include issues that will specifically affect the people being addressed. Most people who do not think about global issues like climate change have a tough time caring about issues they do not think affect them. If they are able to see how this issue impacts their lives, they will come around to the cause." (Karen Young)

"Make the themes about quality of life for humans, and localize the issues whenever possible. It rarely seems to have any impact on people until it actually affects them personally. So, they can see messages where it shows water levels rising and ice melting and crops dying and air pollution, but if things are fine for them in their zip code, then

> *they just won't care enough to take action. I guess what I'm saying is, it has to be more personalized than just this general, bleak, global outlook."* (Daniel Walker)

Appealing to hope came up yet again in response with highlighting "*the progress that is being made, including positive achievements instead of always negative threatening items.*" Some individuals also thought that including "*the benefits to normal everyday people is important*" and "*describing the impact to job creation, energy costs, and potential natural disasters is important as those things affect everyone and can be extremely negative if not addressed.*" Separately, it was immediately clear that many participants wanted to make a difference and be a part of the solution but were unsure what they could do to be involved or how to get engaged. A few people expressed this uncertainty and desire to know more or suggested a strategy that could accomplish this goal. They also stressed the importance of telling people how to get involved as a good way to increase feelings of efficacy.

> *"Unsure of all the methods and ways that can be used to further help with climate change issues and changes that can be done on an individual level aren't usually mentioned in advertisements."* (Lisa King)
>
> *"We need to know what we can do to help. What others and the community or world are doing to help. That there's hope."* (Matthew Wright)
>
> *"I think it is important to let people know that everybody can do something to help correct climate change, no matter how small. Every person and effort no matter how small it is can make a difference collectively. It's not too late to take action against climate change."* (Jessica Scott)

Financial concerns were brought up in the context of pro-environmental behaviors as taking a certain amount of resources to be able to perform. These point to an understanding that some

socio demographic groups are better able to be "eco-friendly" than others and that one's level of involvement may be influenced by economic factors.

> *"Different avenues that people can include into their everyday lives to make an impact on the environment. We need to know practical meaningful activities the average person can engage in which do not involve a large input of money."* (Anthony Nguyen)

Additionally, one participant noted a macro-level consideration regarding the immense societal expenses associated with mitigating and adapting to climate change that may demotivate some from taking action in the first place.

> *"I think most barriers are economic in nature. Most means of production are not environmentally friendly and the cost of making them more sustainable is not cheap. Also, many people are not convinced there is much they can do as an individual so they do nothing."* (Sandra Martin)

Furthermore, some warned against asking for too much when encouraging certain behaviors. They suggest that small steps (at least initially) would work better to promote behaviors that are desired outcomes and allow for deeper engagement to build later. Similarly, a participant wanted specific feedback on the impact they were having individually as the result of taking action.

> *"Discuss ways that individuals can help the environment, even if it is a small step instead of some large daunting thing that scares people from taking action, it will encourage others to try harder and make smarter environmental choices."* (Kevin Thompson)
>
> *"I'm most interested to know what happens because I've done something, and also alternative actions to take. A focus on how things can help (or hurt) would be good information."* (Kimberly White)

Finally, a subtheme of those who were seeking ways to make a difference was acknowledging an often repeated message about wondering what impact an individual can truly have when corporations are one of the main sources of emissions.

> *"Large companies are the problem, not the average person. [We need] realistic messaging on how harmful huge corporations are the main cause. So much is pushed on what "you can do" - when it really doesn't matter, it's near 0 impact even if you went full green."* (Brian Rodriguez)

Another two participants expounded on this idea with the call for some sort of governmental intervention and using elections and voting as a way to make sure those interventions happened. They also asserted that a domino effect may occur where change in one place would positively influence change in another place.

> *"Things like recycling on a personal level may help a small amount but the only real way to effect change in climate policy is by electing people who will make it a priority. Also after those people affect change in our government they should use our country's position to affect other countries' climate policies."* (Nancy Carter)
>
> *"I also think it is important to give people information about what they can do to help address climate change, as well as what institutions and governments should be doing (so they can help apply pressure to those groups to act)."* (George Mitchell)

A few people shared that they would like to know more about "*what kinds of activities and infrastructure today are currently having the largest negative impact towards climate change (Gas vehicles, industrial plants, etc.), and what we can do as a society to help reduce this problem.*" Now turning to participants who discussed the pervasiveness of the impacts of climate

change, we see that the importance of non-human life was recurrent. The next quote captures the essence of this thought:

> *"Information about animals is very important. It makes me reconsider everything. Animals are the most vulnerable population on earth, and we need to protect wildlife. An overall focus on the death of animals, nature, and the world around us."* (Betty Perez)

Moreover, some people understand that it is increasingly difficult for people with more privileged identities to insulate themselves from the effects of climate change and that "*climate change impacts everyone, regardless of where you live or how much money you make, or what your race and culture are. The prices we pay, the air we breathe, and the quality of our lives are all impacted by climate change.*" Some individuals covered some less well-known impacts such as "*heat exhaustion for those who work outside and the importance for businesses to be mindful of allowing employees enough breaks.*" The timeline of climate change was something many participants wanted more information about with comments such as "*how soon will these impacts be felt if we continue to be negligent?*" Still others wondered if details regarding "*what the world could look like if we don't start protecting our environment more would make the viewer feel like a hero who is needed.*" Importantly, a participant noted that "*Climate change isn't fractions or little increments and it's important to address how it impacts people at an individual level. It distorts the message when people just hear it's going to get worse for people, and not really specifying how exactly.*"

Participants wanted to know how climate change would personally affect them. With that, another common element that came up was how vague climate change communication can be "*in regard to impacts"* and how "*it shouldn't be about temperatures but about how things we can touch and actually see.*" Others wrote that "*photos of the devastation caused by climate change*

around the world" might help grow support. On the one hand, a few participants thought it was "*important to mention how it's affecting everyday people, not just how it's affecting the polar caps because people have an 'out of sight out of mind' approach to climate change*." On the other hand, different people highlighted how "*important [it is] to show people what in the world is being affected. Things like rainforest deterioration, wildfires and sea-level rise are great ways to drive home the tangible ways to show why climate change is killing the earth and people on it*." One participant passively wondered if "*we need to see effects more in real time for action to take place*." Importantly, the Earth's climate is a system and impacts are not confined to only one area because, as one person stated, "*Fires in California affect people in the Midwest and coastal flooding affects people inland.*" Even one person's action can have consequences or benefits like a ripple effect. One of the most common themes was those who emphasized consideration of the future. The two following quotes get into many of the arguments for climate change action:

> *"I think people need to be made aware of their responsibility to future generations. We can't just continue to destroy the environment and hope future generations can repair it."* (Melissa Hill)
>
> *"I think the most important theme to include is the fact that climate change will directly impact our future generations. It is a good reminder that while you may not personally experience the negative aspects of climate change, your grandchildren or great-grandchildren certainly will."* (Edward Lopez)

Another theme that merits further discussion is information provision. I posit that this type of information provision was to assert their knowledge and opinions as a way to indicate their held attitudes and group identities. For example, one participant simply listed some of the effects of climate change.

> *"I think people don't realize the severity of climate change because it isn't blatantly in their face. They can't tangibly notice it, therefore they assume it's exaggerated. Most don't think about the worsening floods, droughts, fires and other natural disasters as products of climate change."* (Mark Adams)

Additionally, someone observed "*the fact that often the message of 'climate change' is mixed with 'environmental damage.' These are two separate things. Every intelligent person knows this*." Finally, responses from different participants coded to this theme sometimes contradicted each other. One instance of this is in relation to renewable energy:

> *"There is not enough capacity in renewables to support our lifestyles. The switch to electric everything is not much better as the mining it requires to get the materials to make the batteries are as much if not worse than drilling for oil."* (Dorothy Green)
>
> *"Renewable energy is accessible and not insanely expensive and prices for environmentally supportive products are becoming more affordable"* (Steven Baker)

The last themes I will cover are the answers from those who explicitly deny the existence of climate change and those who reference conspiracism in some way. One response that aptly characterizes this group is, "*CLIMATE CHANGE IS A HOAX, DON'T FALL FOR IT.*" Many responses coded to this theme provided additional elaboration on their views as well. The following five quotes illustrate the range of reasons behind denial of climate change. The first touches on the idea that climate change is a natural phenomenon, the second is about the belief in God holding all the control, the third alludes to the notion that there are more important issues to focus on than a contrived one, the fourth says dramatic forecasts that haven't come to pass diminish belief, and the fifth wishes to provide further evidence in support of their claims.

"People like me who understand that climate change is a natural occurrence that has been happening to the Earth ever since the Earth was created, and that it's not really going to be that devastating." (Brenda Gonzalez)

"I'm not sure because I don't totally believe that humans are the cause. I believe that God is in control and ultimately will take care of our planet." (Paul Nelson)

"The fact that it doesn't even seem to be a problem. There is no such thing as global warming, that is a fallacy." (Megan Campbell)

"That the issue is highly politicized and that apocalyptic predictions (which never come true) make it harder and harder to take claims about climate change seriously." (Larry Rivera)

"Climate change science is a total fraud. How about telling the truth about climate change. I could expand on this with references, but this study had a time limit." (Nicole Ortiz)

Finally, conspiracism was a common theme that resonated with some participants. Within those responses coded to conspiracism, there were a wider range of contentions made from alluding to a deep state that is in search of money, power, and control. A few participants' attitudes show this skepticism of institutions in a variety of ways.

"The liars who force globalization, taxes, rules, and penalties on the people they consider cattle." (Justin Cook)

"All of the climate hysteria. The climate change agenda is purely about money." (Katherine Bell)

> *"I think most of the barriers stem from the untrustworthiness of some of the theories as well as the hunger for power some in our federal government have concerning it."* (Andrew Gomez)
>
> *"The government and the mainstream media they control refuse to let the truth get out."* (Diane Murphy)
>
> *"I think climate change is an excuse that elites use to take more from us."* (Eric Bailey)
>
> *"Climate change is not going to end humanity so I don't fear it, but I do fear command-and-control governments that are driven by power and using issues like 'climate change' to expand their power. Stop the hype and try to crush dissent."* (Rebecca Reed)
>
> *"The politicians and climate change lie in order to keep us under their control. Not all of us are dumb enough to realize how ridiculous all of this is."* (Stephen Barnes)

Returning to a distrust in science and government, some participants discussed how "*some scientists promote the theory to keep receiving grant money. The democrat party supports the theory in order to keep the environmental voting bloc*." Furthermore, one participant asserted that the problem lies in "*the burying and silencing of the scientists who disagree with 'the majority.*"' To conclude my findings, I point now to an answer that advances the idea that common ground is still able to be found between people with high levels of belief, concern, and motivation surrounding climate change and those with lower levels in those areas. Specifically, one participant wrote: "*I am not convinced climate change is man-made. That could be a barrier that might be fixed by focusing on all the things some of the environmental things will help such as the fact that everyone wants clean water, air, and a steady supply of those things*." This kind of

identity-based boundary crossing will be vital to developing our ability to address climate change and its impacts.

5. Discussion

Some of my key findings include the confirmation that participants with higher levels of environmental attitudes and identity were more likely to respond with pro-environmental behavior, regardless of treatment condition. The idea that audiences can be categorized into groups based on their held levels of environmental attitudes and identities is important for communication practitioners to understand. Additionally, the data suggest that appealing to hope in messaging is a significant predictor of pro-environmental behavior and fear did not show any significant effects. While hope was found to be more effective at encouraging pro-environmental behavior, these effects varied widely by levels of concern, belief, and motivation related to climate change and the environment. Thus, as Markowitz and Guckian (2018) critically highlighted, messengers (however defined) need to know what motivates the audience and to figure out what the audience already knows about the relevant subjects. Those who communicate about climate change should identify and understand values, identities, worldviews, etc. differentially shape audiences' engagement with climate change and then tailor communication efforts to their needs. Pre-existing beliefs and experiences with climate change and climate-related events shape how individuals interpret and filter new information, so it is necessary to find frames that fit audiences' needs. Climate change information should be packaged and connected to the needs and values that matter to the intended audiences whenever possible.

Different emotional appeals more strongly influence different categories of behaviors and those effects depend on separate indicators of environmental attitudes and identities. I found

evidence indicating that EIDR is the strongest predictor of *private* behavior, more so than both ENID and SIXAM. This could be due to the notion that the EIDR is more a measure of one's personal attitudes about and solidarity with the natural world as they subjectively relate to it. The evidence also supports an association between hope and *private* behaviors but not with fear. This indication again points to the possibility that hope consistently has been associated with stronger behavioral and other positive outcomes and fear is not overall. Participants seemed to largely intuitively understand that fear does not work in addition to them not appreciating fear-based messages. One participant stated, "*Scare tactics and sounding too much like a doomsayer are not useful, and people don't always believe worst-case scenarios. Being informative, telling people what the potential detriments to society are and what they can do, is useful*." Similarly, participants wanted to hear more about why they should have hope, not about how dire the situation is because, as my quantitative analysis displayed, fear is often demobilizing: "*A more positive and motivational outlook rather than doom-and-gloom would certainly be helpful as well because sometimes the doomsday scenario makes people want to run away. It seems too overwhelming.*" Finally, participants emphasized why they believed people have a sense of powerlessness and how connecting the wider issues to what it meant and how taking action might benefit the individual viewing a certain message could perhaps alleviate that belief. This is exemplified by one participant who affirmed, "*So often, it is negative and people just feel powerless to change it. But there are numerous small things that can make a difference so I think it's important to put a positive angle on climate change as opposed to the usual negative. How would this benefit the person you are talking to? People tend to respond better when situations or issues are framed with benefits to the person*." This relates to strategies that might increase feelings of efficacy types to which we now turn.

Personal outcome efficacy was significantly correlated with *private* behavior but self-efficacy was not significantly related. This suggests that one's expectation of the impact that stems from doing or not doing a behavior is most predictive of at least *private* behaviors. Moreover, I found no evidence that collective efficacy or collective outcome efficacy were correlated with *public* behaviors, this provides further evidence supporting what Choi and Hart (2021) determined to be an unstable relationship between collective efficacy or collective outcome efficacy and general pro-environmental behaviors. Therefore, a need emerges to emphasize solutions in climate change communication. This encourages engagement and builds individuals' feelings of efficacy and hopefulness by focusing on solutions (Markowitz & Guckian, 2018). Here, there is an important distinction to make between focusing on constructive hope by emphasizing human progress such as the rise of clean energy and false hope which maintains that science and technology or God will eventually solve the problem, as shown in this response: "*People have a false perception that they will be able to adapt to any change that occurs and that science and technology will somehow alleviate them from any problems climate change will produce for them. They don't believe that nature is more powerful than science*." Regarding specific emotional responses, receiving the fear condition predicted feeling remorseful and the hope condition predicted feeling hopeful, when both were measured post-treatment. One interpretation of these findings is that it is possible to increase feelings of hope in some audiences via intentionally hopeful messaging. However, this relationship also occurred with a fear appeal increasing self-reported remorse in participants. Therefore, this evidence indicates that in a message about climate change, the underlying emotional appeal can increase certain emotions associated with that appeal.

Returning to the intensity of emotions, higher levels of reported treatment salience aligned with higher levels of pro-environmental behavior intentions, but while the fear condition most motivated those who had a strong reaction, the relative differences were not found to be significant. This is one case where under certain circumstances fear may work to increase attention, but this aspect of communication is extremely difficult to control in real world situations and as stated above, doesn't significantly predict intended behavioral outcomes. Given that, communicators should be conscious of not only which emotion(s) they are attempting to elicit, but also the intensity of those emotions that arise in their audiences in order to make adjustments to what communication practices promote pro-environmental behaviors. Finally, the hope and fear conditions were both more likely than the control to suppress increasing levels of conspiracism at higher levels of EIDR, but only the hope condition was found to be significantly distinct. This final contribution supports the use of hopeful communication as a potential means to maintain or decrease an orientation to conspiracism. By using hopeful climate change communication, an opportunity exists to decrease individuals' and groups' orientation to conspiracism. This finding has broad implications in various fields for strategies that may combat growing trends in conspiracy theorizing.

Promoting pro-environmental behavior via communication faces multiple challenges. Promoting new pro-environmental behaviors is even more challenging, due to additional barriers, such as perceived lack of information and rigidity of habits. Considering first the former problem, many communication approaches assume an *information-deficit model* and these results contradict that view. In practice, the information deficit model is a linear model where scientific information flows from experts to lay audiences with no opportunities for feedback from those audiences (Nisbet, 2018). According to the authors, what we need is not more

information, but rather information disseminated in new ways. Importantly, access to digestible knowledge about climate change was brought up multiple times in the qualitative responses. One such quote posits, "*Lack of access to understandable and relatable data for the average non-scientist [is a barrier]*." Others advocated for the importance of education and how good information is out there, people just need to know where to look and how to interpret it, which implicates increasing the public's scientific literacy whenever found to be deficient. This puts the burden of responsibility on the individual consumer of the content rather than on structural factors that lead to high levels of scientific illiteracy in the first place. One participant's response alludes to this idea: "*Education is very important when it comes to climate change. The myth that climate change doesn't exist needs to be debunked. Information is available about climate change and how it works. Educate yourself*." Davy (2021) indicates that applying an *information-deficit model* often fails to recognize unconscious motivations and shows that climate change discourse makes us aware of our mortality and prompts consumerism as a social psychological defensive strategy, which is counterproductive to pro-environmental behavior. Comparatively, Díaz and colleagues (2020) emphasizes the importance of focusing on educating and motivating citizens to prepare them for contributing to the environmental cause, by providing individual solutions to combat climate change, rather than providing only information on its causes and consequences.

One central debate not yet discussed is whether our society and communication channels have a problem with over- or under-saturation of information. On one side, one participant captured the perception that all we need to fix it is to increase how often it is covered and communicated about. They noted, "*It has been underplayed for so long people think it won't happen soon*," and wanted "*more people to talk about it. It should be advertised as much as*

smoking is bad for you ads." Along the same lines, another individual posited, "*I don't think there are enough messages on TV and social media that show examples of things we are already doing and things we can do more of. Public service type announcements is what I am referring to. Every single day there we should be seeing and hearing about this.*" Separately, some responses commented on how experts need to discover and disseminate more knowledge and information as exhibited in this answer: "*I think all we need is a large variety of scientific articles. Maybe some should be rewritten for non-scientists, but should still include ALL the information in the articles. We should study data and form our own opinions.*" On the other side, a participant wrote about how the issue of climate change is covered too much and that this desensitizes content consumers to the messages contained therein. They presumed, "*Way too much emphasis on the same cause/issue, like a broken record. No one is listening anymore. People are tired of hearing it and nothing changing*." To add a component of nuance, a single participant thought that particular messages (as opposed to the overall incidence) themselves were over-saturated with information. They claimed, "*Talking about climate change can be tough because some of the words used are hard to understand. There's also so much information that it can be confusing. To make it better, we need to use simple words*."

Now, considering the role of habits in developing or maintaining pro-environmental behavior, I point to several important components. For example, meeting people where they are was a recurrent theme. One quote characterizes this well: "*We have to reach people where they are and this can be difficult to know as it's ever-shifting*." Given that, Markowitz and Guckian (2018) stress leveraging the right messengers and communication channels. One should work to identify and work with existing social networks, communication channels, and trusted "in-group" messengers. We see this assertion within my qualitative data as one participant

highlighted: "*The fact that climate change affects us all and how it affects us all. A farmer might listen to an idiot, but they will also listen to someone who doesn't look at them as stupid and might invest the time to explain climate change and how it affects their families*." Some ways to ameliorate this disconnect were also suggested. One prominent strategy included how "*asking for too much can prevent people from acting. People don't like to be bullied or lectured into changing their habits. Instead, offering solutions and giving people ideas would make a big difference in whether or not they listen*." A second method that might be worth using was also raised: "*An effective marketing campaign would be to slowly get people to take on small habits that would better the climate. Localize campaigns to be in the best interest of the people rather than somewhere that isn't nearby. I think a bunch of small victories will be much more effective in getting people involved*." Indeed, action can be minor—the major is made up of many minors.

How climate change will affect someone personally and "*show[ing] how much of an impact that an individual's daily decisions can have on the environment, such as changes in your daily routine and how this affects the environment over time*" was something else that many participants touched on. Communication about any topic, no less climate change with all its related valances, should recognize that a message does not operate out of context as an objective "dose" to be administered to achieve a certain desired result. How communication and responses work in reality are much more complex. Given that, developing relationships and engaging with individuals or groups could be more effective than one-off communication will be a vital part of addressing climate change in our society. One participant supported a path for this to be accomplished by "ma*king it personal to the audience and showing how climate change will affect them otherwise people will not pay attention or care-they will think it is someone else's*

problem." This also relates to the psychological phenomenon diffusion of responsibility in which people are less likely to take action when in the presence of a large group of people.

Another important aspect relates to how peoples' habits will be influenced. A participant expressed this: "*climate change will damage other aspects of your lives that you take for granted right now. It will affect your daily lifestyle, like the cars you drive, the electricity that you use and the food you eat*." Correspondingly, comfort and convenience came up as obstacles in the way of people engaging in pro-environmental behavior because as one person put it, "*Climate change will require everyone to sacrifice something*." This point about people not wanting to easily give up comfort can be seen in this quote: "*People are comfortable in their lifestyle and do not know what to do in the face of the reality that their current consumption of fuel and consumer items is having a negative impact on the environment*." Furthermore, there was often a recognition of the concept of choice architecture, or the presentation of choices in different ways as having an impact on decision making. One participant referenced this without explicitly naming it: "*Improving ways to be more environmentally friendly to make things more convenient. If it was more convenient, more people would participate and increase the impact*." Crucially, as covered above, there is little evidence in support of blanket messages as effective ways to promote pro-environmental behavior. However, as one participant declared, communicators should make an effort to craft messages that "*are shown/explained in ways that do not cause confusion or uncertainty*," because "*people are more likely to show concern and become actively involved when they can apply what is known and learned about climate change to their everyday lives/routines*."

In conclusion, scientists, politicians, journalists, and other practitioners must be hopeful in their messaging styles because as revealed above, those messages are more likely to encourage

pro- environmental behaviors in others. Even if the one communicator does not entirely feel hopeful themselves or believe our society will successfully mitigate and adapt to climate change, it is still important to appeal to that emotion over fear. I argue that this is the ethical course of action because hope has a higher possibility of promoting the ubiquitous pro-environmental behaviors and political action necessary to rise to the challenge in front of and finally address climate change in a meaningful way. I would like to conclude this section with a quote from one individual that I believe to capture the essence of this study: "*I think the most important thing to include in messages about climate change is the idea that hope is not lost. The conversation around climate change is often framed in doom-and-gloom terms, but if combating climate change is to be a meaningful possibility, hope must be a part of the message, so that people are motivated to enact change.*"

5.1 Conclusion

Fear doesn't appear to work as a communication style and people don't like fear appeals in messaging, so why are they still used as a common practice? One possible explanation is there is an inherent conflict between the nature of science and the nature of news. Advances in science develop slowly over years of careful investigation, replication, and correction. Yet news offerings, which include health segments as a staple, must find new (and preferably unusual) developments nearly every day to help fill their space. Further, they often use sensationalistic, dramatic, and emotional presentational styles to both capture the audience's attention and encourage continued viewing. In the same light, scientists often expect fear of climate change and its impacts to motivate public support of climate policies (Nabi & Prestin, 2016). My data suggest that the opposite is in fact true and there is much stronger evidence supporting the use of hope, which is a positive piece of hopeful news. Hopeful communication seems to be more

motivating which points to the need for climate change communicators to alter their approach to message designs and appeals. We, as a society, can address climate change. Our efforts to do so begin (but do not end) with effective, more hopeful communication in order to raise awareness for what we are already doing, what else still needs to be done, and how we can accomplish those goals. We have an auspicious opportunity to mobilize large-scale collective action (both public and private) and unite for a more flourishing planet along with all of its inhabitants.

5.1.1 Limitations

This study is not without limitations. The largest limitation of my study was the decision to eliminate the "Don't know" response option on the four-item Six Americas instrument from Chryst and colleagues (2018). This suppressed the proportion of "Disengaged," which left my distribution substantially different from the national distribution. However, the adjustments made did not yield substantively distinct results. The distribution of the other SIXAM categories were within 5% of the most recently available national distribution published by Yale. This similarity in categorical proportion ensures these results are still a valid way to investigate climate change communication and the interaction between identity, emotions, and mobilization. Additionally, the limited time and resources available to devote to this project largely limited the extent to which I was able to conduct exhaustive analyses of variables and themes. The primary way this can be seen is in how my examination of demographic variables were mostly treated as control variables rather than additional nodes of inquiry. Further, these findings are not generalizable to countries outside of the United States due to the nature of the data collection service we used (*CloudResearch Connect*) as only available to residents of the United States. It was beyond the scope of the present study to explore how various communicators can distribute different messages to distinct audience segments. My instrument also did not include a measure of

participants' emotional state at the beginning of the study so I cannot say with any degree of certainty how their intended behavioral responses were affected by their baseline mentality as they moved through the questionnaire, although personality characteristics were gathered to shed light on more permanent dispositions. This study only measured intended pro-environmental behavior rather than actual pro-environmental behavior, and Lange and colleagues (2018) have shown self-reported behavior differs substantially from actual behavior. Finally, my survey experiment employed between-participant measures of outcomes where different people test each condition rather than within-participant measures of outcome where the same person tests all the conditions. With that, I did not measure pro-environmental behaviors prior to the treatments so it is somewhat difficult to discern if participants who indicated higher incidences of pro-environmental behaviors were already more likely to engage in those behaviors.

5.1.2 Future Directions

This project provides multiple avenues for further research to follow. For one, there could be a more in-depth study conducted with sociodemographics and values to explain how different demographic and personal values variables impact levels of environmental attitudes and identities and how each relates to pro-environmental behavior intentions. For example, age would be interesting to analyze because attitudes toward the environment and climate change and their significance have shifted considerably across generations. Furthermore, I conducted brief overviews of ZIP code-level context data exploring if the type and severity of climate change impact likely to be experienced in different areas influence behavioral intentions, emotions, efficacy type, and levels of environmental attitudes and identity. Additionally, future analysis might examine whether an area's level of vulnerability to the impacts of climate change influences behavioral intentions, emotions, efficacy type, and levels of environmental attitudes

and identity. Another suggestion for future research would be to examine levels of environmental attitudes and identity, pro-environmental behavior items, and types and levels of efficacy cluster together geographically as well as if different emotions are experienced in different places. There could also be different tools that may enhance how individuals' levels of environmental attitudes and identities are measured and what might better predict pro-environmental behavior. Finally, it is important to continue to research and monitor how communication operates in real-world, everyday contexts as opposed to an experimental survey design, such as what was used in this study. Encountering information about climate change in day-to-day life may work differently and this requires further investigation. People are nearly constantly consuming content on many discrete topics, so the need arises to ensure that climate change communication is hopeful and solutions-oriented in order to increase its relative effectiveness.

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7. Appendix

7.1 Anchor Codes

- Dismissive of climate change
- Problem identification
- Solution proposal
- Providing information
- Seeking ways to make a difference
- Calling out hypocrisy
- Considering the future
- Inclusion of the facts
- Political polarization
- Misinformation/disinformation
- Conspiracism
- Changing information
- The pervasiveness of the impacts
- Challenging one's identity

7.2 Final Thematic Framework

- Problem identification
    - Calling out hypocrisy
    - Political polarization
    - Closed-minded reception
    - Misinformation and disinformation
    - Distrust in science and scientific bias
    - Changing information
- Information provision
- Seeking ways to make a difference
- Solution proposal
    - Making change with more information
    - Inclusion of the facts
    - Considering the future
- The pervasiveness of the impacts
- Dismissive of climate change
    - Conspiracism
- Importance of non-human life
- Affecting one personally
- A need for collective action

7.3 Demographic Justifications

- Age: Attitudes toward the environment and climate change and their significance have shifted considerably across generations.
- Gender identity: gender identity might influence attitudes on climate change and subsequent emotional responses and mobilization behavior.
- Race and ethnicity: culture can vary by race and ethnicity and different cultures might view climate change or action in unique ways based on context and history.
- Education level: knowledge about climate change may be differentially understood or believed and the language surrounding it may be interpreted differently based on participants' level of education.
- Geographical location: various regions of the country are impacted by climate change in different ways and degrees. This means exposure to climate change messaging from some sources might vary based on geographic location.
- Population density: subjective views on the population density of one's area may be an indicator of other related attitudes and behaviors such as government regulation and climate change mitigation efforts.
- Political Ideology: political ideology is different from political partisanship and some related attitudes and behaviors can cluster around ideology in important and discrete ways because while ideology and partisanship overlap, they are not the same.
- Political party affiliation: attitudes regarding climate change differ widely across the political spectrum where one party typically agrees and the other disagrees with climate change efforts, and party identity could be a proxy for an environmentalist identity.
- Employment status: employment status is not distributed proportionally across the population and some people may self-select into a group with like-minded individuals on various topics including climate change.
- Income: engaging in pro-environmental behavior is differentially accessible depending on socioeconomic class and available resources.
- Voting status: mobilization and action are often thought of as voting behavior, which would be irrelevant if participants do not vote.
- Voting participation: participants could be registered to vote but may not participate in elections which would indicate their general level of engagement.
- Evangelicalism: this is separate from any one religion and provides important variation in certain political and environmental dispositions.

7.4 Informed Consent Statement

This is a brief survey about attitudes and behaviors related to climate change and the environment. The survey will ask for general demographic info such as age, race/ethnicity, gender identity, education level, and income level as well as questions about your personal views on a range of topics. **This survey is completely anonymous, and we will not ask for your name or any other information which will uniquely identify you.** Some of the questions posed concern climate change and environmental harm that may invite a strong response from participants. Given the controversial nature of some of the topics included in this research, there

is a small potential risk that you may also experience some emotional discomfort or other negative emotions. Those who experience emotional distress as a result of participating in this study can access mental health services free of charge by calling 1-800-662-HELP (4357). **Please consider writing this information down as it will not necessarily be displayed again after you agree to participate in this study.**

We will also not ask about any of the following sensitive information: sexual activity, victimization, illegal behaviors, information that could reasonably place you at risk for criminal or civil liability, and information that could be damaging to your financial standing, employability, or reputation. Although this study poses minimal risk, there is always some level of risk associated with participating in any study. In this study, the risks include the loss of privacy or confidentiality (although this is greatly minimized by not collecting personally identifying information). Your participation in this study is entirely voluntary, and completing the survey should take about 10-12 minutes to complete.

Again, your decision to participate is completely voluntary and you are free to withdraw at any time. You may also decline to answer any question that you don't want to answer. If you would like to discuss concerns or questions about this survey, you may contact the principal investigator for this research project at rlecount01@hamline.edu. If you do not want to participate, simply close the form and disregard the message. If you begin the survey and decide you no longer want to participate, simply close the form; your answers will not be recorded.

Please indicate your agreement with the following statement in order to participate by clicking YES below.

7.5 Treatment Videos

7.5.1 Hope Video

Link: https://youtu.be/HYUdIYqWsow

Transcript

Humanity faces a tough challenge.
97% of climate scientists agree that climate change is happening
And that human activities are behind it.
The burning of fossil fuels add greenhouse gasses to the air,
warming the planet like a blanket.
This warming matters.
It will have major impacts across the U.S. and world,
such as melting ice sheets and glaciers;
rising sea levels, threatening many US coastal cities;

More frequent and intense storms, like Hurricane Harvey in Texas;
Wildfires, like in California;
Worse floods;
Stronger droughts, affecting water availability, especially in the US Midwest;
Significant national security and economic threats;
and permanent loss of biodiversity.
But there are many reasons for hope.
The cost of renewable energy is dropping
and the technology is improving all the time.
We are reducing energy demand with energy efficiency investments.
Cities around the country are transitioning to sustainability.
New technologies might be able to remove carbon from the atmosphere.
People are changing their lifestyles to be more green
and there is significant global political momentum to fight climate change.
All these changes have many benefits for us.
Preventing climate change;
Cheaper and more independent energy systems;
New jobs and employment opportunities;
Cleaner cities, less air pollution;
A healthier planet for future generations.
Humanity can stop climate change and create a better world for all.

7.5.2 Fear Video

Link: https://youtu.be/FtZZRRNiE_o

Transcript
Humanity is in big trouble
97% of climate scientists agree that catastrophic climate change is happening
And that human activities are behind it.
The burning of fossil fuels add greenhouse gasses to the air,
warming the planet like a blanket.
This warming matters.
It will have major impacts across the U.S. and world,
such as melting ice sheets and glaciers;
rising sea levels, threatening many US coastal cities;
More frequent and intense storms, like Hurricane Harvey in Texas;
Wildfires, like in California;
Worse floods;
Stronger droughts, affecting water availability, especially in the US Midwest;

Significant national security and economic threats;
and permanent loss of biodiversity.
We have much to lose...
Economic damage worse than the Great Recession;
Severe air pollution, especially in cities.
Significant agricultural yield declines, food insecurity.
Prospects aren't good.
Although renewable energy prices are dropping,
Transitioning our energy system is a massive project.
Climate change requires unprecedented global cooperation
While political gridlock in the US makes any environmental action exceedingly difficult
And we have very little time.
Unless we take major action, humanity is doomed.

7.5.3 Control Video

Link: https://youtu.be/doPtzDdpZ_4

Transcript
Smartphones have changed the world.
They were invented in the 1990s
But were not widely adopted until the mid to late 2000s.
People have been abandoning landline phones ever since.
While mobile phones were originally invented for just phone calls,
Smartphones now offer countless services.
Photos and videos;
Shopping;
Social media;
GPS Navigation;
Email;
Gaming;
Financial transactions;
and thousands of different applications.
In recent years, smartphone screen sizes have become larger to accommodate new functionalities.
They are also being used for virtual reality headsets.
However, there are some concerns about smartphones.
There are more car accidents involving people distracted on their phones while driving;
More people are experiencing health problems in their hands, neck, and back;
Bright smartphone screens can impact sleep quality;

And phone addiction can have major impacts on our lives.
Nevertheless, despite some significant issues…
For many people, their smartphone is the last thing they see before sleep…
And the first thing they look at upon waking.
Smartphones will continue to play a key role in our lives for the foreseeable future

7.6 Full Survey Instrument

Brief Survey of Attitudes about Nature, Science and Policy

Background Information

* 2. What is your residence ZIP code? Please enter your 5-digit ZIP code (For example 90210).

* 3. In what year were you born? Choose one.

* 4. Which most closely describes your gender identity? Select one.
- ☐ Woman
- ☐ Man
- ☐ Non-Binary
- ☐ My gender identity is not listed

* 5. Which of the following best describes you? Select all that apply.
- ☐ Asian
- ☐ Native Hawaiian or Pacific Islander
- ☐ Black or African American
- ☐ Hispanic or Latino/a
- ☐ Native American or Alaskan Native
- ☐ White
- ☐ Middle Eastern or North African
- ☐ Prefer not to state
- ☐ A race/ethnicity not listed here

* 6. If applicable, please specify your religion.
- ☐ Catholicism
- ☐ Protestant Christianity
- ☐ Orthodox Christianity
- ☐ The Church of Jesus Christ of Latter-Day Saints (Mormon)

- ☐ Judaism
- ☐ Islam
- ☐ Buddhism
- ☐ Hinduism
- ☐ Atheist
- ☐ Agnostic
- ☐ Not Affiliated
- ☐ No Religion
- ☐ My religion is not listed

* 7. Do you identify as evangelical or born again?
  - ☐ Yes
  - ☐ No

* 8. What is the highest level of education you have completed? Select one.
  - ☐ Some high school, no diploma
  - ☐ High school diploma or GED
  - ☐ Some college or other postsecondary education, no degree
  - ☐ Associate (2-year) degree
  - ☐ Bachelor's (4-year) degree
  - ☐ Master's degree
  - ☐ Doctorate or other terminal degree

* 9. Which of the following best describes your total annual income? Select one.
  - ☐ Under $30,000
  - ☐ $30,000 to $49,999
  - ☐ $50,000 to $74,999
  - ☐ $75,000 to $99,999
  - ☐ $100,000 to $149,999
  - ☐ $150,000 or more

* 10. Which of the following best describes the area you live in? Select one.
  - ☐ Urban
  - ☐ Suburban
  - ☐ Rural

* 11. Which of the following best reflects your current employment status? Select one.
  - ☐ Full-time employment

- ☐ Part-time employment
- ☐ Unemployed, seeking employment
- ☐ Unemployed, not seeking employment
- ☐ Self-employed
- ☐ Home-maker
- ☐ Student
- ☐ Unable to work
- ☐ Active-duty Military
- ☐ Retired

* 12. Are you currently registered to vote where you live? Select one.
  - ☐ Yes
  - ☐ No
  - ☐ Not sure

* 13. Did you vote in the last election? Select one.
  - ☐ Yes
  - ☐ No
  - ☐ Not sure

* 14. In general, how would you describe your political viewpoint? Select one.
  - ☐ Strongly conservative
  - ☐ Moderately conservative
  - ☐ Somewhat conservative
  - ☐ Moderate
  - ☐ Somewhat liberal
  - ☐ Moderately liberal
  - ☐ Strongly liberal
  - ☐ Other (please specify)

* 15. In general, how would you describe your political party? Select one.
  - ☐ Strong Republican
  - ☐ Moderate Republican
  - ☐ Lean Republican
  - ☐ Independent
  - ☐ Lean Democrat
  - ☐ Moderate Democrat
  - ☐ Strong Democrat

- ☐ Other (please specify)

Your Views In-Depth

* 16. How much do you agree or disagree with the following statement:
I pay close attention to information about what's going on in government and politics.

- ☐ Strongly agree
- ☐ Agree
- ☐ Somewhat agree
- ☐ Neither agree nor disagree
- ☐ Somewhat disagree
- ☐ Disagree
- ☐ Strongly disagree

* 17. How much do you agree or disagree with the following statement:
Scientific theories are trustworthy.

- ☐ Strongly agree
- ☐ Agree
- ☐ Somewhat agree
- ☐ Neither agree nor disagree
- ☐ Somewhat disagree
- ☐ Disagree
- ☐ Strongly disagree

* 18. Next, we have a few brief questions about how you think about powerful people and groups in our society.

How much do you agree or disagree with each of the following?
(Strongly agree; Agree; Somewhat agree; Neither agree nor disagree; Somewhat disagree; Disagree; Strongly disagree)

- Many important things happen in the world, which the public is never informed about.
- Politicians usually do not tell us the true motives for their decisions.
- Government agencies closely monitor all citizens.
- Events which superficially seem to lack a connection are often the result of secret activities.
- There are secret organizations that greatly influence political decisions.

* 19. In this brief section, we have a few short questions for you about how you think about

making a difference in the world.

How much do you agree or disagree with each of the following?
(Strongly agree; Agree; Somewhat agree; Neither agree nor disagree; Somewhat disagree; Disagree; Strongly disagree)

- I can make a meaningful contribution to our political process.
- If I participate in the political process, our society will be a better place.
- Large numbers of people like me can make a significant impact on the political process.
- If a large number of people like me are active in politics, our society will be a better place.

* 20. Now we have a few questions about how you think about your personality.

How much do you agree or disagree with each of the following statements:
(Strongly agree; Agree; Somewhat agree; Neither agree nor disagree; Somewhat disagree; Disagree; Strongly disagree)

- I am extroverted and enthusiastic.
- I am critical and quarrelsome.
- I am dependable and self-disciplined.
- I am anxious and easily upset.
- I am open to new experiences and complex.
- I am reserved and quiet.
- I am sympathetic and warm.
- I am disorganized and careless.
- I am calm and emotionally stable.
- I am conventional and uncreative.

* 21. Now we have a few short questions for you about how you think about society.

How much do you agree or disagree with each of the following statements:
(Strongly agree; Agree; Somewhat agree; Neither agree nor disagree; Somewhat disagree; Disagree; Strongly disagree)

- In setting priorities, we must consider all groups.
- We should NOT push for group equality.
- Group equality should be our ideal.
- Superior groups should dominate inferior groups.

* 22. Next, we have a few questions about how you think about different parts of the country.

How much do you agree or disagree with each of the following statements:
(Strongly agree; Agree; Somewhat agree; Neither agree nor disagree; Somewhat disagree; Disagree; Strongly disagree)

- Rural areas have a distinctive culture that is often misunderstood by people in cities.
- Rural areas have distinct economic interests that are often ignored by people in the cities.
- Urban areas have too much say in U.S. politics these days.
- Politicians care more about representing people in metropolitan areas than in rural areas.

Considering Nature and the Climate

* 23. Please state your level of agreement or disagreement with the following statements.
(Strongly agree; Agree; Somewhat agree; Neither agree nor disagree; Somewhat disagree; Disagree; Strongly disagree)

- I like to spend time outdoors in natural settings (such as woods, mountains, rivers, fields, local parks, lake or beach, or a leafy yard or garden)
- I think of myself as a part of nature, not separate from it.
- If I had enough resources such as time or money, I would spend some of them to protect the natural environment.
- When I am upset or stressed, I can feel better by spending some time outdoors
- surrounded by nature.
- Behaving responsibly toward nature – living a sustainable lifestyle– is important to who I am.
- Learning about the natural world should be part of everyone’s upbringing.
- Please select "Strongly Disagree" here to demonstrate that you are paying attention to this survey.
- If I could choose, I would prefer to live where I can have a view of the natural environment, such as trees or fields.
- An important part of my life would be missing if I was not able to get outside and enjoy nature from time to time.
- I enjoy encountering elements of nature, like trees or grass, even when I am in a city setting.
- I feel comfortable out in nature.

* 24. How much do you agree or disagree with the following statement?
I consider myself an environmentalist.

☐ Strongly agree

- ☐ Agree
- ☐ Somewhat agree
- ☐ Neither agree nor disagree
- ☐ Somewhat disagree
- ☐ Disagree
- ☐ Strongly disagree

* 25. Please state your level of agreement or disagreement with the following statements. *(Strongly agree; Agree; Somewhat agree; Neither agree nor disagree; Somewhat disagree; Disagree; Strongly disagree)*

- The issue of climate change is important to me personally.
- I am NOT at all worried about climate change.
- Climate change will harm me a great deal personally.
- Climate change will NOT harm future generations of people at all.

* 26. Which of the following do you rely on the MOST when considering the issue of Climate Change?

- ☐ Family and Friends
- ☐ Newspapers (Print and/or Online)
- ☐ Television News Programs
- ☐ Advocacy organizations
- ☐ Social Media (Twitter, Facebook, Instagram, Tiktok, etc)
- ☐ Radio (Over the Air/Real time)
- ☐ Podcasts
- ☐ Other (please specify)
- ☐ None of the above

A Brief Video Message To Consider

* 27. A (33.34)
Please watch the following short clip (with sound if available) and answer the following question after you've finished viewing it:
How impactful did you find the message in the video?
0 (Not at all impactful) 50 (Neutral) 100 (Extremely Impactful)

B (33.33%)
Please watch the following short clip (with sound if available) and answer the following question after you've finished viewing it:

How impactful did you find the message in the video?
0 (Not at all impactful) 50 (Neutral) 100 (Extremely Impactful)

C (33.33%)
Please watch the following short clip (with sound if available) and answer the following question after you've finished viewing it:
How impactful did you find the message in the video?
0 (Not at all impactful) 50 (Neutral) 100 (Extremely Impactful)

Video Message Debrief

* 28. What was the main message of the video that you just watched?

- ☐ Climate change has proven too large a problem for the world to adequately address.
- ☐ Significant progress is being made toward addressing climate change.
- ☐ Smartphones are an important and complicated part of our everyday lives.
- ☐ The transitive property in sports is not necessarily a useful analytical tool.

Your Role In Society

* 29. Which of following activities and behaviors, if any, are you likely to engage in in the near future?
(I'm likely to do this; I'm not likely to do this; I'm not sure if/when I will do this.)

- Avoid using certain products that harm the environment.
- Try to use less water in your household.
- Buy some product specifically because you think it is better for the environment than competing products.
- Voluntarily recycle newspapers, glass, aluminum, motor oil, or other items.
- Reduce your household's use of energy.
- Buy or sell stocks based on the environmental record of the companies.
- Please select "I'm not likely to do this" in order to demonstrate that you are paying attention to this survey.
- Be active in a group or organization that works to protect the environment.
- Vote for or work for candidates because of their position on environmental issues.
- Contribute money to an environmental, conservation, or wildlife preservation group.
- Contact a public official about an environmental issue.
- Contact a business to complain about its products or policies because they harm the environment.
- Sign a petition supporting an environmental group or some environmental protection effort.

- Attend a meeting concerning the environment.

30. We'd love to know your thoughts on the following question:
What kinds of themes and information are important to include in messages about climate change?
(Open-ended response)

31. We'd love to know your thoughts on the following question:
What do you consider to be barriers to effective communication about climate change?
(Open-ended response)

* 32. Which of the following feelings do you often experience when encountering information about climate change (CHECK ALL THAT APPLY)?

- ☐ Anger
- ☐ Happiness
- ☐ Sadness
- ☐ Hopefulness
- ☐ Fear
- ☐ Apathy
- ☐ Pride
- ☐ Anticipation
- ☐ Frustration
- ☐ Despair
- ☐ Satisfaction
- ☐ Guilt
- ☐ Shame
- ☐ Doubt
- ☐ Anxiety
- ☐ Vulnerability
- ☐ Powerlessness
- ☐ Other (please specify)
- ☐ None of the above

* 33. Which of the following are you MOST LIKELY TO EXPERIENCE when encountering information about climate change (PICK JUST ONE)?

- ☐ Anger
- ☐ Happiness
- ☐ Sadness

- ☐ Hopefulness
- ☐ Fear
- ☐ Apathy
- ☐ Pride
- ☐ Anticipation
- ☐ Frustration
- ☐ Despair
- ☐ Satisfaction
- ☐ Guilt
- ☐ Shame
- ☐ Doubt
- ☐ Anxiety
- ☐ Vulnerability
- ☐ Powerlessness
- ☐ Other (please specify)
- ☐ None of the above

* 34. Now, we have a few brief questions about how you think about powerful people and groups in our society.

How much do you agree or disagree with each of the following?
(Strongly agree; Agree; Somewhat agree; Neither agree nor disagree; Somewhat disagree; Disagree; Strongly disagree)

- Many important things happen in the world, which the public is never informed about.
- Politicians usually do not tell us the true motives for their decisions.
- Government agencies closely monitor all citizens.
- Events which superficially seem to lack a connection are often the result of secret activities.
- There are secret organizations that greatly influence political decisions.

* 35. Finally, we have two brief questions for you about what leaders should do when times get tough.

How much do you agree or disagree with each of the following?
(Strongly agree; Agree; Somewhat agree; Neither agree nor disagree; Somewhat disagree; Disagree; Strongly disagree)

- Having a strong leader in government is good for the United States even if the leader bends the rules to get things done.
- It would be helpful if U.S. presidents could work on the country's problems without paying attention to what Congress and the courts say.

7.7 Full Sample Descriptive Statistics

Descriptive Statistics (Unstandardized Measures)

Variable	Obs	Mean	Std. Dev.	Min	Max
PEBs	927	27.26	6.71	13	39
SIXAM	927	3.97	1.88	1	6
EIDR	927	57.8	10.17	12	70
ENID	927	4.04	1.66	1	7
Treatment Salience	927	65.21	29.26	0	100
Condition	927	2.02	0.82	1	3
Highest Degree	927	4.04	1.47	1	7
White	927	0.74	0.44	0	1
Man	927	0.51	0.5	0	1
Age	927	53	9	18	89
Income	927	2.74	1.5	1	6
Political Ideology	927	3.7	1.83	1	7
Party Identification	927	3.85	1.88	1	7
Not Registered to Vote	927	0.11	0.31	0	1
Attention Govt & Politics	927	0.32	0.25	0	1
Evangelical	927	0.22	0.42	0	1

Trust in Science	927	2.92	1.35	1	7
Change in Conspiracism	927	0.18	2.23	-16	20
Collective Efficacy	927	3.65	1.05	1	5
Collective Outcome Efficacy	927	3.65	1.97	1	5
Self-efficacy	927	3.21	1.28	1	5
Personal Outcome Efficacy	927	2.9	0.97	1	5
Democratic Values	927	6.2	3.4	0	10