Research Article

Framing Climate Change: Exploring the Role of Emotion in Generating Advocacy Behavior

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Abstract

Substantial research examines the cognitive factors underlying proenvironmental message effectiveness. In contrast, this study investigates the role of emotion, fear and hope specifically, in the gain/loss framing of environmental policy initiatives. The 2 (threat vs. no threat) × 2 (gain- vs. loss-framed efficacy) experiment revealed emotion, especially hope, as a key mediator between gain-framed messages and desired climate change policy attitudes and advocacy. Results further supported the value of sequencing emotional experiences to enhance persuasive effect. This research offers an inaugural test of emotional flow theorizing and highlights the need for additional research on emotional processes in environmental communication.

Keywords

emotion, framing, hope, climate change, persuasion

After a decade of overwhelming and widely reported scientific consensus on the existence and anthropogenic nature of climate change (e.g., Intergovernmental Panel on Climate Change, 2007; Oreskes, 2004), around

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40% of the American public remains uncertain of, skeptical of, or squarely opposed to these findings and/or the recommended solutions (Pew Research Center, 2015; Roser-Renouf et al., 2014). This discrepancy is of central concern to science communication researchers and practitioners, given the significant impact of public opinion on domestic and international policy (via democratic representation), the economic feasibility of "green" products (via consumer demand), and climate change itself (via individual carbon footprint reduction efforts).

Many early science communication efforts approached this problem from a "deficit model" perspective (Bauer, Allum, & Miller, 2007), assuming that the divergence between public and scientific opinion was largely caused by deficient public knowledge. Hence, initial communication efforts attempted to reconcile this divide by educating the public about the evidence indicating the anthropogenic nature of climate change with the hope that more knowledge would lead to desired attitudinal and behavioral changes. However, subsequent evidence clearly indicated that individuals' ideology, not their knowledge, best predicts climate change attitudes and behavior (Kahan, Jenkins-Smith, & Braman, 2011; Nisbet, Cooper, & Ellithorpe, 2014), and the individuals highest in science knowledge are the most polarized about climate change (Kahan et al., 2012). Further, individuals who are preopposed to climate change persuasion attempts often face barriers in information processing, including psychological reactance, motivated reasoning, and confirmation-biased selective exposure/attention (Kraft, Lodge, & Taber, 2015; Lewandowsky & Oberauer, 2016), all rendering logical appeals largely ineffective and possibly resulting in cumulative (dis)advantage patterns over time (Gustafson & Rice, 2016).

Given the inefficacy of rational, evidenced-based appeals for oppositional audiences (e.g., Lewandowsky & Oberauer, 2016), recent research has ventured away from this "cognitive bias," investigating the utility of emotional appeals in persuasion (e.g., Cooper & Nisbet, 2016; Nabi, 2007, 2015). Indeed, in the context of climate change, affective responses—fear (Feldman & Hart, 2016) and hope (Ojala, 2012) in particular—have been of interest. The present study advances this literature by connecting the role of emotion (fear and hope) in persuasion to commonly used climate change message components—threat, efficacy, and gain/loss framing—through a theoretical integration and empirical test.

Specifically, we offer an initial test of the recently introduced concept of emotional flow (Nabi, 2015), assessing how emotional sequencing maps onto the common message components of standard fear appeals (the threat-with-efficacy structure) together with gain/loss framing. We then advance and experimentally test hypotheses derived from these perspectives, considering

how emotions in response to threat messages followed by emotions in response to gain- or loss-framed efficacy information differentially shape climate change attitudes and advocacy behavior. We begin with a review of the study of emotions in climate change persuasion.

Emotions in Climate Change Persuasion

Emotions and Climate Change

Diverse empirical and theoretical scholarship indicates that positive and negative emotions predict individuals' attitudes and behaviors across a range of social issue topics, from climate change to immigration (e.g., Höijer, 2010; Lecheler, Bos, & Vliegenthart, 2015; Nabi, 2003; Roeser, 2012). Regarding climate change specifically, Smith and Leiserowitz (2014) found that people's experienced emotions when prompted to think about climate change (e.g., hope, worry, interest) explain 50% of the variance in support for climate policies—more than any other set of variables, including sociodemographics. Further, Ojala (2012) found feeling hopeful about climate change associated with engagement in sustainability issues. Still, others argue that negative emotions (e.g., fear) about climate change risks can induce more careful processing about solutions and generate greater persuasion (Meijnders, Midden, & Wilke, 2001a, 2001b). Given that existing emotions associated with climate change–related issues are predictive of associated attitudes and behaviors, it is reasonable to imagine that the emotions evoked by common climate change message styles (e.g., fear appeals; gain or loss frames) play an instrumental role in their resulting persuasive effect.

Emotional Response to Threat

Fear appeals, or messages that emphasize the severity and salience of threats for the purpose of behavioral influence, are common in both research and practice (Moser, 2010; Nisbet, 2009). Fear, which arises when individuals perceive themselves to be faced with imminent physical harm (Lazarus, 1991), is thought to be a useful motivational tool as its associated action tendency is to protect oneself from harm. Although threatening climate changes messages are often successful at evoking fear, scholars are conflicted on the effectiveness of fear in persuading people to take action (e.g., Meijnders et al., 2001a, 2001b; O'Neill & Nicholson-Cole, 2009; Smith & Leiserowitz, 2014; Spence & Pidgeon, 2010). Indeed, these findings are consistent with meta-analytic investigations of fear appeal research, which support a positive linear relationship between fear and persuasive outcomes generally (Tannenbaum et al.,

2015; Witte & Allen, 2000), though there is strong evidence that fear can generate maladaptive message responses, such as reactance, source denigration, and problem minimization—all of which undermine effective persuasion.

Research and theory exploring the conditions of fear appeal effectiveness have identified four cognitions central to persuasive success: perceived threat severity, perceived threat susceptibility, response efficacy, and self-efficacy (e.g., Witte & Allen, 2000). That is, to the extent message features evoke perceptions of susceptibility and severity, as well as response and self-efficacy, persuasive success is more likely (Floyd, Prentice-Dunn, & Rogers, 2000; Levin, Schneider, & Gaeth, 1998). Importantly and unsurprisingly, the primary emotion of interest in such research is the fear evoked by threat severity and susceptibility information, without regard for the emotional response to the efficacy information provided (Nabi, 2015). Such emotional responses have, however, been considered in other contexts.

Emotional Response to Efficacy Appeals

Because efficacy perceptions are considered important predictors of constructive responses to threatening information, and given the contested value (and even potential boomerang effects) of fear-based messaging, scholars have recently begun to investigate the role of efficacy-only appeals (Roser-Renouf, Maibach, Leiserowitz, & Zhao, 2014). Such appeals can focus on any of three types of efficacy: internal efficacy (the individual can take successful action to mitigate climate change threats), external efficacy (powerful others, e.g., politicians, will take action in accordance with the will of an individual or the larger public), and response efficacy (emphasizing the effectiveness of a given solution; Hart & Feldman, 2014).

Like threat messages, efficacy appeals have the potential to evoke emotions that may be important to their ultimate success, most notably, hope. Like fear, hope derives from the perception of an uncertain future, but unlike fear, it is associated with more positive future expectations. As Lazarus (1991) states, hope is a feeling of "wishing and yearning for relief from a negative situation, or for the realization of a positive outcome when the odds do not greatly favor it" (p. 282), and its associated motivational function is to encourage goal pursuit.

Importantly, there is evidence that efficacy perceptions are associated with feelings of hope (Magaletta & Oliver, 1999; O'Sullivan, 2011), and some experimental work has found that efficacy appeals regarding climate change specifically increase feelings of hope, though more so for liberals and moderates than for conservatives (Chadwick, 2015; Feldman & Hart, 2016). Interestingly, efficacy appeals slightly reduced fear among liberals and

moderates but increased fear among conservatives for response efficacy appeals only (Feldman & Hart, 2016). In light of such research, Roser-Renouf and Maibach (2010) argue that hope is a useful supplement to fear in climate change messaging.

In sum, the evidence across multiple domains indicates that fear appeals are most effective when they contain a threat component and an efficacy component. Further, threatening message information tends to evoke fear, and efficacy information is likely to evoke hope. However, important unanswered questions about the emotional experience generated by messages that contain both threat and efficacy information, either in individual messages or presented in sequence, and their implications for persuasive effect remain. The recently proposed emotional flow perspective (Nabi, 2015) offers a useful framework to consider this question.

Emotional Flow

Recent theorizing suggests that a progression of multiple emotions (e.g., fear to hope) may enhance, and indeed be essential to, persuasive success. The concept of *emotional flow* suggests that as different pieces of information are unveiled in a persuasive message, emotional responses shift, which can explain, in part, the success of such messages (Nabi, 2015). Such shifts, which could occur among any combination of negative and positive emotions, are predicted to enhance persuasive effect for two primary reasons. First, individual emotions have different effects of message processing depth and action tendencies. Thus, different emotional experiences may be better suited to the goals of different parts of a persuasive message. For example, fear may be well suited to enhance awareness, whereas hope may be better suited to generate proactive (vs. avoidant) behaviors.

Second, given the centrality of physiological arousal to emotional experiences, emotions in response to one part of a message may influence the intensity of emotional responses to later message components (see Nabi & Myrick, 2018). Indeed, excitation transfer theory (Zillmann, 1983) supports this view, arguing that the physiological arousal associated with an emotional experience decays slower than the associated cognitions. Therefore, if one is aroused physiologically, one's emotional response to subsequent events is likely to be more intense. For example, if one feels frightened by the prospect of unfettered climate change, one would be even more hopeful when hearing of methods that may successfully divert that threat. This may be especially likely in the fear-hope dynamic given that the two emotions are interrelated, with hope arising from a condition of harm or threat (Lazarus, 1991). In sum, not only does emotional flow suggest that people experience different

emotions in sequences as a message unfolds but also that emotional responses to later information may be even stronger than they would otherwise have been as a result of the initial emotional experiences.

Given its relatively recent introduction to the literature, empirical testing of emotional flow is lacking. However, there is some relevant theorizing and data regarding fear appeals specifically. Nabi (2015) initially argued that the threat severity and susceptibility information deemed central to fear appeal effectiveness associates with fear arousal, whereas the response and self-efficacy information also critical to fear appeal success should associate with hope. As such, she suggests that effective fear appeals may be successful due to the emotional flow from fear to hope that is embedded in the threat-efficacy message structure. Some preliminary research supports (though does not actually test) this perspective, demonstrating that adding measurement of hope in response to fear appeals about skin cancer prevention helped explain unique variance in skin protection behavior beyond that of fear or the cognitions associated with successful fear appeals (Nabi & Myrick, 2018). In sum, this particular pattern of emotional flow—from fear to hope—is well-exemplified by the structure of messages that contain threat followed by efficacy information, the effectiveness of which has been advocated by numerous scholars for promoting desired attitudes and action in climate change (Ojala, 2012; Roser-Renouf & Maibach, 2010).

To this point, we have argued that both fear and hope may enhance the effectiveness of climate change messaging, and these emotions can be evoked successfully and in sequence by threat and efficacy information, respectively. As such, the threat-efficacy message structure of a standard fear appeal is an intuitive place to investigate the potential persuasive effects of emotional flow. Given that threatening information is likely to evoke only fear, any reasonable manipulation would relate to the degree of fear evoked. However, different variations of presenting efficacy information, gain or loss framing in particular, could affect the type of emotion experienced and, thus, the nature of the emotional flow that occurs within the two-step fear appeal message structure. To explore this further, we turn to the literature on framing.

Framing and Emotion in Climate Change

Framing Climate Change

Generally speaking, to frame messages is "to select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation . . ." (Entman, 1993, p. 52).

Myriad conceptualizations and operationalizations of framing have arisen over the past few decades (Borah, 2011; Cacciatore, Scheufele, & Iyengar, 2016). Key among these are *equivalence framing*—presenting precisely equivalent information in different orientations (e.g., gaining or losing an identical amount of money)—and *emphasis framing*—emphasizing certain elements or perspectives of a topic over others (e.g., community values vs. individual success; Levin et al., 1998; Scheufele & Iyengar, 2014).

All messages inherently contain perspectives, or frames, that influence a range of persuasion-related outcomes (Nisbet, 2009). As such, much research investigates the occurrence and effects of frames in climate change discourse. Some frames are unintended. For example, journalists often emphasize the uncertainties, disagreements, controversies, and skepticism surrounding diverse climate change topics and actors (e.g., Rice, Gustafson, & Hoffman, 2018). Other frames of climate change are strategically designed to affect persuasion in oppositional audiences, such as appeals that highlight the positive economic and social benefits of green technology and sustainability, the ethics of environmental responsibility, or social identity and community values (e.g., Sapiains, Beeton, & Walker, 2016).

Gain/Loss Framing. Among the most studied framing strategies incorporated into climate change persuasion attempts is the use of either gain or loss frames (Moser, 2010; Nisbet, 2009), for example, claiming that a certain behavior will result in either achieving a desirable gain or avoiding a detrimental loss (e.g., Feinberg & Willer, 2011; Spence & Pidgeon, 2010). The original research by Kahneman and Tversky (prospect theory; Kahneman & Tversky, 1979; Tversky & Kahneman, 1985) found that individuals are more likely to take risks in order to avoid outcomes that are framed as potential losses, compared with when equivalent outcomes are framed as potential gains. Whereas many have interpreted this to mean that loss-framed messages will be more persuasive, meta-analyses do not support this assumption. Rather, the mean effects of gain and loss emphasis frames in persuasion messages across diverse contexts are quite small (O'Keefe & Jensen, 2007, 2009), indicating that neither is inherently more effective than the other. This is likely due to a host of moderating and countervailing forces (e.g., topic and contextual factors, individual ideologies and prior attitudes, etc.) that supersede the relatively small effects of message frame variations (Quick & Bates, 2010).

Gain/Loss Framing in Climate Change. Specific to climate change and sustainability topics, tests of gain/loss framing effects show mixed results. While a collection of empirical and theoretical work indicates that loss-framed messages are more effective in influencing climate change attitudes and behaviors

(e.g., Davis, 1995; de Vries, Terwel, & Ellemers, 2015), other evidence suggests that loss-framed appeals about climate change are less effective than their gain-framed counterparts because loss- and threat-framed messages are more likely to lead to psychological reactance (e.g., Cho & Sands, 2011; Quick, Kam, Morgan, Montero Liberona, & Smith, 2015) and contradict fundamental just-world beliefs (Feinberg & Willer, 2011). The most direct test of gain/loss framing effects on climate change attitudes demonstrated that framing climate change mitigation efforts in terms of gain (vs. loss) resulted in stronger perceptions of climate change severity and greater support for mitigation legislation (Spence & Pidgeon, 2010).

In sum, gain-loss framing on its own has limited and mixed utility for direct persuasion effects (O'Keefe & Jensen, 2007, 2009; Yechiam & Hochman, 2013). Rather, gain and loss framing effects are likely better explained by accounting for mediating and moderating contextual and affective forces. Key among these possible mediators, based on empirical evidence, is emotion.

Framing and Emotions

The study of emotion in the context of framing is relatively recent, and as such, there is little theorizing. However, Nabi (2003, 2007) has proposed an emotions-as-frames model in which emotions are conceptualized as frames, or perspectives, through which incoming stimuli are interpreted. Specifically, when a message contains information that is relevant to an emotion's core relational theme (e.g., imminent threat for fear; possible positive futures for hope), an emotion (i.e., fear; hope) is aroused. Once an emotion is experienced, the emotions-as-frames model predicts that emotion-consistent information will be more accessible from memory, and individuals will seek out information related to the emotion's motivational goals. These emotional experiences, moderated by individual differences (e.g., schema development, coping style), are predicted to influence both information accessibility and information seeking, which ultimately generate emotion-consistent decisions and action. Recent research has supported the predictive power of the emotions-as-frames perspective, demonstrating that emotions mediate the relationship between frames and attitudinal or behavioral effects in controversial social issues (e.g., Kühne & Schemer, 2013;Lecheler et al., 2015; Lecheler, Schuck, & de Vreese, 2014).

Applying this perspective to gain/loss framing, loss-framed messages point out the harms one might incur as a result of action or inaction. Such framing captures the essence of fear (i.e., imminent harm). Thus, such messages are more likely to evoke fear compared with other emotions or a

control. Conversely, gain-framed messages emphasize potential positive future outcomes, which capture the core theme related to hope. Thus, gain-framed messages are more likely to evoke hope. Empirical tests of framing effects support this idea, finding, for example, that positive frames produce positive emotions and negative frames produce negative emotions (Lecheler et al., 2015) and that loss frames specifically result in more fear than gain frames (Spence & Pidgeon, 2010).

Further, Spence and Pidgeon (2010) found that fear responses mediated the relationship between gain/loss framing and desired attitudes about climate change, such that mitigation efforts framed in terms of loss led to more fear than gain frames, and fear positively related to perceived severity of climate change impacts. Similarly, a recent experiment found that discrete emotions mediate the path between gain and loss framing manipulations and their subsequent effects on the willingness to sacrifice for the climate change cause (Bilandzic, Kalch, & Soentgen, 2017), such that loss frames around climate change protection increased willingness by way of increased fear and guilt, and gain frames *decreased* willingness by way of increased hope (possibly by lowering the perceived necessity of personal sacrifice).

In sum, there is only tepid support for gain and loss framing's direct influence on persuasion outcomes. However, there is strong evidence supporting both the influence of gain/loss framing on emotions and the influence of emotions on attitudinal and behavioral effects, which implicates the mediating role of emotion. Combining this research with the notion of emotional flow, we are now prepared to offer unique predictions regarding how emotions evoked by threat information about an environmental danger and efficacy information framed in terms of either gain or loss influence both the strength of emotional arousal and subsequent persuasive outcomes.

Hypotheses

The literature is quite clear that both threat and efficacy information are important in producing persuasive outcomes, especially when combined into a sequential structure. Further, it is likely that threatening information will evoke greater fear and efficacy information will evoke more hope. Thus, we expect a message focused on threatening information to evoke more fear than hope and a message focused more on efficacy information to evoke more hope than fear. Because, in this study, this expectation is more of a manipulation check, we do not provide a formal hypothesis for these expectations.

Given the critical role that efficacy information plays in generating successful persuasion, an important question is how best to present efficacy information. The gain/loss framing literature is not encouraging in terms of

direct relationships with persuasive outcomes. However, we suggest that the true value of using gain frames, or even loss frames, is more in their capacity to evoke the emotions of hope and fear. Specifically, we predict the following:

Hypothesis 1: Gain-framed climate change efficacy information will elicit more hope than loss-framed efficacy information.
Hypothesis 2: Loss-framed climate change efficacy information will elicit more fear than gain-framed efficacy information.
Hypothesis 3: The effects of efficacy information framing on climate change attitudes and advocacy behaviors will be mediated by message-generated emotional arousal.

Next, drawing from the emotional flow discussion, the emotions elicited by information presented early in a message likely influence emotional responses to information presented later. That is, the fear evoked by threatening information is important not only in generating awareness and attention to policy issues compared with more pallid information presentation but also in influencing the intensity of the emotional responses to subsequently presented efficacy information.

More specifically, and consistent with emotional flow theorizing, we expect that threatening information about climate change followed by a gain-framed efficacy message will be an especially effective message structure to generate persuasion because the initial fear in response to the threatening information will enhance the hope response to the efficacy information (fear-hope structure). However, threatening information followed by loss-framed efficacy information (fear-fear structure) will undermine the benefits of hope and thus prove less effective. Thus, we predict the following:

Hypothesis 4: Those exposed to threatening climate change–related information will experience more hope in response to a solutions-oriented efficacy message, regardless of how it is framed.
Hypothesis 5: Fear in response to a threatening message will result in greater hope in response to a gain-framed efficacy message, and, in turn, more favorable attitudes and advocacy behaviors than fear followed by a loss frame.

Method

Participants and Procedures

Three hundred and forty-seven undergraduates at a California university participated in an online experiment in exchange for course research credit. A

speeding check standard of one-third the median time to completion (4 minutes, 30 seconds) was implemented to drop those who were unlikely to provide valid data. As such, 10 cases were excluded, leaving 337 valid cases for analysis. Participants were on average 20 years old (M = 19.98 years, SD = 1.52), and 77% were female. A total of 47.8% of the sample reported their ethnicity as White or Caucasian, 24.1% as Asian American, 18.5% as Hispanic or Latino, 4.2% as African American, 4.2% as other, and 1.2% as Native American.

The study was rooted in a 2 (problem message: threat vs. control) × 2 (solution-oriented efficacy message: gain vs. loss frame) design. Half of the participants first read a threat message in the form of a news article about a federal report highlighting the ways in which climate change threatens national health. The remaining participants read a control message about the history of federal climate change reports. Both articles were approximately 600 words and were constructed from existing climate change–associated documents. After completing message assessment items, participants then read a second news article describing how certain policies and strategies could mitigate climate change and public health effects. This efficacy article was approximately 500 words and framed in terms of either gain or loss—and as close to equivalence as linguistically possible. Emotions were measured after exposure to each message. Climate change attitude and advocacy behavioral measures were assessed after the second message along with demographics and other control variables.

Stimuli

Each participant read two messages presented as very recent *Los Angeles Times* new stories—either a threatening or a nonthreatening message about the issue of climate change, and a solutions message equivalency framed in terms of gain or loss. The threat-based message described the findings of a new report released by the federal government's lead climate change science agency regarding the health threats of climate change in the United States. The article contained statistics regarding California residents' susceptibility to severe threats and thus was expected to arouse fear. The control message offered a brief biography of the report's lead editor and a chronology of federal climate change reporting over the past 20 years. This message was designed to arouse little emotion while still addressing the issue of federal climate change reports. Both articles referenced an actual government report, and all information presented in each article was factually accurate.

The solutions-oriented efficacy article described two policy initiatives under consideration in California that could help stop climate change and benefit public health: (a) redesigning cities and towns to make them more walkable, bikeable,

and conducive to taking public transit and (b) increasing the speed of the current transition to cleaner sources of energy. Two specific actions discussed in the article were Caltrans's California State Bicycle and Pedestrian Plan and the Air Resources Board's Zero Emissions Vehicle program. The article stated that Caltrans and the Air Resources Board are seeking input on these projects.

The gain/loss manipulation was incorporated into only the efficacy message, which described potential solutions to the problem of climate change. The gain-framed message was titled "Stopping Climate Change Will Benefit US Health". The loss-framed message was titled "Not Stopping Climate Change Threatens US Health." Within the messages, information relating to solutions was consistently presented in terms of what could be gained versus lost. Examples include "Further, the report concludes that using cleaner sources of energy—such as solar and wind power—would result in improvements to air and water quality, thereby promoting good health and climate stability" (gain-framed) versus "Further, the report concludes that not using cleaner sources of energy—such as solar and wind power—would contribute to ongoing air and water pollution, thereby advancing illness and climate change" (loss-framed). Differently framed information was presented in each of the seven paragraphs of the news stories.

The threat and efficacy components were presented in two different messages, a design chosen to allow for the measurement of emotion between the threat message and the efficacy message—a requirement for any test of emotional flow. Given that the two messages were on the same topic, were presented in rapid succession, and could readily have been combined into one coherent message and given that the two messages together followed the threat-efficacy structure, this design is well-suited for a test of emotional flow (see Nabi, 2002, for similar design).

Measures

Emotion. Emotional responses were assessed after reading each message. Participants in the threat message conditions were asked how much of 25 emotions they felt while reading the story, on 0 (*not at all)* to 5 (*extremely)* scales. Of these, four items related to fear (*anxious, scared, afraid, worried* (Message 1 α = .89; Message 2 α = .89); four items related to hope (*hopeful, inspired, encouraged, optimistic*; α = .78; α = .92); four items related to sadness (*sad, upset, distressed, disappointed*; α = .86; α = .88); and four items related to anger (*angry, annoyed, irritable, frustrated*; α = .85, α = .90).

Given the pallid and descriptive nature of the control message, the 25 emotion items would have been incongruous and potentially counterproductive by unintentionally priming emotional responses unrelated to message content.

Thus, participants in this condition were asked about general emotional intensity with four semantic differential items: "This article seemed "*moving/emotional/intense/memorable*" (0 = *not at all* and 5 = *extremely*; α = .85). To more closely match the time to complete the threat message posttest, participants were asked several filler questions (e.g., "I learned a lot from this article," "The article seemed factual") that were not intended for analysis.

Attitudes. Attitudes toward the climate policy issues discussed in the efficacy article were measured using 12 semantic differential items. For each of three statements—"I think government policy that aims to reduce climate change is . . ."; "I think government policy that aims to speed California's transition away from fossil fuels and toward wind, water, and solar power is . . ."; and "I think government policy that promotes modifications to cities' travel routes to facilitate travel by foot, bicycle, and public transit is . . ."—participants responded to four semantic differentials rated on 7-point scales (*bad/good, wrong/right, unfavorable/favorable, negative/positive*). The items were averaged to form a reliable index of general attitudes toward climate change policies (α = .95; $M = 6.13$, $SD = 0.98$).

Advocacy Behavior. Participants were asked if they would be interested in signing e-petitions to support the two primary initiatives presented in the solutions article and whether they would like to receive an email with information on how to take further action to support the initiatives. Selecting "yes" on any of the four items then prompted a new window to appear in which participants could sign a petition or provide their email to receive more information. A measure of advocacy behavior was developed by totaling the number of behaviors out of four that each participant, in fact, enacted ($M = 1.26$, $SD = 1.06$).

Control Variables. Several constructs were assessed to be used as potential control variables in the analyses, including perceptions of climate change importance, climate change beliefs, perceived severity of climate change impacts, perceptions of susceptibility to the consequences of climate change, and perception of climate change as an important national problem. However, the only variable that proved significant in the models was *political ideology*, which was measured on a 7-point scale from 1 (*very liberal)* to 7 (*very conservative*; adapted from Bain et al., 2015). In all, 67.9% of the participants identified as liberal, 17.0% as just as liberal as conservative, and 15.2% as conservative. Ethnicity, gender, and age were also assessed.

Finally, negative assessments of the solutions article were measured with six 7-point Likert-type items (*overblown, boring, exaggerated, distorted, hard to understand, hard to comprehend*), which formed a single-factor, reliable index (α

= .87; $M = 2.93$, $SD = 1.12$). Given its more negative bent, it is unsurprising that the loss-framed message was assessed more negatively ($M = 3.17$, $SD = 1.11$) than the gain-framed message ($M = 2.69$, $SD = 1.07$), $F(1, 331) = 15.14$, $p < .001$. As such, negative message assessment was incorporated in the analyses.

Results

Threat Manipulation Check

The threat message evoked a notable degree of fear ($M = 3.16$, $SD = 1.14$), thus supporting its use for testing Hypotheses 4 and 5. Although fear specifically was not assessed after the control message, its mean emotionality was very low ($M = 1.81$; $SD = 0.83$), suggesting that as expected, participants in the control condition felt little of any sort of emotion, including fear. In light of the equivalency framing manipulation incorporated into the policy message, a manipulation check was not warranted. However, we did examine if the efficacy messages evoked more hope than fear as expected, which they did (hope $M = 3.27$, $SD = 1.30$ vs. fear $M = 2.22$, $SD = 1.03$), $t(335) = 11.56$, $p < .001$.

To test Hypotheses 1 to 3, we constructed a path model in AMOS 23.0 based on the study design and expected relationship among variables (exposure to threat vs. control message, exposure to gain- vs. loss-framed message, emotional response, attitude, and advocacy behaviors, controlling for ideology and negative message assessments) with error terms for each exogenous variable set at 1. The goodness of fit criteria used were (1) a χ^2/df ratio of 5 or less; (2) a comparative fit index (CFI) of .90 or greater, as close to 1 as possible; and (3) a root mean square error of approximation (RMSEA) less than or equal to .06. The resulting model evidenced an acceptable fit to the data, $\chi^2/df = 1.21$, $p = .28$, CFI = .993, RMSEA = .025 (see Figure 1), though dropping two nonsignificant paths (fear-attitude and hope-action) improved this fit slightly, $\chi^2/df = 1.09$, $p = .36$, CFI = .996, RMSEA = .017. Of the two control variables, only negative message assessment related to both emotional arousal and persuasive outcomes, and it is thus depicted in the Figure.

Gain Versus Loss Framing and Emotional Arousal

Hypotheses 1 and 2 predicted that the gain-framed efficacy information would evoke more hope than the loss-framed efficacy information, and conversely, the loss-framed efficacy information would evoke more fear than the gain-framed efficacy information. The path model evidenced support for these hypotheses. As shown in Figure 1, the gain frame generated greater hope after the efficacy message than the loss frame ($\beta = .33$, $p < .001$). Conversely, the

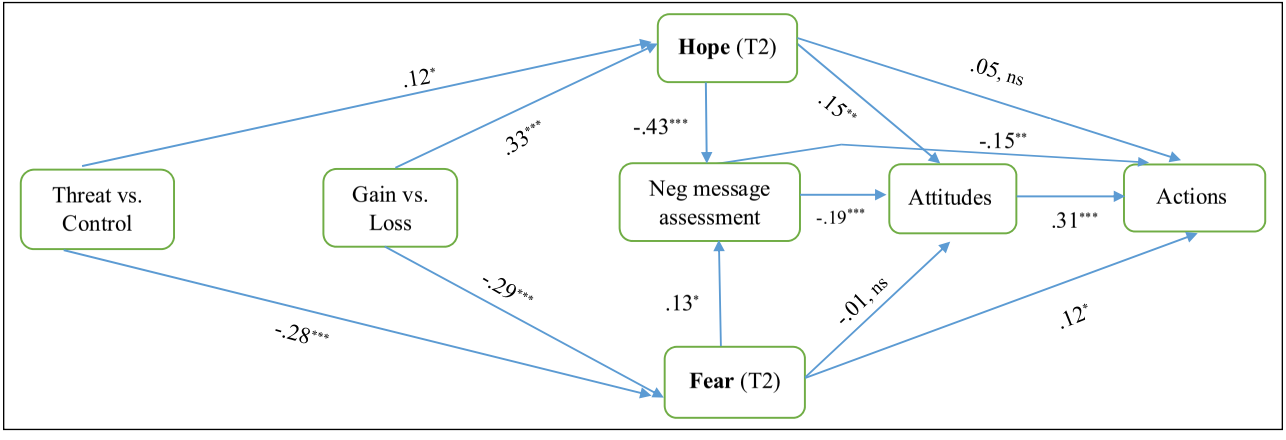

Figure 1. Modeling the effects of threat and gain/loss messages on climate change attitudes and advocacy behaviors.
Note. All relationships control for ideology and negative message assessments. Gain = 1; Loss = 0; χ^2/df = 1.21; p =.28; CFI = .993; RMSEA = .025.
*p < .05. ***p < .001.

loss frame generated more fear after the efficacy message than the gain frame ($\beta = -.29$, $p < .001$). Analyses of covariance confirm this finding: gain-framed message hope ($M = 3.70$, $SD = 1.25$) versus loss-framed message hope ($M = 2.83$, $SD = 1.22$), $F(1, 331) = 25.68$, $p < .001$, $\eta^2 = .07$; loss-frame message fear ($M = 2.51$, $SD = 1.03$) versus gain-frame message fear ($M = 1.93$, $SD = 0.94$), $F(1, 331) = 25.59$, $p < .001$, $\eta^2 = .07$. Thus, Hypotheses 1 and 2 were supported.

Mediating Role of Emotion

Hypothesis 3 predicted that emotional arousal would mediate the effects of efficacy information framing on persuasive outcomes. As shown in Figure 1, the influence of the gain- or loss-framed efficacy information was fully mediated by hope and fear. Exposure to the gain frame generated greater hope, which minimized negative message assessments and boosted supportive attitudes and, in turn, advocacy behavior. Further, exposure to the loss frame generated greater fear which, in turn, boosted advocacy behavior, though its association with more negative message assessments undermined its persuasive benefit. The relationships between exposure to message frame and attitudes or advocacy behavior were not significant. These findings support Hypothesis 3.

The role of negative message perceptions, though not predicted, is worth some additional attention. As shown in Figure 1, fear generated more negative message perceptions ($\beta = .13$, $p = .006$) and hope led to markedly less negative perceptions ($\beta = -.43$ $p < .001$). Given that negative message perceptions were a direct barrier to both supportive attitudes ($\beta = -.19$, $p < .001$) and advocacy behaviors ($\beta = -.15$, $p = .007$), these findings highlight a potentially important role of emotional response.

Emotion Sequencing, Framing, and Persuasion

Hypothesis 4 predicted that those exposed to the threat information initially would experience more hope in response to the solution-oriented efficacy message, regardless of how it is framed. In support of Hypothesis 4, those exposed to the threat-based message reported greater hope after exposure to the solutions-oriented efficacy message, regardless of how it was framed ($\beta = .12$, $p < .05$; see Figure 1). Given the value of hope in predicting advocacy behavior, there appears to be value in the threat-efficacy structure. Interestingly, exposure to threatening information initially reduced the amount of fear experienced in response to the solutions-oriented efficacy message ($\beta = -.28$, $p = .019$), offering further evidence that exposure to an emotional message can influence the degree of emotional response to a later one.

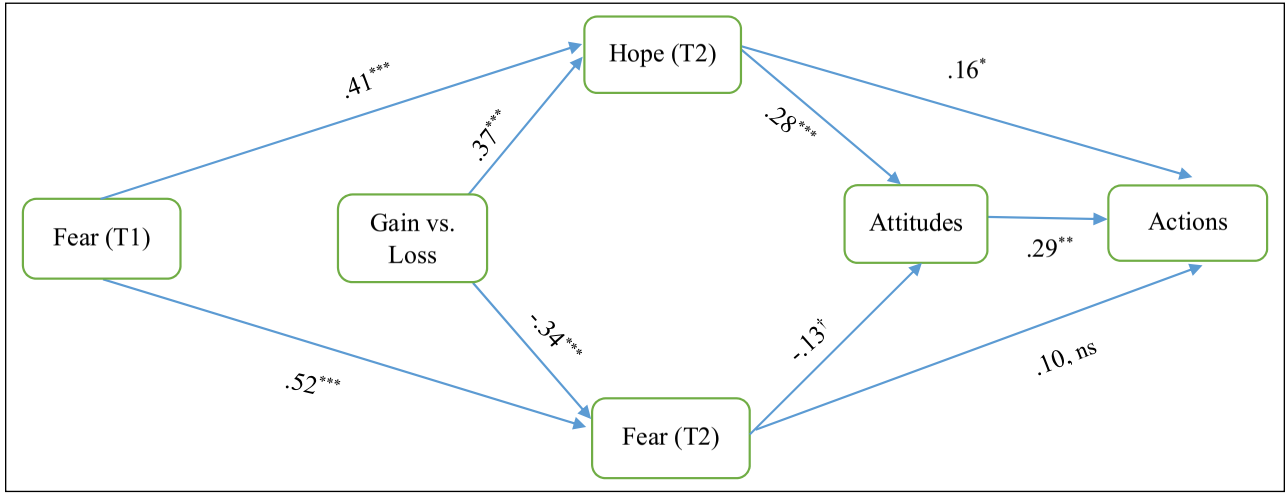

Figure 2. Modeling the effects of emotional sequencing on climate change attitudes and advocacy behaviors (threat message condition).

Note. All relationships control for ideology and negative message assessments. Model fit statistics reflect the model with significant paths only. Gain = 1; Loss = 0; $\chi^2/df = 1.56$; $p = .10$; CFI = .976; RMSEA = .057.

$^{\dagger}p < .10$. $^{*}p < .05$. $^{***}p < .001$.

It is critical to note at this point that Hypothesis 4 focuses on exposure to message content, rather than the emotional response to that content, as the predictor. Given the critical role of emotional response to differently framed messages on persuasive outcome, it is essential for a test of emotional flow that we consider the emotional response to the threat message and its subsequent effects.

Hypothesis 5 predicted that fear in response to a threatening message would result in greater hope in response to a gain-framed efficacy message, and, in turn, more favorable attitudes and advocacy behaviors than the emotional experience resulting from threat-loss frame message sequence. This hypothesis was tested based on only those who were exposed the threat-based message ($n = 171$). A path model was constructed similar to the initial model, but with experienced fear in response to the threat message as the primary variable of interest. Unlike the initial model, negative message assessment did not significantly relate to either attitude or advocacy behavior, and thus, those paths were dropped. The resulting model evidenced a good fit to the data, $\chi^2/df = 1.56$, $p = .10$, CFI = .976, RMSEA = .057 (see Figure 2).

Similar to the results based on the full data set and consistent with Hypotheses 1 to 3, the gain-framed efficacy message generated greater hope, and the loss-framed efficacy message generated great fear. Further, the influence of message framing was fully mediated by emotional response. In support of Hypothesis 5, greater fear in response to the threat-based message generated greater hope ($\beta = .41$, $p < .001$), which led to both more supportive attitudes ($\beta = .28$, $p = .007$) and more supportive advocacy behavior ($\beta = .16$, $p = .02$). The indirect effect of fear via hope on advocacy behavior was .099. Although greater fear in response to the threatening message led to increased fear in response to the solutions-oriented efficacy message, postefficacy message fear maintained a negative relationship with attitudes and a weak, nonsignificant relationship with advocacy behavior, resulting in an indirect effect of .032. Thus, the evidence suggests that when exposed to equivalent content, the emotional flow from fear-hope is more persuasive than the limited emotional flow experience of fear-fear. Further, when considering the influence of efficacy message framing on emotional response and, in turn, advocacy behavior, the total influence of the fear-hope emotional flow was .348, whereas the total effect of the fear-fear emotional flow was .122. Thus, it is clear that the emotional flow condition, highlighted by hope responses to efficacy information, was more effective at generating productive action than the fear dominant condition.

Discussion

In contrast to the substantial body of cognitively oriented research investigating the efficacy of message strategies promoting proenvironmental attitudes and behaviors, this research sought to advance our understanding of the role of emotions in classic climate change persuasion messages, with particular attention to the potential value of emotional sequencing. Results indicated that, as expected, efficacy information presented through a gain frame evoked more hope than when that same information was presented through a loss frame, and loss frames evoked more fear than gain frames. Also as expected, the effect of the gain-/loss-framed efficacy message was fully mediated by emotion. The resulting model indicated that the differently framed messages led to increases in both fear and hope, which, both directly and indirectly via message assessments, influenced both attitudes and advocacy behaviors. Further, more hope was felt in response to the efficacy message if it was prefaced by a threat message, rather than a control message. Importantly, this first test of emotional flow demonstrated that, as predicted, messages that evoked fear and then hope had the strongest positive influence on advocacy behavior compared with the message structure that lacked emotional flow.

In sum, these results support the significant influence of hope in the psychological processes linking threat and gain/loss efficacy framing to desired attitudinal and behavioral outcomes in climate change. Messages that evoked the most hope were associated with more supportive attitudes and advocacy. Further, hope both mediated the effects of the efficacy message and proved to be a key component of the threat-efficacy message structure. This integral and beneficial role of hope complements the existing theoretical and empirical evidence, indicating that hope predicts proenvironmental attitudes and action (e.g., Ojala, 2012; Roeser, 2012; Smith & Leiserowitz, 2014).

Moreover, these results highlight the insufficiencies of considering message exposure alone. The threat manipulation was not more persuasive than the control, and neither gain nor loss framing had a relative advantage. Importantly, this finding corroborates the growing sentiment of the field that considering individual, contextual, and psychological moderators (e.g., emotion, ideology, topic features, identity, social norms) are more effective lenses for parsing the intricacies of persuasion effects, compared with a focus on the direct effects of message features.

As mentioned earlier, in this first test of emotional flow, we found evidence that the intensity of fear experienced from reading the threatening message influenced the intensity of both fear and hope in response to reading the subsequent solution-oriented efficacy message. That is, excitation in response to the first message transferred to the second message and thus heightened

participants' emotional responses. Thus, in additional to its contribution to the emergent emotional flow literature, this study offers unique evidence that excitation transfer occurs and has significance for persuasive outcomes, which has significant practical and theoretical implications. In sum, these findings support the importance of studying the role of dynamic emotional responses in sequential persuasive message strategies, as well as in common message styles such as threat, efficacy, and gain/loss framing.

One potentially surprising finding worthy of explanation is the negative relationship between exposure to the threat message and fear response to the efficacy message. Essentially, the efficacy/solutions message evoked more fear when prefaced by the control message than the threat message. This finding is understandable when we consider that the efficacy message contained some reference to the dangers of climate control in explaining why the policy initiatives were being pursued. On its own, it is not surprising that it would evoke some fear, though certainly less than what those exposed to the threat-based message had already experienced. Importantly, though exposure to threatening information may have inhibited levels of fear evoked by the second message—and thus apparently reduced its effectiveness—the *fear* response to that threatening information *increased* fear in response to the efficacy message to nearly double the magnitude. Thus, the threat messages' direct influence on fear response to the efficacy message was likely more than offset by the influence of the fear experienced in response to the initial message itself.

As with all studies, the results of this experiment must be interpreted in light of its limitations. First, the undergraduate sample overwhelmingly believed that climate change is real. Thus, this audience was likely more open than the general population to our study's sustainability advocacy messages and suggested actions. Although it is possible that this skew in climate change attitudes is a partial cause of the results indicating the importance of hope in motivating action, it is more likely that given their different perspectives, skeptical audiences would have different emotional reactions to scientific evidence and policy proposals (e.g., anger rather than fear or hope.) As such, careful attention to how resistant audiences perceive message content is especially critical in message design for desired emotional response. In essence, fear and hope would likely lead to similar outcomes across a range of audiences, but what information generates those emotional experiences may differ vastly. This is the true message design challenge not only within this context but also in persuasive communication generally. A more challenging and generalizable test of the influence of emotional sequencing would be with a population that includes individuals who are more resistant to the policies described.

Second, given the incongruity of asking about a range of emotional responses to a very neutral, descriptive news article, we did not measure fear in response to the control message. Although we assessed emotionality, which as expected was quite low and serves as an adequate indicator that the manipulation was successful, we were unable to test how minimal emotional responses to a control message influenced later emotional experiences. Third, the efficacy messages focused on supporting policy initiatives rather than on changing individual behaviors. As such, our findings cannot generalize beyond this context. Finally, this study had a modest test of emotional flow, comparing one dynamic—fear-hope—with a more emotionally consistent message design—fear-fear. Future research would be well-served by comparing different patterns of emotional flow (e.g., fear-hope, fear-relief, sadness-hope, etc.) not only to continue to test and refine this newer theoretical lens but also to determine how to best design persuasive message in the realm of both environmental science and beyond.

Despite these limitations, this study provides valuable insight into the role of emotions—and the value of hope especially—in persuasive appeals that are common to climate change communication. Not only do these findings contribute to the growing literature on the mediating role of emotion in framing effects, but they also highlight the important function of emotional sequencing and excitation transfer in this process. In essence, not only can gain/loss framing be used to evoke hope and fear respectively, but also those emotions can be intensified, and productive outcomes enhanced, by prefacing efficacy information with emotionally evocative content. Future research would be well-served by pursuing the finer nuances of these relationships, such as manipulations of threat and efficacy levels, the longevity of attitudinal and behavioral responses, the effect of repeated message exposure as might occur in the context of prolonged campaigns, the types of efficacy information most likely to benefit from emotional motivations, and different patterns of emotional flow. For now, this research offers an interesting and useful extension to the climate change persuasion literature by highlighting not simply the mediating role of emotion on proenvironment attitudes and behaviors but the fundamental importance of emotional sequencing as well.

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