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How Hope and Doubt Affect Climate Change Mobilization

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The severe threats posed by anthropogenic climate change make hope and a sense of efficacy key ingredients in effective climate communication. Yet little is known about what makes individuals hopeful–or in contrast, doubtful–that humanity can reduce the problem, or how hope relates to activism. This study uses mixed-methods with two national surveys to (1) identify what makes people hopeful or doubtful that humanity will address the problem (Study 1, $N = 674$), and (2) whether hopeful and doubtful appraisals are related to activism or policy support (Study 2, $N = 1{,}310$). In Study 1, responses to open-ended questions reveal a lack of hope among the public. For those with hope, the most common reason relates to social phenomena–seeing others act or believing that collective awareness is rising ("constructive hope"). Hope for some, however, stems from the belief that God or nature will solve the problem without the need for human intervention (which we call "false hope"). The most prevalent doubts are low prioritization, greed, and intergroup conflict (i.e., the need for cooperation at various scales to successfully address the issue). We identified both "constructive" and "fatalistic" doubts. Constructive doubts are concerns that humanity won't address the problem effectively, while fatalistic doubts are beliefs that we can't address the problem even if we wanted to because it is in the hands of God or Mother Nature. In study 2, we used these emergent hope and doubt appraisals to develop survey measures. Regression analyses suggest that constructive hope and doubt predict increased policy support and political engagement, whereas false hope and fatalistic doubt predict the opposite. 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 recognition that humans are not doing enough may also be constructive and motivate political action. 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.

Keywords: climate change, hope, fear, doubt, activism, politics

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KEY FINDINGS

- Many Americans who accept that global warming is happening cannot express specific reasons to be hopeful that we can address the problem and find it easier to identify doubts.
- The most commonly stated reasons for feeling hopeful are personal actions and perceived changes in social awareness and norms; less common reasons include human nature, government, scientists, and God.
- Among those who accept that global warming is happening, the primary reasons for doubt that we can limit global warming are the belief that it's a low priority for most people, and greed. Other common doubts relate to politics, the need for international cooperation, the belief that it's already too late, and concern that the public is ignorant and/or being misled.
- Hope and doubt are both significant predictors of political behaviors (e.g., donating to an organization) and support for greenhouse gas mitigation policies (e.g., regulate carbon dioxide as a pollutant). Specifically, "constructive" forms of hope and doubt positively predict engagement, yet, "false" hope (e.g., wishful thinking) and "fatalistic" doubt (e.g., beliefs that there is nothing humans can do) appear to have negative effects on engagement.

KEY LESSONS

- A lack of hope may undermine an individual's response and collective efficacy, which are essential for motivating actions to solve the problem.
- Communicating that awareness is increasing, and highlighting efforts being made to address the problem (rather than progress already made, which can weaken motivation for some) may reinforce existing sources of hope among the public and support motivation to engage in climate issues. Hope, however, is not enough—action is essential.
- Hope is not always good and doubt is not always bad; the combination of constructive hope and doubt may actually be motivating, whereas false hope and fatalistic doubt may lead to avoidance, distancing, and inaction.

INTRODUCTION

Anthropogenic climate change poses serious risks to societies through its impacts on species, natural resources, economies, socio-political institutions, and structures, cultural traditions, and human health (Intergovernmental Panel on Climate Change (IPCC), 2018; USGCRP, 2018). To motivate action that would allow us to avoid the worst climate change damages, many communicators highlight impacts such as sea level rise and extreme weather that pose direct threats to the economy, human health and communities, national security, and more. The intention is to elicit public concern and promote protective actions by helping individuals understand that although climate change involves global-scale processes, it increases many risks to our own well-being and safety. Specifically, people need sufficient awareness of the seriousness of the risks to motivate action, but also sufficient efficacy in solving the problem (Witte, 1992). We assert that this sense of efficacy is dependent upon both hope that solutions exist and can be implemented, as well as doubt that the problem will resolve itself without action.

The academic literature addresses the advantages and disadvantages of eliciting emotional responses in the American public through climate change communications. In particular, many warn against fear appeals because they can trigger counter-productive responses like avoidance, denial, and reactance, when solutions are unknown, undesirable, or inaccessible (Folkman and Lazarus, 1990; Lazarus, 1999; Hastings et al., 2004). However, little research has examined the role of hope and doubt in the beliefs Americans hold about climate change, and how these appraisals might impact collective action to address the issue. We examine different types of hopeful and doubtful appraisals, and discuss how literature on the use of other emotion framing in climate change communications may inform the potential for hope and doubt to engage the public.

Hope

Past research in health and psychology shows that hope serves to motivate effort, goal achievement, and adaptive responses in the face of adversity (Stotland, 1969; Farran et al., 1995; Lazarus, 1999; Snyder, 2000; Fritze et al., 2008). Our understanding of the role that hope plays in climate change communication and pro-environmental action (e.g., activism), however, is much more limited. An explicit examination of the emotion of hope regarding climate change revealed that individuals who feel more hope express stronger support for mitigation policies (Smith and Leiserowitz, 2014). Other studies have examined efficacy in relation to hope, for example by testing the effects of optimistic messages on political participation (Chadwick, 2010; Feldman and Hart, 2016; Hornsey and Fielding, 2016), but found mixed results. Several studies have examined the effects of hope about climate change on behavioral intentions (Ojala, 2007, 2008, 2012b; O'Neill and Nicholson-Cole, 2009; van Zomeren et al., 2010; Myers et al., 2012; Hart and Feldman, 2014). Most—but not all—of these studies find positive relationships.

One reason for the disparate findings may be the type of appraisal individuals are making about climate change that lead them to feel hopeful. "Realistic hope" (Hickey, 1986) or "constructive hope" (Ojala, 2012a) include appraisals that one has the ability to overcome obstacles and can lead to constructive problem solving. Constructive hope may be associated with beliefs that humans are capable of changing their behavior or that elected leaders will enact climate change policies. Alternatively, "false hope" or "magic hope" (Schachtel, 1959) is considered a coping mechanism that refers to the hope that things will improve on their own accord. False hope can be likened to wishful thinking that climate change is not serious, or that someone or something else will fix the problem; such hope is likely unproductive or counter-productive to public activism on climate issues. Previous research suggests that constructive hope appraisals (i.e., remaining hopeful about the human capacity to address climate change) are positively related to pro-environmental behavior, whereas having a sense of "false hope"

(i.e., remaining hopeful that climate change will work itself out) is negatively related to behavior (Ojala, 2012a).

Doubt

Doubt plays a significant role in the public discourse about climate change, but it is often considered primarily in relation to the vocal few who dismiss the existence of the problem itself. Yet, many who believe global warming is happening and who want to address it may also have doubts about whether effective change is possible. Although doubt could diminish feelings of hope, it may also work alongside hope to encourage climate change activism. Capstick and Pidgeon (2014) identify this difference and distinguish two categories of doubts about climate change, including doubts about its existence as a human-driven problem (i.e., skepticism), and doubts about the effectiveness of potential responses (i.e., response efficacy).

However, doubts about efficacy may also be divided further by their impact on engagement. Like hope, "constructive doubt" may include the appraisal that something can be done, combined with concern that all the necessary steps may not come together. In the context of climate change, constructive doubt may manifest as the worry that people may not act quickly or at a scale large enough to avoid the major impacts of climate change. Specifically, some constructive doubtful appraisals that reflect recognition of human inaction and skepticism about whether people are willing to change might be associated with personal responsibility and motivation to take individual action. For example, in a nationally representative survey of Americans, 89% were found to express some degree of doubt or pessimism about people's willingness to reduce global warming in spite of many reporting personal willingness to change their household conservation behavior (Leiserowitz et al., 2009). On the other hand, "fatalistic doubt" includes the belief that nothing can be done, and that there is no point in trying to address the issue. Such fatalistic doubt might demotivate engagement on climate change because it indicates a complete lack of efficacy. As such, previous research finds that those with fatalistic attitudes are less supportive of climate change policy (Leiserowitz, 2006).

The Impact of Hope and Doubt Appraisals on Collective Action

The extended parallel process model (EPPM; Witte, 1992) provides a framework for effective risk messages that can support the development of public and political will. The EPPM emphasizes the importance of keeping the severity and personal vulnerability of a threat central to the message, while coupling it with information about solutions in a way that engenders both response efficacy (i.e., a belief that there is a remedy or solution to the problem) and self-efficacy (i.e., feeling capable of taking the needed action); this allows people to focus on controlling the danger instead of controlling only their fearful emotions (Bandura, 1982, 1997).

In the context of climate change, high self-efficacy is positively correlated with intentions to reduce one's carbon footprint (Milfont, 2012; Hornsey et al., 2015). Efficacy constructs are also central to Protection Motivation Theory (PMT, Rogers, 1983), which proposes that the motivation to protect oneself depends on a threat appraisal or risk assessment (i.e., the perceived severity and likelihood of a threat), and a coping appraisal, which includes both response efficacy and self-efficacy (Floyd et al., 2000; Hornsey et al., 2015). Given the broad scope and diffuse nature of the climate change threat, proxy efficacy–the perception that others who are acting on our behalf (i.e., government representatives) will do so successfully–is vital (Bostrom et al., 2018).

The EPPM expands on the PMT by emphasizing that the levels of both fear and efficacy must be high in order to promote the intended effects (i.e., "danger control"). If fear is high but efficacy low, "fear control" may result. However, if fear is too low, there may be no effect at all. Thus, when a serious threat is communicated and coupled with information that increases response efficacy, behavioral engagement to mitigate climate change can also increase (Bockarjova and Steg, 2014; Keshavarz and Karami, 2016).

While the EPPM and PMT models emphasize the importance of fear and efficacy in risk communication, they do not directly address the roles of hope and doubt. Efficacy and hope are related, as they are both future- and goal-oriented, but hope is considered a discrete emotion (Lazarus, 1991), and is distinct from the cognitive beliefs associated with efficacy (Magaletta and Oliver, 1999). In addition, hope is evoked by appraisals of a future outcome that are consistent with one's goals, possible but not certain, personally important, and imagined as leading to a better future (Chadwick, 2015). Doubt is similarly linked with appraisals of future outcomes and their probabilities of occurrence, but with the effect of decreasing efficacy.

However, given previous research on the need for both positive and negative responses to evoke efficacy and engage collective action on climate change, it is possible that both hope and doubt are necessary components of Americans' appraisals about climate change. Specifically, constructive doubt about whether we are taking the necessary actions may motivate those who realize that failure becomes the most likely option if everyone just stands by without acting. In addition, constructive hope and doubt that climate change can be mitigated may be helpful in countering apathy, denial, or free-riding. Previous qualitative research on individuals participating in a climate march suggest that both hope and doubt may promote engagement (Grecni et al., 2014). Through dozens of participant interviews during the march, three types of hopeful attitudes were identified in response to the question "What gives you hope that global warming can be reduced?" One common response was from individuals who were not hopeful (i.e., they were doubtful) but who were acting nonetheless out of a sense of duty and responsibility. A second common response was from those who said they were not hopeful until they arrived at the march and saw so many other people feeling the same way they did (i.e., doubt was transformed into hope). A final group indicated a clear sense of being hopeful, often referring to specific actions and policies being enacted at local, state, and/or national and international levels. The interplay of constructive hope and doubt is evident in these

responses, and points to the need for further exploration of both constructs.

The purpose of the present research was to understand what evokes hopes and doubts about the public's ability to take meaningful action on climate change. Here we systematically investigate the beliefs that make Americans hopeful and doubtful about climate change using data from two nationally-representative surveys conducted during the Spring and Fall of 2013. Study 1 explores the qualitative contents of Americans' hopes and doubts about reducing anthropogenic climate change. Study 2 examines how holding particular hopeful and doubtful beliefs about why we can or cannot address global warming is related to political behaviors and policy preferences. We also analyze these relationships in the context of efficacy to test the unique relationships between hope/doubt and political engagement. Our research approach follows several strategies from Slater and Gleason's (2012). First, we address fundamental conceptual issues about hope and doubt, including redefining and re-operationalizing a key concept (Strategy 1a). We also use content analysis of responses to questions about hope and doubt to identify potential messages that may resonate with the public and warrant subsequent research (Strategy 8a). Taken together, we employ content analysis, construct elucidation, measurement development, and predictive tests to improve our understanding of how hope and doubt relate to political engagement.

STUDY 1

Study 1 addresses the question "What makes Americans hopeful or doubtful that we can reduce anthropogenic climate change?" We collected open-ended responses from our survey respondents about what made them feel hopeful or doubtful that climate change can be reduced. In particular, we were interested in the types of appraisals about climate change that constituted (1) constructive hope, (2) false hope, (3) constructive doubt, and (4) fatalistic doubt. Although skepticism about the existence of climate change is a form of doubt, this form of skepticism automatically negates the need for action, while we were interested in the appraisals that may influence or hinder collective action on climate change. Thus, only respondents who acknowledged that global warming exists were asked the questions.

Study 1 Method

Participants and Recruitment

Data were gathered from 1,045 American adults who completed an online survey[1] weighted to be nationally representative (part of the *Climate Change in the American Mind* project[2] in April, 2013. All participants were aged 18 and older, and the demographics were generally representative of the adult US population (**Table 1**). Of the 1,045 initial survey participants, 63% (674) believed that global warming was happening and were asked the questions about hope and doubt (the order of the questions was randomized). Of those 674 participants, 34% (n = 223) did not respond to the hope item, and 29% (n = 189) did not respond to the doubt item. This left an overall response rate of 42% (n = 435) to the hope item, and 45% (n = 469) overall response rate to the doubt item.

Design and Measures

Two single, open-ended items were used to measure hope and doubt in Study 1 ("*What, if anything, makes you [hopeful/doubtful] that global warming can be reduced?*"). The items were part of a larger survey that included questions on the reality and causes of climate change, risk perceptions, and

TABLE 1 | Study 1 and 2 demographics.

	Study 1 (N = 674)	Study 2 (N = 1,310)	2013 U.S. census data
Average age (SD)	47.4 (15.8)	47.0 (17.1)	
Sex			
Male	333 (48.7%)	642 (47.1%)	48.6%
Female	341 (51.3%)	668 (52.9%)	51.4%
Race/ethnicity			
Non-hispanic white	511 (66.5%)	1010 (66.8%)	63.3%
Hispanic/Latino	55 (13%)	114 (13.7%)	16.6%
Non-hispanic black/African American	62 (11.8%)	104 (11.7%)	12.2%
Non-hispanic biracial/multiracial	27 (1.1%)	48 (1.3%)	2.1%
Non-hispanic other	19 (7.6%)	34 (6.5%)	5.9%
Income			
Less than $25,000	107 (17.8%)	235 (19.3%)	23.4%
$25,000–$34,999	66 (10.8%)	127 (10.6%)	10.3%
$35,000–$49,999	93 (14.8%)	160 (11.1%)	13.6%
$50,000–$74,999	140 (19.7%)	268 (18.4%)	17.9%
$75,000–$99,999	94 (12.2%)	180 (15.4%)	12.2%
$100,000 or more	174 (24.7%)	340 (25.1%)	22.6%
Highest level of education			
Less than high school	37 (9%)	88 (10.9%)	13.9%
High school	193 (29.3%)	426 (30.1%)	28.1%
Some college	187 (29.1%)	374 (28%)	29%
Bachelor's or higher	257 (32.6%)	422 (31%)	28.8%

Study 1 and 2 frequencies are unweighted and percentages are weighted. U.S. Census data were derived from the 2013 American Community Survey. Education percentages reflect only those 25 years and older.

[1]Participants were randomly sampled from a large, online panel recruited by GfK using random digit dialing and address-based sampling. Panel members who did not have Internet access were provided access in order to participate in the panel. The panel is nationally representative, and following data collection, the final sample was weighted to adjust for any deviations from national benchmarks on all major demographics.

[2]Climate Change in the American Mind (CCAM) is an ongoing collaboration between the Yale Program on Climate Change Communication and the GMU Center for Climate Change Communication. The collaboration entails bi-annual nationally representative surveys on Americans' climate-relevant beliefs, attitudes and behaviors, which are used for both polling reports and social research. See http://climatecommunication.yale.edu/ and https://www.climatechangecommunication.org/).

policy preferences. The responses were coded using a bottom-up, grounded theory approach to identify emergent themes or categories of appraisals that arose naturally from the participants. Responses to the open-ended hope/doubt questions that were very similar to one another were first grouped independently by two of the co-authors into narrow categories (e.g., "I am not hopeful" was grouped with "Nothing"), and then a broader set of about one dozen categories each for hopeful and doubtful responses. Through discussion, a single scheme was developed where responses were assigned to up to two categories. Two authors then assigned all responses to categories using this scheme but an inter-coder reliability test of 40 random responses by a third co-author was unacceptably low ($\alpha < 0.7$). The categories were subsequently revised through discussion to clarify the broadest categories, such as "human nature" and "effort/action," which occasionally captured similar ideas. Categories were also considered mutually exclusive, so when a response could fit into multiple categories the first idea mentioned was used to capture appraisals that were most salient and cognitively accessible to respondents. An inter-coder reliability test showed that this final scheme, which contained 14 categories, was robust for both the hope items ($\alpha = 0.93$) and the doubt items ($\alpha = 0.99$).

Study 1 Results

Hope

Initial analysis of the responses to the question "*What, if anything, makes you hopeful that global warming can be reduced?*" resulted in 10 categories of hopeful responses as follows (from largest to smallest): (1) Not hopeful (17%); (2) Effort/Action (16%); (3) Awareness/Information (15%); (4) Other (11%); (5) Science/Technology (10%); (6) Human nature (9%); (7) Nature/God (9%); (8) Don't know (6%); (9) Government/Corporations (6%); and (10) Feeling the effects (6%). These 10 categories include three combined groups ("Children/Future generations" went into "Other," "Science," and "Technology," and "Government," and "Corporations" were combined) which ensured that each had at least 5% of the valid responses (**Table 2**). Some gender differences are apparent in hopes and doubts that we can reduce global warming (**Supplementary Table 1**). For example, female respondents were more likely than males to say that "Awareness/Information" or "Effort/Action" inspired hope, whereas males were more likely to have hope rooted in "Human nature" or "Science/Technology." Liberals were more likely than conservatives to say that "Awareness/Information" gave them hope or that people would need to "Feel the effects," whereas conservatives were more likely to say "Nature/God" inspired hope, or that they don't know or have no hope that we can reduce global warming.

Doubt

Initial analysis of the valid open-ended responses resulted in 10 types of doubtful responses: (1) Low priority (25%); (2) Greed/Money (18%); (3) Nature/God (10%); (4) Politics/Government (10%); (5) Other (7%); (6) No doubt (7%); (7) Don't know (7%); (8) Lack of international cooperation (6%); (9) Too late (6%); and (10) Lack of knowledge/Misinformation (5%). Several categories were combined due to similarities in the responses and to ensure that each group had at least 5% of the valid responses: "Little care or concern" and "Change is difficult" were combined into "Low priority," "Corporate greed/Money" was combined with "High costs/Greed," and "Government/Politics" was combined with "Corruption (Money in politics)" (**Table 3**). Male respondents were more likely than females to cite "International cooperation" as a cause of doubts that we can reduce global warming, while females were more likely to cite "Misinformation" (**Supplementary Table 2**). Liberals were more likely than conservatives to offer doubts related to "Greed," "Politics/Gov't," and "Misinformation" while conservatives were more likely to reference "Nature/God" or say "Don't know," it's "Too late," or it is a "Low priority."

Study 1 Discussion

The survey responses indicate that, for many people, reasons to be hopeful that we can address climate change are not obvious (**Table 1**). The most common response among those who answered the question about hope was "Not hopeful" (17%), especially among conservatives. Furthermore, 6% of people said they don't know what makes them hopeful. This lack of hopeful beliefs is striking, especially considering that respondents who do not accept that the problem exists (and thus can be expected to say they are not hopeful about solving it) were not included in the sample. When participants did offer a specific hope, the results were diverse, but most commonly emphasized beliefs about people. Liberals were more likely to cite "Awareness/Information" rather than "Effort/Action" as a source of hope, whereas conservatives and moderates were more likely to cite "Effort/Action" rather than "Awareness/Information," which suggests that emphasizing concrete actions that can be taken and building efficacy may be particularly important for promoting hope among moderates and conservatives. References to external forces such as God, the resilience of nature, or technology were much lower than those with social associations. The top two categories that referenced specific hopes (33% combined) were Effort/Action, and Awareness/Information–both of which included concrete, experiential ideas about the social dimensions of problem solving, such as behavioral changes surrounding energy use, education, and communication efforts, or social and political organizing.

Another common category that focused specifically on people was "Human nature" (9%) (e.g., faith in people, in human ingenuity and innovation). Although the "Other" category included some references to people as well (e.g., future generations), this group also included incoherent responses. Thus, the "Effort/Action," "Awareness/Information," and "Human nature" categories (42%) all represent hopes focused on individuals and groups working together (excluding corporations and governments). In contrast, hopes about government and institutions, science and technology, or reactionary motivation (e.g., responding only after the damage is more evident) were less common–about 6% each. Fewer (11%) expressed hope that the problem will be solved due to factors other than individual or collective action (e.g., Nature or God).

TABLE 2 | Open-ended responses about what is making Americans hopeful about climate change.

Response category (%) & operational definition	Examples of verbatim open-ended responses
Not hopeful (17%)–succinct, clearly expressed lack of hope.	"Nothing," "Not hopeful"
Effort/Action (16%)–references to individuals or groups making efforts and doing more (often visibly) to solve the problem, including observations of changing behaviors.	"Grassroots and group efforts"; "People are trying more"; "Everyone doing a small part"
Awareness/Information (15%)–a broad category focusing primarily on cognition, e.g., rising awareness, information, consciousness, education, realization. Excluded mentions of specific efforts/actions.	"People seem to be getting more informed"; "The number of people who think it's happening increases each year"
Other (11%)–all responses that did not clearly fit an existing category.	"The alternative is unthinkable"; "My kids and grandkids"; "Children of our future"; "By reducing the depletion of the ozone layer and not chemical spraying by the government…"
Science/Technology (10%)–references to science, scientists, scientific knowledge or opinions, consensus, overwhelming evidence, disentangling cause-and-effect, and technological developments, renewable energy, consumer products, innovations that increase efficiency and reduce waste.	"Electric cars"; "Technology will most likely be the answer. Heavy investments in RD"; "Increased viability of alternative energy sources"; "Scientists… maybe they can come up with ideas"
Human nature (9%)–abstract category for references to all humans, to people joining together, or to characteristics and qualities of people as good, caring, cooperative, feeling responsible, or wanting to succeed, persist, and survive.	"People"; "Conscientious, compassionate and motivated human spirit"; "Faith in mankind"
Nature/God (6%)–hope because the problem is beyond human control and that nature or God will take care of it, or that natural cycles, Mother Nature, or the supernatural will rectify the problem.	"Jehovah's kingdom"; "Prayer"; "The planet is only doing what it has been doing for thousands of years. We might have some impact but not a lot"
Don't know (6%)–explicit expressions of lack of knowledge or opinions.	"Don't know"
Gov't/Corporations (6%)–responses about government, laws, regulations, politicians, political parties, or how governmental entities are acting or should act, and references to companies, corporate responsibility, sustainable development and growth, industry, the private sector, costs of doing business, manufacturing, and factories.	"President Obama"; "New government policies and regulations"; "US should be the leader in battling the global warming"; "Private companies leading the effort"
Feeling the effects (6%)–responses about impacts motivating people, the need to feel fear and pain, to be personally affected or to incur costs before being willing to change, references to extreme weather or to declining or threatened natural resources such as water and food.	"Natural disasters"; "Extreme weather," "Sudden die-offs"; "Superstorms"; "Fear and pain brought on by actuality"

Overall, the more common emphasis on hope about people emphasizes our fundamentally social nature (van der Linden et al., 2015), and suggests that information describing individuals working to address the problem may resonate with many people and amplify hope. This is not to say that personal responsibility is not important—other research indicates that attributions of personal responsibility in relation to climate change (i.e., that the individual is responsible for climate change mitigation) may motivate systematic processing of information (Rickard et al., 2014), which has implications for behavior change. There is also risk, however, insofar as hope that others are learning and acting can diffuse responsibility and lower engagement, such as having a sense of "false hope" or unrealistic optimism that others (including technology or a higher power) will solve climate change Ojala, 2012a; see Snyder et al., 2002 for a review of false hope).

Doubts included perceptions about the low personal relevance and importance of the issue to others, barriers to action such as politics and money, religion, and experiences relating to weather and climate (**Table 2**). The most common doubtful responses related to a lack of concern, care, or prioritizing of climate change among others (25%). The lack of concern and prioritization identified by many respondents is consistent with the perceived distance of climate change (Weber, 2006) and with the low priority assigned to the issue more generally when people are asked to rank it against other current issues like healthcare, jobs, or terrorism (Leiserowitz et al., 2014). The greater importance that respondents placed on such social rather than physical limitations (e.g., believing that it is too late to slow the warming given the lags in the system) is worth emphasizing as it points to the central importance of social norms and collective efficacy in generating motivation for addressing global warming.

Another important set of doubts (18%) related to competing priorities, primarily surrounding money, and including references to greed. Perceived intergroup conflict, whether in the US (10%) or internationally (6%), and the fact that some impacts are already "locked in" because of the inertia of the climate system (6%) were also common sources of doubt. Misinformation or a lack of awareness among the public about the problem are also recognized as significant barriers to progress on climate change that limit hope for some (5%). About 5% of responses cited outcomes beyond human control. Relatively few individuals who replied (7%) said they don't know what makes them doubtful about reducing global warming.

Overall, Study 1 provides insights into the types and frequency of hopeful and doubtful associations that Americans have with global warming, which may have implications for political engagement on the issue. Results also help to pinpoint

TABLE 3 | Open-ended responses about what is making Americans doubtful about climate change.

Response category (%)	Examples of verbatim open-ended responses
Lack of concern/Low priority (25%)–references to human traits such as carelessness, laziness, apathy, complacency, stubbornness; recognition that change is difficult, good intentions may exist but other more pressing concerns have higher priority.	"People just don't want to change"; "That nobody really cares"; "Unwilling to change"; "Too many other issues we are facing have greater priority"
Greed/Money (18%)–references to individual greed and selfishness or corporate drive for profits over environment and public good, problems with capitalism, lack of care, and concern about others, environment, or resources due to prioritization of personal or private gain.	"Big money doesn't care"; "Consumers greed for convenience"; "People can't afford the increased cost of making changes"; "financial backing for new technology"
Nature/God (10%)–references to natural weather patterns, Mother Nature, cycles, God being in control, biblical prophesies, or destiny.	"Man can't control Mother Nature"; "It truly is not in our hands"; "It's a natural process. It's happened for billions of years"; "I believe in the bible and it says things are going to get worse"
Politics/Government (10%)–responses about elected officials, politicians, Democracy, Congress, government denial, or unwillingness to act.	"Political gridlock"; "Because I don't believe the government will do enough to make a difference"; "Congress of fools"; "Politicians not believing the impact of Global Warming"
Other (7%)–all responses that did not clearly fit an existing category.	"We live a world thats messed up"; "over population"; "only if we don't take an active role"; "There is a large dependence on fossil fuel powered transportation. It will be hard to find away around that"
No doubt (7%)–expressions that no doubt exists.	"Nothing. We have to change our attitudes"; "Never too late"; "I'm not doughtful"
Don't Know (7%)–clear expressions of lack of knowledge or opinions.	"Don't know"; "not sure"; "have no idea"
Lack of international cooperation (6%)–responses that identify concerns surrounding other countries, particularly China and India, also developing countries, global governments, or the need for international cooperation among multiple countries.	"Getting other countries to agree on a plan"; "China, India and other largely population countries have to participate in cutting emissions"; "Apathy in developing countries"; "The rapid growth of warming industries in China and Africa"
Too late (6%)–expressions of doubt that there is still time for remedies or that the problem can be solved at all, references to catastrophic impacts that have already taken place, or that forces underway are unstoppable.	"Events that caused it have already happened"; "We have ignored the issue for too long–it's too late"
Lack of knowledge/Misinformation (5%)–responses about people's ignorance, lack of knowledge about the problem or its consequences, about denial, lack of awareness or lack of acceptance of the problem.	"The amount of people ignorant or in denial of the problem"; "The general public is stupid"; "We are not sure of the prime causes, nor whether we can take proper steps to reduce the harm"

some common motivating or demotivating beliefs regarding climate change among Americans, and hint at potential avenues for hopeful messaging. A limitation of Study 1, however, is that it reflects hopes and doubts in a dynamic political environment, which has changed substantially since the survey was administered. Nonetheless, the content analysis of responses provides insights, such as the social nature of hope and doubt, and the commonness of false hope. Study 2 grew directly out of analyses from Study 1, so again focuses only on individuals who believe global warming is happening. In Study 2, the open-ended questions were used to construct closed-ended questions to allow modeling. Thus, Study 2 is a more quantitative analysis that examines hopeful and doubtful appraisals based on the open-ended (unprompted) questions in Study 1. Study 2 also assesses the strength of these appraisals in predicting political engagement with climate change.

STUDY 2

The purpose of Study 2 was to further examine Americans' hopes and doubts about climate change identified in Study 1 through analyses of their effects on political engagement. Study 1 revealed Americans' open-ended perceptions, which may be held more strongly than simple responses of agreement or disagreement to close-ended prompts. Operationalizing the results of Study 1 in close-ended questions, however, allows us to assess the hopeful and doubtful appraisals of climate change and the relationship of these appraisals to political engagement. We expected to find positive (negative) relationships between hopeful (doubtful) appraisals and both policy support and political behavioral intentions; however, it is also plausible that there are different types of hopeful and doubtful appraisals (as we found in Study 1) that differentially predict engagement. To examine these questions, we developed measures of hope and doubt based on the open-ended results from Study 1, and assessed the relative strength of appraisal indices created from the hope and doubt measures in predicting political behavioral intentions and policy preferences. Further, to elucidate the moderation or boundary conditions of relationships (following Slater and Gleason's, 2012, Strategy 4.1), we also explored interactions between hope and doubt on engagement.

Study 2 Method

Participants and Recruitment

Data were gathered from 1,657 American adults who completed a nationally-representative survey (part of the *Climate Change in the American Mind* project) in December, 2013[3]. Sampling

[3]For a different project unrelated to the study reported here, an experiment was embedded in the December, 2013 survey to test the effects of the term "global

and weighting replicated procedures described in Study 1. Participant demographics were closely representative of the adult US population (**Table 1**).

As in Study 1, our sample was limited to Americans who believe global warming is happening, at least to some extent. Of the 1,657 initial survey respondents, 198 did not receive the hope and doubt items (about 12%) because they said they were "extremely" or "very sure" global warming is not happening. Of the remaining respondents, 149 were excluded due to excessive missing data (about 10%; see **Supplementary Material** for procedures) resulting in a final sample size of 1,310 respondents.

Because some cases were still missing data on some of the questions, we used the hot deck imputation method (Myers, 2011) to impute values (see **Supplementary Material** for details). The percentage of cases that had at least one item imputed in any one of the scales (hope, doubt, political engagement, and policy preferences) ranged from 4.2 to 9.8%.

There were some small differences between the retained sample and the cases that were excluded due to missing data (see **Supplementary Material**). Although respondents who were retained had relatively similar levels of efficacy, policy support, and political behavioral intentions compared to excluded cases, dropped respondents scored lower on constructive hope and doubt, and scored higher on false hope and fatalistic doubt. These results indicate there may be some bias in our final sample. In addition to excluding respondents who are certain global warming is not happening, our final set of respondents may not be representative of the general public and, accordingly, results should be interpreted with some degree of caution.

Design and Measures

All questionnaires were self-administered by respondents in a web-based environment. The survey took an average of 29 min to complete. Closed-ended items (based on the themes that emerged from Study 1) included 11 statements that reflect reasons why people are hopeful about climate change, and 10 statements that reflect reasons why people are discouraged or doubtful about climate change. The question stem for the hopeful and doubtful reasons was identical and read "Please indicate how strongly you agree or disagree with each of the following statements" with response options as follows: "Strongly disagree"; "Somewhat disagree"; "Somewhat agree"; "Strongly agree"; and a "Don't Know" option (coded as the midpoint of the 5-point scale).

Question indices were constructed using Principal Components Analysis (PCA) on hopeful beliefs, doubtful beliefs, political behavioral intentions, and policy preferences (see **Supplementary Material** for analyses and items). Based on results of the PCAs and reliability analyses, two subscales emerged within each of the hope and doubt measures, and behavioral intentions and policy preferences each loaded onto single components as expected. Thus, the following scales were used (see **Table 4** for a correlation matrix as well as scale means and reliabilities).

Hopeful because people–individually and collectively–can reduce climate change (constructive hope)

The extent of agree or disagreement with eight statements indicated a form of constructive hope or remaining optimistic that people will solve the problem (e.g., "Humanity will rise to the occasion and reduce global warming/climate change" and "The nations of the world will cooperate to reduce global warming/climate change").

Hopeful because something external–other than people–will fix the problem (false hope)

Three items indicated false hope reflecting either a kind of wishful thinking, or faith that a higher power will solve the problem, such as "We don't need to worry about global warming/climate change because nature will take care of it" and "We don't need to worry about global warming/climate change because science and technology will solve it."

Doubtful because of skepticism of human action (constructive doubt)

Four statements measured a form of doubt that we consider constructive to motivating engagement, that is, skepticism about whether people will act on climate change (e.g., "Most people don't know enough about what they can do to reduce global warming/climate change," and "Most people are unwilling to take individual action to reduce global warming/climate change").

Doubtful because nothing can be done (fatalistic doubt)

Four items measured a form of doubt based on fatalism or believing that there is nothing people can do to solve the problem including "Humans can't affect global warming/climate change because you can't fight Mother Nature" and "It's already too late to do anything about global warming/climate change."

Political behavioral intentions

Respondents answered the question "How likely would you be to do each of the following things if a person you like and respect asked you to?" by rating 14 statements (e.g., "Write letters, email, or phone government officials about global warming" and "Sign a petition about global warming, either online or in person") from "Definitely would not" to "Definitely would" ("Don't know" responses were coded as the midpoint of the 5-point scale similar to hope and doubt items). Those who answered "Don't know" were excluded from the scale. Responses were averaged to indicate intentions to take political action climate change.

Policy support

Respondents were also asked "How much do you support or oppose the following policies?" to indicate their support or opposition to six climate change policies (e.g., "Regulate carbon dioxide (the primary greenhouse gas) as a pollutant" and

warming" vs. "climate change." Half of the sample (n = 830) was randomly assigned to a questionnaire using the term "global warming" and the other half (n = 827) was randomly assigned to a questionnaire with identical questions, except using the term "climate change." There were statistically significant differences between conditions on only three of the 21 hope and doubt items. Further, the mean composites of scales used in the present analyses were not significantly different between the conditions suggesting that, overall, responses were relatively similar between conditions. Given these results, and that both terms are widely used in public discourse, we combined the two datasets and treated the questions as equivalent.

TABLE 4 | Study 2 correlation matrix (N = 1,310).

	Mean	SD	1	2	3	4	5	6	7
1. Constructive hope	3.14	0.62	(0.73)						
2. False hope	2.17	1.00	−0.01	(0.76)					
3. Constructive doubt	3.59	0.76	0.14***	−0.20***	(0.65)				
4. Fatalistic doubt	2.69	0.84	−0.02	−0.64***	0.08**	(0.67)			
5. Response efficacy	2.59	0.90	0.16***	−0.30***	0.04	−0.37***	–		
6. Policy support	2.85	0.66	0.22***	−0.44***	0.20***	−0.40***	0.26***	(0.86)	
7. Behavioral intentions	2.75	0.79	0.19***	−0.43***	0.14***	−0.43***	0.31***	0.69***	(0.96)

$^{***}p < 0.001$; $^{**}p < 0.01$. Cronbach's alpha coefficients are in the diagonal.

"Provide tax rebates for people who purchase energy-efficient vehicles or solar panels") on a 4-point scale from 1 ("Strongly oppose") to 4 ("Strongly support").

Response efficacy

Respondents indicated how much they agree or disagree with the statement "The actions of a single individual won't make any difference in global warming/climate change" on a 4-point scale from 1 ("Strongly disagree") to 4 ("Strongly agree"). Responses to this item were reverse-scored so that higher scores suggest greater response efficacy than lower scores.

Study 2 Results

Correlation Analyses

Correlations between measures of hope and doubt suggested surprisingly small relationships between constructive hope, false hope, and constructive doubt (see **Table 4**), except there was a strong positive relationship between having false hope and fatalistic doubt ($r = 0.64$, $p < 0.001$). This suggests that people who exhibit wishful thinking that something other than people will solve climate problems (e.g., technology, a higher power) also tend to doubt that there is anything that can be done because it is out of people's hands.

As expected, constructive hope is positively related to response efficacy, climate change policy support, and intentions to engage politically on the issue (rs range from 0.16 to 0.22, $p < 0.001$). Conversely, false hope and fatalistic doubt are both negatively related to efficacy, policy support, and behavioral intentions (rs range from −0.30 to −0.44, $p < 0.001$). Constructive doubt is positively associated with policy support ($r = 0.20$, $p < 0.001$) and political behavioral intentions ($r = 0.14$, $p < 0.001$) suggesting that having some doubt may be related to pro-climate attitudes and intentions to take political action.

Hierarchical Multiple Regression Analyses

As shown in **Table 5**, hierarchical multiple regression analyses tested the relative strength of hope and doubt in predicting engagement on climate change (Model 1). Analyses also tested the predictive strength of hope and doubt compared to response efficacy—a correlate to remaining (constructively) hopeful about global warming, policy support, and behavioral intentions. Response efficacy was entered in on the second step of regression models (Model 2). Further, as an exploratory test, we also examined the extent to which hope and doubt interact with one another in predicting policy support and behavioral intentions (Model 3).

Regression analyses suggest that constructive hope, false hope, and fatalistic doubt are the strongest predictors across models: people who remain hopeful about human action tend to support climate change policy and say they are willing to take political action, whereas those who have false hope that others (e.g., higher powers) will solve climate change tend to have less policy support and weaker behavioral intentions. People who have fatalistic doubt or believe that there is nothing that can be done to solve problems also tend to have less policy support and weaker intentions to take political action. Constructive doubt also predicts greater policy support and stronger behavioral intentions, but is lower in predictive strength than the other hope and doubt predictors. The predictive strength of hope and doubt remain similar even when controlling for response efficacy (Model 2). Compared with the hope and doubt predictors, response efficacy explained little additional variance in policy support ($\Delta R^2 = 0.004$) and behavioral intentions ($\Delta R^2 = 0.014$) when entered into the model. Conversely, when reversing the order of entry, the hope and doubt predictors explained a sizeable amount of additional variance in policy support ($\Delta R^2 = 0.216$) and intentions ($\Delta R^2 = 0.180$) compared to when it was just response efficacy in the model (respectively, $R^2 = 0.07$ and $R^2 = 0.099$).

Interaction tests of constructive hope and doubt (Model 3 in **Table 5**) indicate a significant effect on behavioral intentions, but not policy support. As shown in **Figure 1**, there is a stronger positive relationship between constructive hope and intentions to take political action on climate change for those who have higher (constructive) doubt than those who have less doubt. In other words, having hope that humans will reduce climate change with some degree of skepticism and recognition that humans are not doing enough may be constructive and motivate political action. The results from the regression models shown in **Table 5** were similar when controlling for gender, age, education, and political ideology (see **Supplementary Material**).

DISCUSSION

Research on hope related to engagement with societal issues is nascent. Studies from health perspectives (e.g., "palliative"

TABLE 5 | Hope and doubt predicting policy support and political behavioral intentions ($N = 1,310$).

Predictor	Policy support			Political behavioral intentions		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Constructive hope	0.20***	0.19***	0.19***	0.17***	0.15***	0.15***
False hope	−0.25***	−0.24***	−0.24***	−0.23***	−0.21***	−0.22***
Constructive doubt	0.14***	0.14***	0.15***	0.09***	0.09***	0.11***
Fatalistic doubt	−0.25***	−0.23***	−0.23***	−0.29***	−0.25***	−0.25***
Response efficacy		0.07**	0.07**		0.13***	0.14***
Const. Hope*Const. Doubt			0.04			0.12***
F	127.39***	103.99***	87.30***	116.41***	100.06***	89.46***
R^2	0.282	0.286	0.288	0.264	0.278	0.293
ΔR^2		0.004	0.002		0.014	0.014

*$p < 0.001$; **$p < 0.01$. Standardized Beta coefficients are presented. Predictors used to create interaction terms in Model 3 were mean centered.*

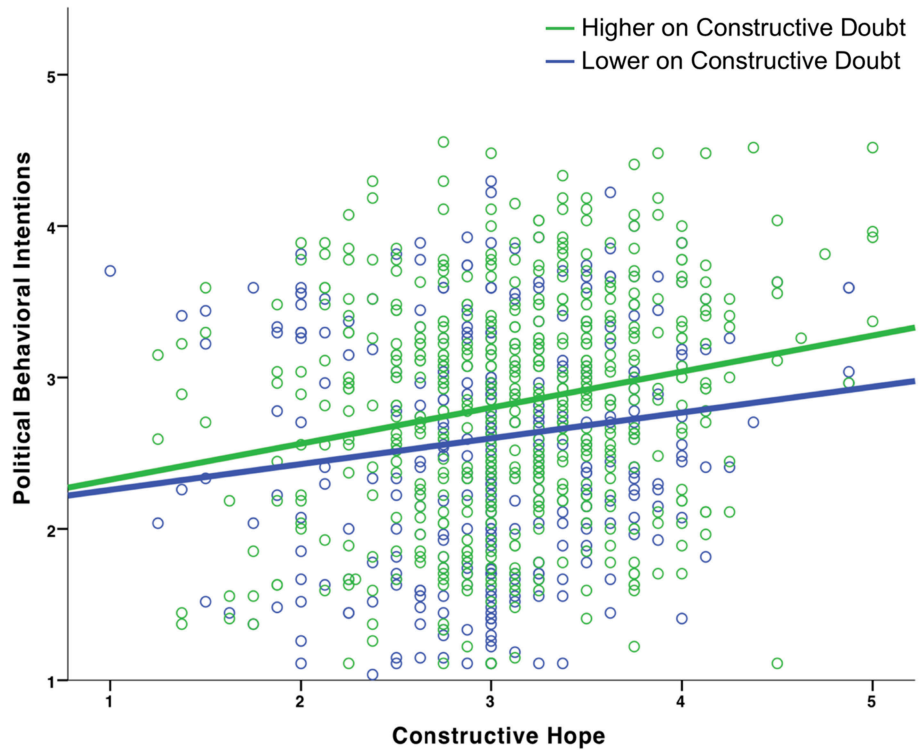

FIGURE 1 | Interaction effects of constructive hope and doubt on political behavioral intentions. Higher constructive doubt (green) refers to respondents scoring a four or more on the doubt measure ($n = 535$) and lower constructive doubt (blue) refers to those scoring a three or below ($n = 409$).

hope in cancer patients) or psychological perspectives have often examined hope in relation to character traits like optimism or to goal-setting (Stotland, 1969; Scheier and Carver, 1985; Snyder, 2000). Scholars have only recently begun to focus on how hope may motivate engagement with broad issues like climate change (Myers et al., 2012; Smith and Leiserowitz, 2014), and how to best construct messages that effectively promote hope in climate change (Chadwick, 2015). Even less work, if any, examines doubt. As a step toward understanding the role of hope and doubt in building public will, we sought to elucidate the constructs and explore how they relate to climate change engagement.

We found many different types of hopeful and doubtful appraisals about climate change. Yet, nearly one quarter (23%) of participants were either not hopeful or could not recall any reasons to be hopeful. Among those who *were* hopeful, the most common reasons included seeing others act or learning about other's efforts to reduce the problem. Hope was primarily derived from individual and collective actions, and from positive observations of behaviors rather than from negative pressures to respond (such as extreme weather events) or from developments in science and technology, although these do provide hope for some. While many individuals were inspired by seeing

others engage in pro-environmental behaviors, such feelings alone are insufficient to reduce the impacts of climate change; taking personal responsibility for changing behaviors–through cooperation, participation, and organization of social, political, and cultural efforts–is ultimately required.

Content analysis of the hopeful appraisals also revealed a coherent component we label "false hope" after Snyder et al. (2002). False hope indicated a belief that there is no need to worry about global warming because some external force is going to address it. Although the belief that God or nature will solve global warming could also be considered faith, we prefer the label false hope because the negative relationship between these appraisals and policy support or political engagement suggests that these ideas are being used to rationalize inaction rather than to promote constructive faith-based support. False hope is not always recognized in studies of hope, and sometimes it is considered in the broader context of (unrealistic) optimism. People consistently exhibit an optimism bias, expecting positive events to happen more often to oneself than to others (e.g., Weinstein, 1980). Extreme forms of optimism can be harmful because they can lead to decreased risk perceptions and poor decision-making (Lovallo and Kahneman, 2003). Extreme forms of optimism may also negatively impact pro-environmental behavior, as suggested by our study. It is important for communication researchers to understand the distinction between constructive and unrealistic forms of optimism and hope. In communication research, optimistic messages have been hypothesized to either motivate climate change mitigation behaviors by stimulating hope and efficacy (Chadwick, 2015) or to promote complacency by reducing risk perceptions and distress (Hornsey and Fielding, 2016).

The sources of doubt among participants related in large part to perceptions that human nature is flawed–that people are greedy, ignorant, inherently apathetic, or have difficulty enacting change. Concerns about corporations and politicians were also major sources of doubt. As with hope, there are two distinct components of doubt, which reflect different types of efficacy. Constructive doubt referenced ideas linked primarily to collective-efficacy (e.g., people are unwilling to take action), whereas fatalistic doubts related primarily to response-efficacy (e.g., can't fight Mother Nature).

The different hopeful and doubtful appraisals are uniquely related to political engagement. The constructive forms of hope were consistently associated with increased policy support and political engagement on climate change, which is consistent with previous research on climate change and hope as a discrete emotion (Smith and Leiserowitz, 2014). Previous research examining hope in the context of climate change, however, did not distinguish constructive from false hope. We also found that constructive hope exerts an influence on engagement that is distinct from response efficacy, which suggests that hope (and doubt) may have an independent effect on action that is not accounted for in the EPPM or PMT. In contrast to constructive hope and doubt, false hope and fatalistic doubt had negative relationships with both policy preferences and political behaviors. We hope this study will motivate new research exploring the intersection of hope and optimism especially at the intersection of climate and health given the enormous health co-benefits that could be achieved by reducing carbon emissions (Petrovic et al., 2014).

Communication guidelines for practitioners in the climate change domain have emphasized the importance of conveying hope to counter the emotional reactions that can accompany the recognition of the seriousness and scope of the threat. Our study supports these efforts and suggest that communications might focus on inspiring constructive hope specifically, and not just efficacy. There is also a need to focus efforts on dampening false hope and fatalistic doubt. The positive relationship between constructive doubt and political engagement, however, is an interesting finding that may point to the value of recognizing the difficulties inherent in addressing the problem. The interaction between constructive hope and doubt was predictive of willingness to engage in political behavior. This finding implies that recognizing that we could reduce climate change, but that people are not doing enough and thus we may fail, is highly motivating.

There are several limitations of this study. First, the data were collected during the Obama presidency at a time when climate change was being taken seriously by the administration. The administration was developing a range of policy solutions to reduce greenhouse gas emissions and was cooperating with other countries to pursue strategies for limiting the threat of global warming. In contrast, the Trump administration has refuted or minimized the threat of climate change, arguing variously that it is a hoax, or not serious, or easily fixed, or is already too advanced to be addressed. The dramatic reversal in the administration's attitudes toward the problem and the corresponding effects on policy progress and efforts to address the issue very likely influenced public attitudes toward the problem. Thus, the relative distribution of hopeful and doubtful appraisals has potentially changed over time, but the broad categories of appraisals and their relationships to engagement are probably more stable.

Second, we did not aim to validate measures of hope and doubt. Study 1 conducted a content analysis to elucidate the constructs in an exploratory fashion and Study 2 developed measures from these appraisals to assess their relationships with engagement. This is likely why we found low reliabilities for the doubt construct in particular. In addition, the construction of the typology of hope in Study 1 grouped some categories that include potentially interesting distinctions, such as those between individual and collective, systemic, or structural approaches, as well as between public and private efforts. While these distinctions were recognized in Study 1, their expression did not register as a unique factor in the analysis of the closed-ended questions that comprised Study 2. Using results from the present work, future research could seek to develop and validate measures of hope and doubt.

Third, we consider response-efficacy but not self or collective efficacy (the latter of which is more difficult to measure) although these are also key components of engagement with climate change. We also do not examine other forms of efficacy (i.e., self- and collective-efficacy) that also warrant investigation in relation to hope and doubt about global warming. Relatedly, our study reflects only results from those who believed that global

warming is happening. While hope is, by definition, only relevant to those who perceive a threat in the first place, doubt could be examined in future work among those skeptical that global warming is happening. Doubts about the distribution of benefits of proposed solutions to climate change (in light of the costs and their distributions), are clearly a major motivating force for some. "Solution aversion," for example, exists in the US for some conservatives who perceive that most policies designed to address the issue are incompatible with their ideological values, and thus deny the existence of the problem in the first place (Campbell and Kay, 2014). Last year in France, a new carbon tax prompted violent opposition because the costs were perceived as too high and poorly distributed relative to the perceived benefits. In this case, the problem is accepted and the solution may have been effective at reducing emissions if implemented, but doubts about its fairness and the value of benefits resulted in a rollback of the tax.

Future research could address some of these limitations as this study is only broadly scratching the surface of what underlies Americans hopes and doubts about this complex issue, and how they relate to different forms of efficacy and engagement. Future work could look, for example, at which sources most strongly influence hope (e.g., "people are starting to come together to challenge the fossil fuel industry") and doubt (e.g., negative appraisals of corporations vs. politicians). In our model, the predictive strength of response efficacy decreases with hope and doubt in the model, so it may be that feelings of efficacy precede hope and doubt, which promote action, but it could also be that the reverse is true–that hope and doubt appraisals lead to feelings of efficacy. Alternatively, and perhaps most likely, these relationships are bidirectional.

Implications and Conclusions

Public will refers to a "social system's shared recognition of a particular problem and resolve to address the situation in a particular way through sustained collective action" (Raile et al., 2014, p. 105). Our research has implications for the roles that hope and doubt play in building public will and fostering engagement with climate change. First, despite increasing emphasis on hope in the climate communications subfield, our results indicate that there seems to be a "hope gap" among the public. Not only is there a lack of hope, there is also a lack of information and ideas about what may promote hope, especially among political moderates. This hope gap is especially relevant in the face of increasing climate impacts and insufficient national and international actions thus far to address the root causes of the problem.

Second, it is important to distinguish between hope that is associated with political engagement and support for policies that address climate change (constructive hope) vs. hope that distances the issue and is linked with disengagement (false hope). Doubt can either reinforce hope in a constructive manner (i.e., via recognition of a problem), or in a negative manner (fatalistic doubt), which seems to hinder or be used to rationalize disengagement. In their constructive forms, doubt relates to recognizing that there is a problem—people are not acting—while hope helps to raise people up to address the situation; these findings are evidenced by the interaction between hope and doubt when predicting political intentions.

Messages about the realistic solutions that exist for reducing climate change impacts can directly address the need for hope, while information about the known causes of climate change (Ranney and Clark, 2016) can address misconceptions that produce false hope. Likewise, messages that address common doubts about climate change may reinforce constructive hope, while information that addresses response-efficacy may help limit fatalistic doubt (e.g., the feeling that it is already too late).

Perceptions of changing social norms and mobilization are common among those individuals who are hopeful and are strongly related to pro-environmental behavior. Hopeful messages can be informed by these ideas that emerged unprompted in the themes of Study 1 as they are likely to continue to resonate with the public. Such stories would focus on seeing others taking action, information about changing social norms and growing awareness among the public (Pew Research Center, 2018), information about the co-benefits of reducing global warming (e.g., clean air, economic growth, technological advancement), and stories about local to global initiatives that are succeeding. These ideas are already associated with hope in the public mind. Coupling these kinds of stories with news about the threat are likely to be more effective than if solutions are presented separately (Witte, 1992). Moreover, solutions are often presented with a conflict frame, rather than with an innovation or mobilization frame (Hart and Feldman, 2014). Our research is consistent with the positive impact of an innovation or mobilization frame insofar as these ideas are already common among hopeful appraisals made by the public.

Hope and efficacy can also be promoted jointly by demonstrating the value and power of interpersonal communication about climate change, particularly when it is face-to-face (Clark and Brennan, 1991). Encouraging communication about both the physical and social dimensions of climate can help empower participants and promote action. While the "information deficit" model is now widely recognized as flawed, obtaining accurate information about cause and effect for many problems remains a key element of learning. Experimental evidence shows that acquiring new information about the physical mechanisms behind the greenhouse effect can transform attitudes about global warming (Ranney and Clark, 2016). Understanding the strength of the scientific consensus on climate (i.e., 97% of climate scientists are convinced by the abundant evidence that global warming is happening and human-caused) is linked to greater support for climate policies, and yet is largely underestimated (van der Linden et al., 2015). Social influence approaches are also shown to be effective at promoting behavior change, such as leveraging community leaders to promote action in communities and perceiving social norms supportive of actions (e.g., Abrahamse and Steg, 2013). Conveying the widespread support for action on climate in the US, even among conservatives and Republicans (Leiserowitz et al., 2018), can also help to reduce pluralistic ignorance (Geiger and Swim, 2016). Structural, institutional,

and policy factors are also central in supporting individual and collective action.

The appraisals absent from or limited in our content analysis of hope also yield insights that might inform efforts to build public will. Limited appraisals invoking scientific and technological advances, for example, suggest that these may be less engaging than messages relating to movement building or other social efforts. Technology and scientific advances explicitly being used by family and friends, or in the context of social organizing, however, may be more salient. Such "peer effects" have been documented through the diffusion of solar photovoltaic panels in communities, for example, where the adoption of the new technology by homeowners in the area increases the probability of additional installations (Bollinger and Gillingham, 2012). Other research has demonstrated the importance of addressing perceived social norms in the diffusion of environmentally friendly behaviors more broadly and highlights the effectiveness of these frames in increasing pro-environmental behaviors (Cialdini, 2007). Highlighting pro-environmental actions also directly counters common doubts about climate change, such as that humans are innately apathetic and greedy, or that change is too difficult or costly.

In general, the findings across two studies suggest a hope gap among the American public, despite the myriad efforts underway to address climate change at individual to international scales. Our data suggest that Americans by-and-large are not hearing about these efforts. Yet, those who do feel hopeful are supported by hopeful beliefs, are more likely to engage in pro-environmental behaviors and to support policy. In addition, we find some evidence that there is such thing as a "healthy dose of doubt"–that understanding the scope and seriousness of the threat can also serve to support public will and reinforce engagement with climate change.

ETHICS STATEMENT

This research utilizes data from the Climate Change in the American Mind surveys, conducted by the Yale Program on Climate Change Communication and the George Mason University Center for Climate Change Communication. The Human Subjects Committee of Yale University deemed this study as exempt under 45 CFR 46.101(b) (2): Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior, unless the information is obtained and recorded in such a manner that the human subjects can be identified, directly, or through identifiers linked to the subjects; and any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation. All subjects gave electronic informed consent to complete the online survey.

AUTHOR CONTRIBUTIONS

JM, AL, EM, and CR-R designed the instruments and collected the data. JM, MB, BB, and JR-R performed data analysis. All authors contributed to writing and editing of the manuscript.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fcomm.2019.00020/full#supplementary-material

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