

POWERFUL FEELINGS: EXTENDING THE EXTENDED PARALLEL
PROCESSING MODEL TO COLLECTIVE ACTION ON CLIMATE CHANGE

by

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A Dissertation
Submitted to the
Graduate Faculty
of
George Mason University
in Partial Fulfillment of
The Requirements for the Degree
of
Doctor of Philosophy
Communication

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Date: July 27, 2015

Summer Semester 2015
George Mason University
Fairfax, VA

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action on climate change**

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Doctor of Philosophy at George Mason University

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DEDICATION

This is dedicated to my father, David Stenhouse, who did a lot to make sure I got into this business.

Thanks Dad.

ACKNOWLEDGEMENTS

I owe thanks to a large number of people for their help and support throughout the production of this dissertation. First among these people is my supervisor, Ed Maibach. I owe Ed a huge debt of gratitude, not only for the enormous amount of support in having this dissertation come to fruition, but also for inspiring me to come to America in the first place. Ed doing such great, practically-oriented work at 4C, as well as being friendly and encouraging when some random New Zealander sent him an email, were primary factors in my deciding to apply to George Mason and study climate change. Over the course of my dissertation, and over the entirety of my time spent at GMU, Ed has been extremely generous with his time and wisdom, and has provided countless opportunities that would not have been available otherwise. He has taught me a massive amount, not just about communication theory and methods, but things like the norms of publishing, how to write grants, and how to be a good academic colleague. I have already promised him my first-born son, but I'm not sure even that will be enough to repay what I owe him. Ed, thank you for being so generous, kind, and inspiring, from the moment you first replied to my email on July 27, 2010. I look forward to many more conversations and collaborations as we both move "onward and upward".

The other members of my committee have been an immense help to me as well. Xiaoquan Zhao has been my oracle of structural equation modeling, and methods generally, from my induction into the PhD program to the present. Despite his extremely busy schedule, he generously gave patient and wise responses to my many panicked emails and phone calls. Emily Vraga provided important early guidance on the political efficacy literature, as well as fantastic advice on which variables to study, how to set deadlines to keep the dissertation moving, and additional guidance on the related topic of the job search process. Teresa Myers was another methods oracle, and provided much wise advice on structural equation modeling, other methods matters, and how the EPPM might relate to collective threats. It was upon her suggestion that I added one of the efficacy variables ("EOP") to my model. Teresa deserves special thanks for having the generosity to be on my committee despite this kind of service not being part of her job description. Also deserving of this special thanks is Dave Karpf of George Washington University. Dave, as both a former Sierra Club organizer and scholar of political communication, gave me unique guidance on how to make the messages ecologically valid, and generally on how to do work that is useful for practitioners.

Tim Gibson, besides being a model of kindness and encouragement, selflessly put in a large amount of work on making sure the dissertation research and my degree could keep happening at a reasonable number of credits. The dissertation would also have spontaneously combusted at various points if not for the tireless efforts of the Communication department administrative staff – Brittany Sanders, Maria Carabelli, Lisa Sevilla and Jessica Hall. Many others in the department also put in substantial effort with administrative or academic sides of the dissertation, especially Anne Nicotera and Kevin Wright.

Much thanks is also owed to my fellow denizens of the 4C compound. Karen Akerlof generously provided wise feedback, access to a great sunlit office, and a wonderful demonstration of what a good (and complete!) dissertation looks like. John Kotcher had some supreme quality tips on theories, methods, acronyms, and music that goes whomp whomp whomp, and listened to my wailings when things went wrong. Jagadish Thaker also provided great comments and a clear example of what a good dissertation looks like. Justin Rolfe-Redding was a key participant and sharp discussant in early, beery planning meetings for dissertation ideas. Jenell Walsh-Thomas deserves special thanks for schooling me on the details of setting up Mturk studies and not panicking. Moe Ahmed provided invaluable support in making sure my studies, employment, and presentations continued in their proper fashion, despite my many attempts to mess things up. Connie Roser-Renouf was a remotely situated but no less supportive 4C denizen whose paper on climate activism served as a very helpful model. Ian Stanford, who also counts as a remotely situated 4C denizen in my mind, provided welcome advice and encouragement on the mechanics of dissertating.

I owe special thanks to Susanna Priest, for extremely enlightening teaching and conversations generally, but also for being the first person to steer me towards studying social movements. There's no way this dissertation could have happened without her generosity and mentorship. I'm looking forward to many more fruitful collaborations (though hopefully no more dissertations).

Non-academic thanks are due to several lovely humans. Frank Bonoff and Judy Solish were wonderful hosts in Thousand Oaks, CA, during much of the final stretch of the writing. My friends in DC, NZ, and other locations provided moral support in the form of numerous reminders that things will be "fine", as well as (more importantly) fun time away from the keyboard.

Naturally, thanks are also due to my mother, Lesley Phillips, from whom I inherited approximately 50% of my academic karate moves. She provided an inordinate amount of support, and an entirely appropriate amount of concerned inquiries about whether I was actually going to finish the thing. Mum, detailing what I owe you would fill another 300 pages. I'm so grateful for everything.

I thanked Dad in the dedication, but what the heck, thanks again Dad for the other 50% of my karate moves, among other things.

Finally, I want to thank a woman who is my ally in the vanquishing of breakfasts, my causal identification role model, and also my fiancée, Nicole Bonoff. Thank you for putting up with me, supporting me, pushing me, and drinking with me. Nothing fills me with happiness and hope more than the idea of many more years with you (and Cooper).

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ABSTRACT

POWERFUL FEELINGS: EXTENDING THE EXTENDED PARALLEL PROCESSING MODEL TO COLLECTIVE ACTION ON CLIMATE CHANGE

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George Mason University, 2015

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The extended parallel processing model (EPPM) is a theory of how individuals' perceptions of a threat, combined with their perceptions of their own ability to effectively remove the threat, influence their behavioral response (Witte, 1992). Two scholars (Hart & Feldman, 2014) have suggested extending the EPPM to explain responses to the collective threat of climate change. This extension consists of the addition of two efficacy perceptions into the model: perceived likelihood of political action influencing politicians' actions, and perceived effectiveness of policy in reducing the threat of climate change. In this dissertation, I use survey and experimental data to extend Hart & Feldman's work by examining two additional forms of efficacy perceptions -- participative efficacy and expectations of others' participation. I also control for a third construct, collective identification with climate advocates. I hypothesized that each of the efficacy beliefs, and perceived threat, would be independently and positively associated

with collective action. My results showed that four of the five forms of efficacy beliefs, perceived threat, and collective identification with climate advocates, were each positively associated with at least one measure of political action. Expectation that others would participate in political action was not associated with taking action.. The constructs with the strongest associations with political action were perceived efficacy of government climate policy, and collective identification. The failure of most experimental messages to have significant effects on efficacy and threat perceptions, combined with problems in the way that several variables were measured, mean that strong conclusions about the causal effects of each variable cannot be made. These results do, however, suggest that models of collective action will be strengthened by including a more diverse range of efficacy beliefs. Other implications for theory and practice are discussed.

1 INTRODUCTION

The ability to communicate about threats, in order to persuade others to take action to avoid them, is one of the most important forms of communication among social animals, and has been important in helping both humans and nonhumans adapt successfully to their changing environments (Hilton, 2008). The fear appeals literature in communication focuses on the ways in which different types of threat-inducing messages can affect psychological and behavioral processes (Witte, 1992). Several theories of fear appeals have suggested that people need to both feel threatened and perceive themselves to be capable of responding effectively in order for them to act to control the threat.

One of the most prominent of these theories is the Extended Parallel Process Model (EPPM; Witte, 1992). This theory builds on previous theories of fear appeals. It makes specific predictions about how cognitions of threat and capability to respond combine to determine whether a person will respond adaptively, by acting to control the source of the threat, or maladaptively, by acting to control their own feelings of threat without averting the threat itself.

A second important use of communication is to elicit collective action from a group of people. From ancient peace treaties to calls to war, humans have used communication to convince others to join collective efforts. Since at least the 1960s, social scientific work has examined the specific individual-level psychological variables

that might be responsible for mediating the relationship between calls to action and participation in collective action (Klandermans, 1984). Several of these variables have been found to be similar to variables in the EPPM, including several different types of belief relating to the perceived likelihood of collective action being successful (van Zomeren, Postmes, & Spears, 2008; van Zomeren, Saguy, & Schellhaas, 2013).

Recently, it has been suggested that the EPPM might be productively applied to societal-level threats (Hart & Feldman, 2014; Roberto, Goodall, Witte, & Heath, 2009). While studies of psychological motivations for collective action have examined multiple efficacy beliefs, few have looked at them together, or have theorized about or checked whether threat and efficacy interact. No studies to my knowledge have done both these things. The EPPM has most often been applied to the contexts of threats to individual people's health, in which the threat is a threat to that individual specifically, and their individual response can generally be effective in resolving the threat (Popova, 2012; Roberto et al., 2009).

This dissertation tests whether the EPPM can be further extended to apply to political action on a global collective action problem, climate change. This is an issue where the threat is perceived as focused on wider society, rather than specific individuals. In addition, Direct individual actions to address climate change are insufficient to resolve the threat; instead, collective action is required in order to encourage the kinds of legislative and industrial shifts that can reduce carbon emissions on a wide scale (Ockwell, Whitmarsh, & O'Neill, 2009). This poses a potential problem for applying the EPPM, as the cognitions and behaviors involved are qualitatively different from the

typical EPPM context of health threats to individuals. Hart & Feldman (2014) have proposed an extension to the EPPM designed to make the theory better fit the context of collective threats and indirect, collective political action. In this dissertation, I propose a modified version of Hart & Feldman's extended EPPM and test the accuracy of this theoretical model.

Understanding more about how perceptions of threat combine with various efficacy perceptions in influencing action on global issues like climate change is important. For many large-scale issues now and in the future – such as pandemics, terrorism, nuclear weapons, and near-earth objects – understanding how our perceptions of threat and efficacy shape our political actions (or inaction) may be crucial in understanding and positively influencing the societal response. Testing how a successful theory like the EPPM extends to this practically important new area is the present study's primary contribution.

Studying the impact of threat and efficacy messaging on climate change advocacy is also important from a practical perspective. Firstly, many groups are already assuming that threat and efficacy are powerful motivations for climate action, and are using them in their communication (Nordhaus & Shellenberger, 2014; Romm, 2014). However, there have still been few empirical studies conducted in this area to confirm that both threat and efficacy are effective. The present author's own experience has shown at least one group – the Sierra Club – found guidance based on empirical EPPM literature to be useful (Han & Stenhouse, 2014). However, this advice was not based on multiple studies relating specifically to climate action, which ideally should be the case.

2 LITERATURE REVIEW

The overall plan for this section is as follows. First, I give a brief overview of the threat of climate change, and why collective action will be required to achieve an effective policy solution, setting up the context for which the extended EPPM is designed to explain behavior. Next, I give a history and explication of the EPPM, along with its component concepts, and work already conducted in extending the EPPM to collective threats. Then, I discuss relevant areas of theory looking at how various forms of efficacy influence political behavior, showing how scholars within the disciplines most focused on collective political action have dealt with variables and frameworks similar to the EPPM. I then discuss Bandura's social cognitive theory (1986), to illustrate how concepts from that theory map onto concepts from the EPPM and collective action literatures, and how areas of difference can be understood. After that, I explain how this literature shows that the EPPM is likely to be productively expanded to the area of political action, or more specifically, for the area of political action in response to collective threats, and what adjustments need to be made to our conceptual and operational understanding of the EPPM in order for the extension to work. Next, I explicate each of the proposed variables in the EPPM in greater depth, explaining them clearly and showing where they overlap with and diverge from related or similar concepts. Finally, I present my hypotheses and research questions.

2.1 Background context – climate change, clean energy and collective action

A rapid, global energy transition is necessary to prevent the worst effects of climate change (Lester & Hart, 2011). In order to keep global temperature increases within relatively safe limits, all countries must shift towards being powered mostly by clean energy sources (Stern, 2007). Keeping temperature increases low will also require that the transition happens within fewer decades than is commonly required for large-scale societal energy transitions (Smil, 2010; Stern, 2007). Strong government-imposed policies will be one of several necessary factors in making this happen in the US (Lester & Hart, 2011; Stern, 2007). However, the political situation in the US is not conducive to large-scale government action at this stage. While many in government wish for stronger action, the almost total opposition from the Republican Party, as well as a few Democrat legislators from fossil fuel-dependent states, makes near-term action unlikely (Skocpol, 2013). In order to convince them to act, well-organized advocacy organizations will need to raise public awareness and support for an energy transition, apply political pressure strategically, and send a credible signal to politicians that they will be supported in terms of votes or monetary contributions if they take strong action on climate change (Burstein & Linton, 2002; Lohmann, 1993; Ockwell et al., 2009; Skocpol, 2013).

Because organized collective action is required to send this signal to lawmakers, understanding what influences collective action on issues of renewable energy and climate change is of critical importance. However, few studies have yet been conducted that test empirically for causal influences on activism around climate or clean energy (the exceptions include Albertson & Busby, 2015; Bolsen, Leeper, & Shapiro, 2014; Feldman,

Hart, Leiserowitz, Maibach, & Roser-Renouf, 2015; Roser-Renouf, Maibach, Leiserowitz, & Zhao, 2014; van Zomeren, Spears, & Leach, 2010). There is an increasingly large literature of empirical social science related to climate change, renewable energy and related issues. However, much of this is either correlational in nature, or does not look at factors influencing political action. This means not much strong evidence is currently available about what kind of interventions might influence political action for climate and energy issues.

A pair of scholars (Hart & Feldman, 2014) have suggested adapting a well-known theory of fear appeals, the Extended Parallel Process Model, as a useful framework for understanding how communication might influence political action on climate through affecting perceptions of efficacy and threat. In the next section the EPPM and its extension to the issue of collective climate action are explained.

2.2 The Extended Parallel Process Model (EPPM)

The Extended Parallel Process Model was constructed to extend previous models of how people responded to fear-inducing messages (Witte, 1992). These were the fear-as-acquired-drive model (Hovland, Janis, & Kelley, 1953); the parallel process model (Leventhal, 1970); and protection motivation theory (Rogers, Cacioppo, & Petty, 1983). Each of these models described part of the way in which messages encouraging fear and efficacy interacted to promote action. The fear-as-acquired-drive model suggested that people could learn to fear particular things through communication, and were motivated to reduce fear by solving the problem or taking other actions to reduce their fear (Hovland et al., 1953). The parallel process model (Leventhal, 1970) explored these two

potential processes – solving the problem, or merely reducing fear – hence the name “parallel process model”. Protection motivation theory (PMT; Maddux & Rogers, 1983; Rogers et al., 1983) specified the cognitive antecedents necessary for eliciting behavior designed to control the threat: severity (magnitude of possible harm), susceptibility (likelihood of harm), self-efficacy (confidence in ability to respond) and response efficacy (confidence the response would be effective).

The EPPM (Witte, 1992) combines the structures of the PPM and PMT, and builds on what Witte (1992) saw as a weakness of the PMT: its sole focus on danger control responses (acting to remove the source of the threat), and ignorance of fear control responses (acting to minimize one’s own fear via actions such as message rejection). As well as being one necessary step for achieving danger control resources, as hypothesized by PMT, Witte (1992) conceived of fear as driving the intensity of *all* responses, whether danger control or fear control responses. In other words, if an individual became fearful of a stimulus, and did not come to feel able to control the danger, they would respond maladaptively by trying to reduce the symptom (fear) rather than the cause (the danger). The level of fear felt at this point would determine the intensity of this response, something the PMT did not specify (Maddux & Rogers, 1983). For example, if the response was to deny that the threat is likely to occur, low levels of fear would lead to mild denial, whereas high levels of fear would lead to strong denials of the threat.

Essentially, the EPPM states that when people are faced with a threatening message or situation, they first evaluate the level of danger to themselves. This danger is

made up of two components: severity (again, how harmful the feared event would be) and susceptibility (perceived likelihood of actually experiencing the threat). If the level of felt danger is not high enough, message recipients are not motivated to appraise their level of efficacy; they cease processing of the message, and their attitudes and behavior are not affected. However, if the fear they feel in response to the message is high enough, they then proceed to the next step of evaluating their ability to respond. Their ability to respond is made up of two components: self-efficacy (ability to enact behaviors designed to reduce the threat) and response efficacy (perceived likelihood of same behaviors actually reducing the threat). If these two cognitive perceptions are high enough to outweigh the perception of threat, the individual will respond via danger control behaviors. If instead threat outweighs efficacy, the individual will respond via maladaptive fear control behaviors, with the intensity of the maladaptive behavior positively correlated with the intensity of the perceived threat. Stating that danger control occurs when efficacy is “high enough” to outweigh threat may seem vague; however as noted by Popova (2012), a more precise conceptual definition of this threshold has not been made, either by Witte herself or by others.

Many studies have since been conducted that draw on the EPPM (Peters, Ruiter, & Kok, 2013; Witte & Allen, 2000). One scholar (Roberto, 2013) noted that in September 2012, Witte’s original 1992 article had been cited over 800 times according to Google Scholar; that number now (in June 2015) stands at almost 1400 times. Several of the studies conducted found support for the EPPM’s theoretical propositions. For example, one study provided results in line with the idea that if recipients of a message

do not perceive enough threat in response, their efficacy beliefs will have no effect on their behavior (Wong & Cappella, 2009). In this study, respondents who received a low-threat message were equally likely to seek help for quitting smoking, regardless of the efficacy they felt in response to the message. However, low- and high-efficacy respondents *did* differ in their likelihood of seeking help if they received a high-threat message. Another study found support for the idea that more threat leads to more maladaptive behavior for those low in efficacy. Rippetoe and Rogers (1987) found that women who received a message about the threat of breast cancer were more likely to respond maladaptively, with increased levels of fatalistic thinking, when efficacy was manipulated to be low as opposed to high. While the threat messages led to adaptive behavioral intentions (performing a breast self-exam) when efficacy was high, it led to maladaptive behavior when efficacy was low. A third study also found that efficacy and threat interacted to determine positive responses to the threat (Duval & Mulilis, 1999). The effect of threat on stated intention to prepare for an earthquake was greater for those who also received messages boosting their perceptions of efficacy for preparing for earthquakes.

While the EPPM has thus inspired many studies conducted using its framework, and received some support, other scholars have noted that various elements of the EPPM have either not been tested at all, have not been tested many times, or have received only mixed support. One clear indication of this is provided by a meta-analysis published in 2013 by Peters, Ruiter and Kok. One goal of their study was to test arguably the most crucial element of the EPPM: the interaction between threat and efficacy in determining

behavior. The authors found that of all the many studies using EPPM as a framework, only six had an adequate design to test for the causal interaction between threat and efficacy predicted by the EPPM. Specifically, only these six studies used messages that manipulated both threat and efficacy independently, and measured the resulting effects on behavior, as opposed to behavioral intentions. When they subjected these six studies to a meta-analysis, they found the significant interaction effect between threat and efficacy: efficacy only affected behavior when threat was high, and vice versa. This supports the EPPM. However, the fact that only six studies were able to provide proper tests of the EPPM's central theoretical postulate suggests that the actual evidence base for the EPPM may be somewhat weaker than might be assumed from the 1200-plus citations.

A critical review of the EPPM also notes that it has received mixed support (Popova, 2012). The EPPM includes 12 theoretical propositions, such as “When perceived threat is low, regardless of perceived efficacy level, there will be no further processing of the message” and “As perceived threat increases when perceived efficacy is low, people will do the opposite of what is advocated” (Witte, 1992). The author of the review found that of all the studies relating to the EPPM published since 1992, only 29 included a quantitative empirical test of at least one of these 12 theoretical propositions (Popova, 2012). Across the 29 studies, the 12 theoretical propositions received, at best, mixed support, and some had barely been tested at all. One example of a proposition that received mixed support is the idea that “As perceived threat increases when perceived efficacy is high, so will message acceptance” (Witte, 1992). This received clear support in five studies (Roberto & Goodall, 2009; Smalec & Klinge, 2000; Terblanche-Smit &

Terblanche, 2010; Witte & Allen, 2000; Witte, Berkowitz, Cameron, & McKeon, 1998), mixed support in four other studies (McKay, Berkowitz, Blumberg, & Goldberg, 2004; McMahan, Witte, & Meyer, 1998; Rimal & Real, 2003; Wong & Cappella, 2009), and contradictory findings in five further studies (Hubbell, 2006; Muthusamy, Levine, & Weber, 2009; Smith, Ferrara, & Witte, 2007; Witte et al., 1992; Witte & Morrison, 1995).

There are two main reasons for why it makes sense to structure the present study around the EPPM, despite the findings outlined above. First, the only truly compelling reason not to use EPPM would be if it had been conclusively *falsified* by empirical evidence, or if it was incoherent. Neither of these conditions have been met. The evidence supporting the EPPM, while not as conclusive as many would expect, is still far from being conclusively negative.

Second, the EPPM is a clearly formulated, logical theory for *why* threat and efficacy beliefs relate to each other, and to action, in the way they do. It provides a plausible account, based on a general drive to reduce fear, of why people sometimes respond to threats proactively and sometimes maladaptively by denying the threat. It is certainly not the only plausible explanation for how threat and efficacy perceptions relate to action. However, despite other accounts for how threat and efficacy relate to climate action also being plausible, the EPPM is plausible enough that it makes sense to test it before moving to other explanations.

Finally, testing the EPPM in this context will enable us to provide clear advice to communication practitioners on a question of interest to them. Debate among prominent US commentators on climate and energy (Nordhaus & Shellenberger, 2014; Romm,

2014) and within major environmental organizations such as the Sierra Club (Han & Stenhouse, 2014) suggests that the question of how to mix threat and efficacy content in persuasive messages is still of great practical interest to those working for action on climate. Understanding whether the EPPM is an accurate theory of response to climate messages would go a long way to answering this question.

In summary, despite the EPPM having somewhat less empirical support than one might expect, it is still worth testing in this case.

2.3 Extension of EPPM to collective threats

The EPPM has largely been applied to individual-level threats, such as smoking and AIDS (Muthusamy et al., 2009). However, others have recently suggested that the EPPM might also apply to societal-level threats (Roberto et al., 2009; Smith et al., 2007). Societal-level threats are phenomena perceived to threaten one's collective; this threat may or may not include a direct threat to oneself (Roberto et al., 2009). For example, a wealthy native of Mumbai might perceive food shortages as a threat to Indian wellbeing, even if they felt that their own personal wealth would ensure they would remain healthy. A poor person in Mumbai might perceive a threat to the collective in addition to personal threat. Both of these people might act to prevent the threats to Indian wellbeing that they perceived, even if only one felt personally threatened.

Roberto and coauthors (2009, p296) note that the EPPM can be extended to societal-level risks merely by changing the reference point of the questions. Instead of asking whether an individual perceives global warming as a threat to them personally, and perceives their own actions as likely to be effective in them stopping it, the

researchers can ask whether they see global warming as a threat to their country (or city, state, family, et cetera) and whether they see their country as having the ability to avert the threat. This assumes that the same processes of fear control and danger control operate for societal risks, as well as individual risks. In other words, people first assess whether there is a threat to society, and if there is, the nature of their response is determined by their efficacy perceptions: to act to avert the threat if they perceive high efficacy, and to deny the threat if they do not perceive high efficacy.

Several studies have provided evidence of the collective-level EPPM correctly predicting behavior in this way (Smith et al., 2007). One study also provided evidence suggesting not only that the societal-level EPPM could explain behavior, but that the societal level of threat and efficacy could be *more* important than perceptions of individual threat and efficacy in explaining individuals' responses (Myers & Goodall, 2006). The authors found that individuals' perceptions of societal-level threat and efficacy on global warming explained a larger amount of variance in behavioral response intentions on global warming.

These studies suggest that expanding the EPPM to collective-level threats is possible. Additional light can be shed on this possibility by examining other areas of study that have looked at the relationship of threat and efficacy to action at the collective level. Both the political science literature and the sociological literature have examined this kind of relationship, and scholars in these areas have developed models that are both similar to and different from the EPPM. In the section below, I outline these theoretical

areas and what their implications are, both for theoretical considerations, and for how the present study should be conducted.

2.4 Efficacy in the political science literature

Efficacy has been studied in the political science literature since at least the 1950s (Niemi, Craig, & Mattei, 1991). A distinction similar to Bandura's (1997) distinction between self-efficacy and outcome expectancy (see discussion in Section 2.6, below) was noted by political scientists in the 1970s. Political scientists divide political efficacy into internal efficacy and external efficacy. Internal efficacy refers to individuals' perception of their own ability to take part in politics; external efficacy refers to their perception of the likelihood that politicians will respond to their political actions. These are essentially just self-efficacy and response efficacy in the political realm.

A subtle difference between external efficacy and response efficacy in the EPPM literature should be noted, however. Response efficacy refers to the perceived likelihood of an action taken having its intended effect (Witte, 1992). The concept focuses on the efficacy of the action, rather than the responsiveness of the environment the action takes place in. External efficacy, on the other hand, measures individuals' perceptions of the general responsiveness of the political system. This concept focuses on the responsiveness of the environment that actions take place in.

Within the political realm, both internal efficacy and external efficacy have been consistently found to predict political participation (Verba, Scholzman, Brady, & Brady, 1995). One study using US National Election Survey data found that external efficacy was more strongly related to voter turnout than internal efficacy (Rosenstone & Hansen,

1993). Another study found that external efficacy had a stronger effect than internal efficacy on registration to vote (Timpone, 1998).

2.5 Efficacy in the sociology literature

One of the earliest and most important works to draw attention to beliefs similar to efficacy, and their relevance to collective action, was economist Mancur Olson's book *The Logic of Collective Action* (1965). Olson sought to explain what he saw as a conflict between human rationality and participation in collective action. The paradox comes from the fact that many collective goods, such as voting rights or fairer wages, will end up being awarded to all group members if collective action is successful. Even those who did not participate in action will end up reaping its collective rewards, giving rise to what is known as the *free-rider problem*. This is the phenomenon whereby individuals who think they will receive a "free ride", and receive the benefits of collective action without paying any of the costs themselves, are less likely to participate. Olson's (1965) suggestion was that groups can solve the free-rider problem by offering selective incentives, rewards that are given only to those who *do* participate in collective action. For example, an individual participating in social movement activity receives the selective incentive of friendship and socialization with others in the movement.

Other attempts to model collective action in the sociological literature built on Olson by discussing how the size of one's collective affects the perception that individual action is unlikely to make a difference to collective efforts (Oliver & Marwell, 1988). While the connection to efficacy may not be immediately obvious, these theories are relevant. Although the authors did not measure individual-level perceptions to test their

theory, an implicit assumption of these theories of collective action is that group size affects participation by making the perceived impact of individual participation (a perception discussed in Section 2.10 as “participative efficacy”) larger or smaller.

One of the most prominent early attempts to combine Olson’s theory of collective action with empirical measurement of individual-level perceptions was by Bert Klandermans (1984). He combined theories of collective action with expectancy-value theory to form an influential model for understanding the individual-level psychological factors influencing a person’s decision to take part in collective action. Expectancy-value theory is a broad theoretical tradition that began in research on both animals and humans in the mid-20th century (Atkinson, 1957; Nagengast et al., 2011; Tolman, 1938). Its central idea is that individuals’ motivation to perform an action can be modeled as the product of the subjective value of successfully performing the action multiplied by their expectation that they would, in fact, successfully perform the action (Nagengast et al., 2011). The similarity of expectancy-value theory to the threat-efficacy interaction postulated in the EPPM reflects the fact that the EPPM is also a theoretical descendant of expectancy-value theory (Witte, 1992).

By combining expectancy-value theory with previous models of collective action, Klandermans (1984) created a model for how an individual’s various expectations relating to the success of collective action could combine with their value for the action’s potential outcome to influence that individual’s decision to participate. Klandermans proposed that three expectations would be important. First, the expected number of people likely to participate in collective action; second, the expected marginal increase a

person's individual participation would add to the likelihood of success; and third, the expected probability of success if participation was substantial.

The parts of the political science and sociology literatures summarized here support the idea that threat and efficacy perceptions are likely to be important influences on collective action. After introducing some of the new types of efficacy that will be used to extend the EPPM, it now becomes clearer how the insights from a third theoretical area can be incorporated into the study. Albert Bandura's Social Cognitive Theory (1986) offers a conceptualization of threat and efficacy variables and their relationship to behavior that is slightly different from the theories discussed above. In the section below, I outline how the literature on SCT suggests theoretical and methodological refinements to the present study.

2.6 Comparison of Social Cognitive Theory to EPPM

Albert Bandura wrote the first complete account of social cognitive theory in 1977, when it was called social learning theory (Bandura, 1977). The updated version, released in Bandura's 1986 book, was dubbed social cognitive theory (SCT), because it was less completely focused on learning. SCT explains human behavior as determined by three major sets of influences: environmental factors, behavioral factors, and cognitive factors (Bandura, 1986). Environmental factors are incentives such as social norms, social institutions, and the physical environment, that make certain behaviors more or less likely, but exist independently of the individual's behavior or cognition. Behavioral factors are the individual's own actual experiences – their record of success or failure at performing certain actions, their record of practice, and the skills that have accrued as a

result. Cognitive factors are influences within the mind of the individual – that are influenced by environmental and behavioral processes, but are not fully determined by them, owing some influence to the interaction of these factors with the individual's values and other similar influences.

Social cognitive theory is similar to the theories discussed above in that it seeks to explain how cognitions about personal ability interact with other cognitions relating to the likelihood of success (“outcome expectancies”), and the value of particular outcomes, in order to predict individual behavior. Indeed, theories such as the EPPM explicitly draw from social cognitive theory and/or Bandura's writing about self-efficacy (Witte, 1992). However, while other theories see self-efficacy and outcome expectancies/response efficacy as separate variables that interact but do not cause each other, Bandura sees self-efficacy as also being an antecedent to outcome expectancies. This is demonstrated by several quotes, such as the following: “the outcomes people anticipate depend largely on their judgments of how well they will be able to perform in given situations” (Bandura, 1997, p21). Because people's perception of likely consequences if they personally took action depends on their currently perceived personal likelihood of performing well (i.e. their self-efficacy), self-efficacy is an antecedent to outcome expectancies as defined by Bandura.

This is a somewhat different construct from response efficacy as defined by Witte. Response efficacy refers to “an individual's beliefs as to whether a response effectively prevents the threat” (Witte, 1992, p332). Response efficacy typically measures individuals' perceptions of the ability of a general class of response to prevent a

threat, rather than the specific instance of that response that they would personally perform. For example, response efficacy for condom use in preventing HIV infection would look at an individual's belief in the ability of condoms generally to prevent infection. An outcome expectancy as defined by Bandura would focus instead on the more specific belief of how effective a condom would be if used by them personally. These beliefs are distinct; an individual might believe that condoms generally are effective, but that their own inept usage of them might make infection likely. Conversely, an individual might perceive abstinence to be an ineffective form of contraception generally speaking, but might expect the outcome of pregnancy to be highly unlikely if they personally used this strategy, due to their own above-average levels of self-control.

While response efficacy may seem similar to outcome expectancies conceptually, in fact response efficacy is more similar to a concept Bandura calls "controllability". As Bandura says, "controllability affects the extent to which efficacy beliefs shape outcome expectancies... where performance determines outcome, efficacy beliefs account for most of the variance in expected outcomes... efficacy beliefs account for only part of the variation in expected outcomes when outcomes are not completely controlled by quality of performance... expected outcomes are independent of efficacy beliefs when... no level of competence... can produce desired outcomes" (Bandura, 1997, p23-24). Bandura gives the example of academic performance: because people perceive academic honors as being highly contingent on actual performance, their self-efficacy beliefs are strongly predictive of behavior (1997, p23-24). Expressed in Bandura's terms, individuals perceive the receipt of honors as controllable by performance. In the language of the

EPPM, one might say that individuals perceive high response efficacy for the action of performing well: achieving high academic performance is effective in reducing the threat of not receiving honors.

If it were the case that response efficacy were conceptually identical to outcome expectancies, that would mean that SCT would suggest the EPPM should consider self-efficacy to be an antecedent to response efficacy, as well as both of them being antecedents to action. However, response efficacy is in fact conceptually more similar to Bandura's concept of controllability, which is not affected by self-efficacy. Therefore, in fact SCT does *not* propose that self-efficacy should be considered an antecedent to response efficacy.

One way in which SCT differs from the extended EPPM is its proposal that multiple outcome expectancies – both positive and negative – should be taken into account in predicting behavior. SCT theorists might thus suggest that multiple outcome expectancies be included in the extended EPPM as well. Many outcome expectancies would be relevant to collective action on climate change. For example, individuals' expectations that they would have an enjoyable time, that their friends would support them or criticize them for being overly alarmist, and so on – all these might affect an individual's decision to engage or not engage in collective action. Obviously, to the extent that any of these expectancies come to mind, and the individual cares about them, they will affect their behavior. A model that attempted to account for *all* the outcome expectancies that might be relevant to climate action would need to include many of these.

However, a model's completeness should be weighed in conjunction with other concerns, such as theoretical parsimony. The primary purpose of the EPPM is to explain behavior that has a single root motivation: the fear of harm (Witte, 1992). The EPPM, and the extended EPPM tested in this dissertation, do not propose that expectations of harm are the only important motivation for behavior. Rather, they seek to explain the subset of behavior that *does* result from the fear of perceived threats. While other motivations for engaging in climate action will certainly be important, including them in the model is not necessary in order to clearly understand the relationships between threat, efficacy and action.

In summary, SCT has several similarities to the EPPM, Klandermans' model (1984), and expectancy-value theory generally. Its significance for the present study lies in its clarification of the kind of response efficacy that should be measured, and in confirming that additional outcome expectancies motivating climate action do not need to be added to the extended EPPM. Otherwise, no changes to the proposed theoretical need be made.

2.7 Implication of findings in other areas for the EPPM

The literature in both sociology and political science has several similarities to the EPPM. In sociology, Klandermans' model of collective action is very similar to the extended EPPM in terms of both its structure and the specific beliefs measured. In political science, the distinction between internal efficacy and external efficacy is very similar – though not identical – to the distinction between self-efficacy and outcome expectancies in Bandura's theory (1997), and self-efficacy and response efficacy in the

EPPM. Altogether, this evidence provides strong support for the idea that the EPPM could be extended to political action on climate change. In the next section, I outline the extended EPPM suggested by Hart & Feldman (2014), that was one of the major inspirations for this dissertation.

2.8 Suggested extension to the EPPM – Hart & Feldman (2014)

In extending the EPPM to the realm of collective action on climate change, Hart and Feldman (2014) suggest that two forms of the efficacy beliefs used in traditional individual-level applications of the EPPM – self-efficacy and response efficacy – should be included in the model. They suggest that the form of self-efficacy included should be the individual's confidence that they can take part in political action on climate change. The form of response efficacy included, they suggest, should be external political efficacy: the individual's perception that collective action on climate change can influence politicians' actions. This marks a shift from the traditional EPPM, where the response efficacy perception measures the individual's perception that their own actions will effectively remove the threat to themselves. In the extended EPPM, Hart and Feldman suggest there should be no variable measuring the individual's perception of being able to remove the threat of climate change directly through their own actions. Instead, they suggest adding a second type of response efficacy, *perceived policy effectiveness* (Lubell, 2003). This is the perception that policies enacted by politicians can be effective in stopping global warming. By measuring this perception together with an individual's perception of external political efficacy, it becomes possible to model an individual's confidence in removing the threat of global warming indirectly, by

influencing politicians, who then enact policies to combat global warming (Hart & Feldman, 2014).

2.9 Suggested additional variables for the extended EPPM

There is good reason to believe that the collection of efficacy beliefs suggested by Hart & Feldman (2014) will better predict collective action on global warming than a single collective efficacy item. Efficacy beliefs associated with specific actions are more predictive of those specific actions than general efficacy beliefs are predictive of general categories of action (Bandura, 1997). Therefore, perceptions that are directly relevant to the efficacy of a specific behavior – political action designed to indirectly lead to policy change – ought to be stronger predictors than perceptions of the efficacy of a broader class of climate action.

However, there is no reason to believe that the efficacy beliefs suggested by Hart & Feldman (2014) will be the only efficacy beliefs related to this kind of action. The rationale behind their addition of perceived policy effectiveness to the model was that it is a form of efficacy that could be expected to influence decisions to engage in political action towards policy change. This same rationale also justifies the addition of other variables that could be expected to influence this kind of decision. In this dissertation, I test the addition of two such beliefs to the extended EPPM model: *participative efficacy* and *expectation of others' participation*.

Participative efficacy (PE) is the perception that one's own participation can make a significant marginal contribution to the likely success of group efforts (van Zomeren et al., 2013). This is the opposite perception to that held by a “free-rider”, someone who

sees their own contribution as likely to be irrelevant to group success. If one believes that one's own individual participation *will* make a significant contribution to the success of group efforts, it makes sense that one would be more likely to participate. This form of efficacy has been measured in previous studies of individual decisions about collective action, although in these studies it was often referred to as "efficacy", and not distinguished from other potential forms of efficacy belief (Klandermans, 1984; McAdam, 1982; Oliver, 1993). The authors of a study where both collective efficacy and participative efficacy were measured in the same individuals found that both were independently positively related to collective action intentions (van Zomeren et al., 2013).

The second efficacy variable I propose adding to the extended EPPM is the expectation of others' participation (EOP) in collective action. This belief was included in Klandermans' (1984) model of collective action, and has been found to be important in subsequent research (e.g. Flood, 1993; Stürmer & Simon, 2004). EOP can be expected to be important in the extended EPPM because it should be relevant to individuals' overall perception of the efficacy of collective action to solve climate change. For the original EPPM, there is little need to include an EOP perception. When one is focusing on problems that can be solved by the individual alone, as the original EPPM does, each individual has control over their own participation – which is the only relevant participation. However, in collective action problems, each individual has no control over the behavior of all others -- yet collective behavior is required for success. Because the numbers of participants will affect the likelihood of success, an individual's perception of

the number of likely participants can be expected to influence their willingness to participate. As explained further in Section 2.10, empirical evidence has also shown EOP to be significantly related to collective action. Therefore, it should be added to the model.

In summary, in extending the EPPM to collective threats, it seems likely that Hart and Feldman's model will provide a better explanation of the relationship between threat and efficacy perceptions and collective action than a model that only included a general measure of collective efficacy. Their key insight is crucially important: due to the number of factors involved in producing effective collective action, as opposed to effective individual action, the number of relevant efficacy beliefs needs to increase beyond self-efficacy and response efficacy. However, the model suggested by Hart and Feldman (2014) may not go far enough in expanding the number of efficacy beliefs considered. PE and EOP should be added to the model, and their relationships to collective action empirically tested.

Of course, it is possible that items designed to measure conceptually distinct efficacy beliefs may in fact measure the same underlying belief. For example, people's responses to items designed to measure belief that others will participate in collective action, and items designed to measure belief that collective action can influence politicians, might both be determined by a more generalized latent perception that effective collective action on climate change is likely (Kahan, 2015). On issues like climate change, which most Americans are not highly personally involved with (Leiserowitz, Maibach, Roser-Renouf, Feinberg, & Rosenthal, 2014), it would be unsurprising if citizens had not developed clear and distinct beliefs about how likely and

effective various different forms of collective action on the issue are, what the likely consequences of action would be, and so on. Therefore, while the possibility remains that all efficacy beliefs added to the model have a psychological reality and important, unique effects on behavior, we should not assume that this is the case, and should test item responses psychometrically to ensure they are distinct. For this reason, multiple factor analyses are tested below to see whether each kind of efficacy belief really does have a distinct psychological reality.

The variables in each of the EPPM models discussed in this dissertation are summarized in Table 2.1.

Table 2.1. Efficacy and threat variables in the original EPPM and two extended EPPM models.

Variable name	Description	Original EPPM (Witte, 1992)	Extended EPPM (Hart & Feldman, 2014)	Extended EPPM (Stenhouse, 2015)
Perceived threat	Severity (how harmful the threat is) plus susceptibility (likelihood of being affected by threat)	✓	✓	✓
Self-efficacy (SE)	Confidence in one's ability to perform the target behavior	✓	✓	✓
Response efficacy (individual level)	Confidence that individual actions can remove the threat	✓		
Participative efficacy (PE)	Confidence that one's own participation can make a substantial contribution to collective effort			✓
Expectation of others' participation (EOP)	Confidence that many others will participate			✓
Collective external political efficacy (CXPE)	Confidence that collective action can influence politicians		✓	✓
Policy response efficacy (PRE)	Confidence that policies politicians enact can remove the threat		✓	✓

2.10 Conceptual explication of all extended EPPM variables

Having introduced the different types of efficacy to be included in this study, and the rationale for including them all, in the section below I outline a more detailed conceptual explication of each type of efficacy.

2.10.1 Self-efficacy (SE) – Conceptual explication

Table 2.2. Summary of SE characteristics.

Construct name	Self efficacy (Bandura, 1997)
Acronym	SE
Conceptual definition	Confidence in one's ability to perform the target behavior
Alternative names	Self efficacy expectations (Bandura, 1977) Internal efficacy (Balch, 1974)
Example measure	Please indicate how much you agree or disagree with the following statement: If I wanted to, I have great confidence I could contribute time to a group acting politically on climate change. <i>1 - Strongly disagree</i> <i>2</i> <i>3</i> <i>4 - Neither agree nor disagree</i> <i>5</i> <i>6</i> <i>7 - Strongly agree</i>

Self-efficacy is an individual's perception that they are capable of performing a particular behavior or category of behavior (Bandura, 1997). As with all other beliefs included in the extended EPPM, SE is an individual-level cognitive phenomenon, thus the unit of analysis is the individual person. Self-efficacy is task-specific, meaning that a person can only have self-efficacy in relation to a particular task; it does not refer to generalized perceptions of one's capability across all types of behavior. However, people can have self-efficacy for relatively broad categories of behavior. For example, a person's

sense that they are highly capable of taking part in many kinds of sports would be considered self-efficacy for sports.

A person can have varying levels of self-efficacy for different tasks; a person might have high self-efficacy for writing with chalk, yet low self-efficacy for writing with a fountain pen. A person's self-efficacy can vary over time; a person might initially have low self-efficacy for writing with a fountain pen, but come to have high self-efficacy for the same task after a year of regular practice.

There are several concepts that might be confused with self-efficacy that are in fact distinct. Perceived behavioral control refers to a person's perception that they are capable of voluntary control over some particular behavior (Ajzen, 1988). This is distinct from self-efficacy, which measures a person's confidence that they would actually be able to perform a behavior; perceived behavioral control does not measure whether the person is confident in this way, but merely whether they perceive voluntary performance of the behavior to be technically possible. Another concept that might be perceived as similar to self-efficacy is self-esteem. Self-esteem refers to a person's liking for themselves, and their own feeling that they are competent (Tafarodi & Swann, 2001). This is distinct from self-efficacy, as self-efficacy is specific to particular behaviors (rather than being a person's global evaluation of themselves), and is a cognitive evaluation of capability that contains no emotionally valenced content (although this kind of content can be a consequence of self-efficacy) (Bandura, 1997; Tafarodi & Swann, 2001). Finally, the term "efficacy" on its own is sometimes used in the social movements literature. When used to refer to an individual's confidence in their own ability to

perform social movement related actions (e.g. Brunsting & Postmes, 2002), this is self-efficacy (because any measurement of an individual's confidence in their ability to perform a behavior is self-efficacy, regardless of the type of behavior). The term "internal political efficacy" also refers to a specific type of self-efficacy – self-efficacy for action in the political realm (Craig, Niemi, & Silver, 1990). However, when the term "efficacy" is used to refer to perceived ability of a group to affect political outcomes (e.g. van Zomeren, Postmes & Spears, 2008), this is external political efficacy, which is not a type of self-efficacy.

Self-efficacy is generally measured by closed-ended items relating to individuals' confidence they can perform a specific behavior. For example, in one study (Maibach, Maxfield, Ladin, & Slater, 1996), respondents were asked, "assuming you want to, how confident are you that you can do each of the following, starting this week and continuing for at least one month?" Following this, participants saw a series of items such as "drink no more than two alcoholic beverages per day" and "eat a low-fat diet", and responded on a scale from zero (representing no confidence) to ten (representing complete confidence).

Bandura (1997) states that the most powerful influence on self-efficacy is enactive mastery experiences, where one has the direct experience of successfully completing a task, and has one's efficacy boosted as a result. Second to this in power is vicarious experiences – the experience of observing someone else complete a task successfully. Verbal persuasion refers to changes in efficacy resulting from a person being told they are efficacious (or not) by another person (Bandura, 1997). It is generally thought to be less powerful than enactive mastery experiences or vicarious experiences.

However, verbal persuasion can have an important influence on efficacy when a person does not believe themselves to be knowledgeable enough to be a competent judge of their own capability (Bandura, 1997). In this case, the persuasion of a credible other person can be a strong influence on efficacy. Finally, physiological or affective states can also influence self-efficacy; for example, being in a positive mood – regardless of the origin of the mood - can cause a person to be more confident in their ability to complete a task.

The consequences of self-efficacy fit with a general, rational principle that people are more likely to devote effort to something they think they can succeed at. Thus, consequences include the devotion of greater effort to a task, and longer persistence at a task when difficulty prevents immediate or complete success (Bandura, 1997). People will also set higher performance goals if they have high self-efficacy (Lee & Bobko, 1994).

One important area where scholars disagree over the antecedents and consequences of self-efficacy is in its relationship to outcome expectancies. Bandura states that self-efficacy is causally prior to outcome expectancies, and cannot be influenced by them (Bandura, 1997, p21). He argues that because self-efficacy is a judgment purely of one's capability of doing something, regardless of whether one in practice *wants* to do it or not, then expected outcomes should have no effects on judgment. This argument is conceptually sound. However, it assumes one thing that other scholars take issue with: that self-efficacy items as commonly operationalized in fact *do* measure judgments of capability that are free from the influence of motivation (Williams, 2010). Several scholars have argued that self-efficacy items are often worded such that

people take their motivation into account when formulating their judgments of self-efficacy (Borkovec, 1978; Corcoran, 1991, 1995; Eastman & Marzillier, 1984; Kazdin, 1978; Kirsch, 1982; Teasdale, 1978; Williams, 2010). One experimental study serves as an illustrative example of this effect. In this study, participants were asked to provide self-efficacy ratings for withstanding a painful stimulus (Baker & Kirsch, 1991). Across experimental conditions, the wording of the self-efficacy questions was kept identical, but half the participants were randomly assigned to receive monetary incentives for withstanding the stimulus for a longer period of time. The participants who had been informed of the monetary incentives rated their self-efficacy for withstanding pain as significantly higher than those who had been offered no incentives. This suggests that the expected outcome of monetary reward had a causal effect on the individuals' self-efficacy ratings. When appraising their ability to withstand pain, they appear not to have considered their overall ability to withstand pain regardless of circumstances, but their ability to withstand pain given the circumstances they expected to surround the pain's occurrence.

This highlights an issue that is important for the measurement of self-efficacy. Changes to item wording can be used to measure self-efficacy as intended by self-efficacy theory, without influence from outcome expectancies. Rather than items of the form "I am confident that I could [perform the target behavior]", using items of the form "I am confident that I could [perform the target behavior] if I wanted to" should reduce the influence of outcome expectancies (Williams, 2010). Self-efficacy items worded in this way were uncorrelated with outcome expectancy items in one study (Maddux,

Norton, & Stoltenberg, 1986), and other studies also found that items qualified with a phrase similar to “if I wanted to” were less highly correlated with outcome expectancies than unqualified self-efficacy items (Rhodes & Courneya, 2004; Rhodes & Blanchard, 2007; Rhodes & Courneya, 2003; Williams, 2010).

2.10.2 Participative efficacy (PE) – conceptual explication

Table 2.3. Summary of PE characteristics.

Construct name	Participative efficacy (van Zomeren, Saguy & Schellhaas, 2013)
Acronym	PE
Conceptual definition	Confidence that one's own participation can make a substantial contribution to collective effort
Alternative names	Participative self-efficacy (Azzi, 1998) Expectations about one's own contribution to the probability of success (Klandermans, 1984) Efficacy (Oberschall, 1994)
Example measure	Please indicate how much you agree or disagree with the following statement: I believe that I, as an individual, can provide an important contribution to groups working to influence politicians' actions on climate change. <i>1 - Strongly disagree</i> <i>2</i> <i>3</i> <i>4 - Neither agree nor disagree</i> <i>5</i> <i>6</i> <i>7 - Strongly agree</i>

Participative efficacy refers to an individual’s beliefs that their efforts can make a significant contribution to collective efforts to achieve a particular goal (van Zomeren et al., 2013). It is distinct from self-efficacy in that it does not measure an individual’s perception that they are capable of taking part in collective action, but rather their perception that their own marginal contribution to collective efforts will be significant. It is also different from external political efficacy in that it does not measure an individual’s

perception of the likely effectiveness of group efforts. Just because one can make a significant contribution to a group does not mean that that group is likely to succeed. For the same reason, participative efficacy cannot be considered to be a type of collective efficacy; it does not involve any perception of the likelihood of the group achieving its goals, which is what defines collective efficacy.

However, participative efficacy can be considered to be a form of outcome expectancy/response efficacy. Participative efficacy measures the perceived likelihood of an effect *if* an individual participates in collective action. Specifically, it measures the perceived likelihood of collective efforts being made significantly stronger if the individual participates. While it is unlikely that the ultimate goal of participation is just to make collective efforts incrementally stronger, participative efficacy still measures the likelihood of a desired outcome occurring if action is taken. Therefore, it is a form of response efficacy.

The unique antecedents or consequences of participative efficacy, in contrast to other forms of efficacy, have been little studied; exceptions include Klandermans (1984) and van Zomeren et al. (2013). These studies both gave evidence suggesting one consequence of PE is the intention to engage in collective action. As PE consists of an affirmation of the idea that one can have a substantial effect on collective efforts, it could also be expected to have the consequence of increasing perceptions of increased personal responsibility for taking action (Bolsen, Druckman, & Cook, 2014). Also, because participative efficacy measures an individual's perception of their own ability to perform a task competently, it likely shares many of the same antecedents as self-efficacy:

experiences of successful contributions to collective action in the past, vicarious experiences of success, verbal persuasion by others, and affective states promoting efficacy (Bandura, 1997).

2.10.3 Expectation of others' participation (EOP) – Conceptual explication

Table 2.4. Summary of EOP characteristics.

Construct name	Expectation of others' participation
Acronym	EOP
Conceptual definition	Confidence that many others will participate in collective action
Alternative names	Expectations about the number of participants (Klandermans, 1984)
Example measure	How confident are you that, over the next 12 months, a number of Americans will contribute time or money to organizations taking political action on climate change? Specifically, how confident are you that at least 10% will contribute to organized political efforts? 1 - <i>Not at all confident</i> 2 3 4 - <i>Moderately confident</i> 5 6 7 - <i>Extremely confident</i>

EOP is the expectation that a substantial number of people will participate in collective action. Like SE, one can have different EOP beliefs for different kinds of action; one might expect a large number of individuals to sign an online petition on climate change, and a much smaller number to participate in a rally outdoors in the middle of winter. EOP beliefs can also vary in how specific or general they are; one might have EOP beliefs regarding the likelihood of Americans participating in all forms of collective action, as well as EOP beliefs about the likelihood of participation in a Saturday barbecue event held by the Fairfax, Virginia chapter of an environmental organization. EOP beliefs can also vary in the time period they cover; one might have

very different levels of EOP for participation in climate action over the next decade, as opposed to the next two weeks.

EOP is distinct from the other four efficacy beliefs in that it does not measure an individual's perceived ability to take action, nor the ability for some type of action to have a particular consequence. In this sense, some could argue it should not be considered a type of efficacy at all. However, I refer to it in this dissertation as one of the "efficacy beliefs" for the same reason I proposed including it in the extended EPPM. Because it is a belief that could be expected to be highly relevant to the overall effectiveness of participation in political action, in this broad sense it is an efficacy belief. As noted in Section 2.11 below, in this case "efficacy belief" can be taken to mean "belief that contributes to overall perceived efficacy of collective climate action", as opposed to "belief that is itself a perception of the capacity to achieve some goal."

Because it is focused on the likelihood of a number of individuals participating in collective action, one might assume that EOP simply measures perception of descriptive social norms. Indeed, the two concepts are related; however, they are not identical. Descriptive norms refer to perceptions of what people generally tend to do at the moment. EOP, on the other hand, does not measure perceptions of what people are doing right now, but an expectation of the likelihood of doing something (i.e. engaging in collective action) at some specific point in the future. This means that perceived descriptive norms are likely to be an antecedent to EOP: the extent to which people generally engage in collective action now should affect any guesses about what they are likely to do in the future. The two beliefs are not the same, however; those who believe

that people generally do not engage in collective action may nevertheless see collective action as likely in the future, due to some other reason to expect people to break with the descriptive norm.

Similarly to PE, the antecedents and consequences of EOP have not received much study, apart from the obvious consequence of intentions to participate in collective action, and participation itself. However, one could expect social trust and other forms of social capital to be antecedents to EOP; the more one feels a sense of trust and shared community with a group, the more likely that one will expect others to participate in collective action seen as important to the fate of that group (Uslaner & Brown, 2005). Similarly, perceived descriptive social norms – i.e., perceptions that it is common or uncommon for people to engage in the kinds of collective action in question – should be antecedents to EOP for that kind of action (Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007). In addition, communication with others about the likelihood of taking collective action – e.g. describing one's own voting intentions to one's friends and family, and hearing about their intentions also – is thought to influence individuals' levels of EOP (Oberschall, 1994).

Whether EOP should have a positive or negative relationship to action is a matter of debate. Some theorists have suggested that levels of expected participation should have a negative relationship to action (Gerber & Rogers, 2009). Olson (1965) theorized that individuals who expected high levels of participation would be *less* likely to participate in collective action than those who expected low levels of participation. The reasoning behind this was that if high participation was expected, then individuals would

expect their own participation to make little difference to chances of success. Other scholars have made similar arguments (e.g. Aldrich, 1997; Downs, 1957).

On the other hand, some have argued that EOP should have a positive relationship to participation. The rationale behind this expectation is that people are only likely to bother contributing to a collective effort if they believe that effort is likely to bear fruit. In this line of thinking, EOP has a simple positive relation to overall expectations of success: more people mean a higher chance of success, and fewer people mean a lower chance of success. Theories of Klandermans (1984) and Oberschall (1994) have made this argument.

Empirical evidence does not conclusively favor either explanation. Klandermans (1984) found that EOP was positively associated with Dutch industrial workers' intentions to take collective action to shorten their work weeks. However, Flood (1993) found that EOP was negatively correlated with action intentions for members of an Irish transport union. More recently, Gerber and Rogers (2009) conducted an experiment where participants were given a message arguing that voter turnout was likely to be either high or low in an upcoming gubernatorial election. Those participants who read the high-turnout message reported higher levels of expected voting, and also were more likely to report that they intended to vote themselves, compared to participants who read the low-turnout message. Although the authors did not test whether EOP mediated the effect of the message on voting intentions, the result is consistent with the idea that EOP has a positive relationship to action.

2.10.4 Collective external political efficacy (CXPE) – Conceptual explication

Table 2.5. Summary of CXPE characteristics.

Construct name	Collective external political efficacy (Wang, 2013)
Acronym	CXPE
Conceptual definition	Confidence that collective action can influence politicians
Alternative names	External political efficacy (Balch, 1974) External efficacy (Hart & Feldman, 2014) Efficacy (van Zomeren, Postmes & Spears, 2008)
Example measure	Please indicate how much you agree or disagree with the following statement: Government officials are likely to be strongly influenced by the actions of climate change advocacy organizations. <i>1 - Strongly disagree</i> 2 3 <i>4 - Neither agree nor disagree</i> 5 6 <i>7 - Strongly agree</i>

Political efficacy is usually split into distinct components of internal and external political efficacy (Balch, 1974; Craig et al., 1990). Similarly to self-efficacy, internal and external political efficacy are individual-level psychological variables that consist of judgments of one's ability to perform political tasks. Also similarly to self-efficacy, the unit of analysis is the individual, the perceptions are often specific to particular political actions, and levels of efficacy can vary for different specific political tasks, as well as varying within the same individual over time.

As noted above, internal political efficacy is essentially just self-efficacy for participating in the political process. External political efficacy, at least as traditionally defined in the political science literature, is an individual's perception that they individually have the power to make politicians respond to their demands (Craig et al.,

1990). While it might seem excessive or irrational for people to believe that they individually can influence politicians, many people respond to scales measuring individual-level external efficacy by indicating that they do perceive themselves to have some influence over politicians (Leiserowitz, Maibach, Roser-Renouf, Feinberg, & Howe, 2013). Multiple scholars have found that people systematically overestimate their level of individual external efficacy, for example their likelihood of casting an influential ballot in an election (Darmofal, 2010; Riker & Ordeshook, 1968). Finally, individuals' self-reported perception they can individually influence politics has been shown to predict participation in political action (Niemi et al., 1991; Rosenstone & Hansen, 1993; Verba & Nie, 1972). This evidence shows that even the somewhat irrational perception of having external political efficacy as an individual can significantly predict political action.

External political efficacy is one example of what Bandura (1997) refers to as *controllability*, or what Witte (1992) refers to as *response efficacy*. Both of these terms refer to the confidence that actions are likely to result in their desired consequences. External political efficacy can be considered to be one specific form of response efficacy, specific to the task of influencing policymaker behavior.

There is good reason to believe that *collective* external political efficacy (CXPE) would be a more powerful influence on collective action, and more worthy of inclusion in the extended EPPM, than perceptions of individual external political efficacy. CXPE refers to an individual's perception of the likelihood of a group being able to collectively influence politicians' decisionmaking. It is not conceptually distinct from collective

efficacy, as described by Bandura (1997). It is merely a particular type of collective efficacy for a particular task: influencing politicians. As mentioned above, it is also not conceptually distinct from the concept of response efficacy. CXPE fits within both broader categories: it is both a form of collective efficacy and a form of response efficacy.

The reason CXPE should be included in the extended EPPM is that it more precisely measures the intended consequence of participation in collective action. Individuals do not participate in collective action because they hope to individually influence politicians, but because they hope that the collective, working together, will be able to do so. Therefore, their participation will be more strongly predicted by the perceived influence of the collective, rather than the perceived influence of the individual on political decisions.

To my knowledge, CXPE has only been described using this specific term (“collective external political efficacy”) in one publicly available document, a Master’s thesis (Wang, 2013). However, other studies have referred to this concept using less specific terminology. For example, several of the studies reviewed in the meta-analysis by van Zomeren and colleagues (2008) measure individuals’ perceptions of the likelihood of their collective influencing political outcomes. However, these studies refer to what they are measuring as “political efficacy” or simply “efficacy”. Thus, while CXPE is not a new concept, using the precise term CXPE to describe it has been rare.

There is an important distinction between how external efficacy is sometimes measured in the political science literature, and how response efficacy has been

traditionally measured in the EPPM literature. Some external political efficacy items are focused on general responsiveness of the political system to citizens, such as “I have a real say in what the government does” (Pinkleton, Austin, Zhou, Willoughby, & Reiser, 2012). This contrasts with traditional response efficacy items, which are more focused on the effectiveness of specific actions, as in “I believe condoms prevent HIV contraction” (Witte, 1992, p332). The former example is focused on a general property of the political environment, whereas the latter is focused on the ability of specific actions to achieve specific outcomes. These latter items are more specifically focused on the theoretical process of interest in the EPPM: the encouragement via communication of the idea that there is an important threat, and that the message recipient is capable of making a specific effective response to that threat. Because persuasive messages designed via the EPPM are intended to cause people to take specific actions in this way, items measuring their confidence in the effectiveness of these specific actions are likely to be more strongly related to the intended outcomes.

Major antecedents of external political efficacy, when measured by the traditional items focused on general responsiveness of the political system, include prior experience of civic participation, internal political efficacy, political knowledge, and living in a non-authoritarian society (Karp & Banducci, 2008; Sulitzeanu-Kenan & Halperin, 2013). Major consequences of high CXPE, by the same definition, include participation in conventional political actions such as voting or contacting elected officials; consequences of low CXPE include apathy or participation in unconventional action such as protest (Lee, 2006; Sulitzeanu-Kenan & Halperin, 2013). The potentially puzzling result of low

CXPE leading to higher likelihood of unconventional action highlights one of the limitations of defining CXPE as the generalized responsiveness of the formal political system. Low CXPE in this case refers to low confidence that *conventional* actions such as voting will effect change, thus the higher likelihood in choosing alternative *unconventional* means of participation, such as protest. If the same people had been asked about their perceptions of the efficacy of protest in achieving their goals, it is likely that the expected positive relationship would have been found. Because I do not define CXPE as the generalized responsiveness of the political system, however, results such as this one should not be counted against the idea that CXPE might have a positive influence on action.

2.10.5 Policy response efficacy (PRE) – Conceptual explication

Table 2.6. Summary of PRE characteristics.

Construct name	Policy response efficacy
Acronym	PRE
Conceptual definition	Confidence that policies politicians enact can remove the threat
Alternative names	Perceived policy effectiveness (Lubell, 2003) Response efficacy (Hart & Feldman, 2014)
Example measure	How confident are you that federal government policies can help reduce climate change? 1 - <i>Not at all confident</i> 2 3 4 - <i>Moderately confident</i> 5 6 7 - <i>Extremely confident</i>

PRE is an individual's perception that government policy is likely to be effective in addressing a problem (Lubell, 2003). In the case of action on climate change, an

individual would have high PRE if they saw government policy as having a good chance of effectively reducing CO₂ emissions. Similar to other forms of efficacy, one can have different PRE perceptions for different levels of specificity. For instance, one might have low PRE for government policy generally, but high PRE for one specific policy. This situation would be the case for those individuals who see an economy-wide carbon tax, and no other policy, as effective at reducing carbon emissions. In this dissertation, I focus on PRE for US government policy generally.

Conceptually, PRE is similar to CXPE in that they are both forms of response efficacy. Both represent an individual's perception that if a specific action is taken, a specific effect will result. For CXPE, the action is participation in collective action, and the effect is a successful enactment of policy. People who have a strong sense of PRE believe that if the policy is enacted, the problem will be substantially reduced. People who have a weak sense of PRE believe that enactment of the policy will not substantially reduce the problem. Despite their similarity in terms of both being a form of response efficacy, there is nonetheless good reason to distinguish between CXPE and PRE. Perceiving advocacy groups as effective is quite a different thing from perceiving policies as effective, and both seem likely to contribute to decisions about action in different ways. Distinguishing between these different subcategories of response efficacy allows us to include both in the extended EPPM, and test for their unique impacts on collective action behavior.

Lubell (2003) lists several antecedents to individuals' PRE perceptions for specific policies. These include the perceived quality of scientific information about a

problem; a policy where scientific information is relevant will be perceived to be more effective if it is seen to be based on adequate scientific grounds. Individuals will also see a policy as more effective if they see the body that will enact the policy as actually able to control the problem. For example, if someone saw fossil fuel companies, rather than politicians, as being truly in control of global carbon emissions, then they would have low PRE for government policies.

The degree to which a policy matches with an individual's *policy core beliefs* also determines perceptions of PRE (Lubell, 2003). This is a similar process to the way in which cultural cognition theory suggests an individual's cultural worldviews influence their perceptions of topics such as climate change (Kahan, Jenkins-Smith, & Braman, 2011). Policy core beliefs are beliefs about what kind of policies, generally speaking, are effective. For example, some individuals have policy core beliefs favoring policies that are implemented strictly and hierarchically. These individuals will have high PRE for hierarchical policies, and low PRE for policies implemented in a less hierarchical, more collaborative fashion (Lubell, 2003). The opposite will be true for individuals whose policy core beliefs suggest collaborative policies are generally more effective.

The main proposed consequence of PRE is collective action designed to bring about policy change. Individuals will be more likely to act to bring about a policy if they see it as effective. Lubell (2003) also suggests that high levels of PRE have the consequences of increasing cooperation between stakeholders acting for policy change, as well as increasing the amount of administrative and institutional resources devoted to the policy by government officials and other bureaucrats.

2.11 Rationale for describing SE, PE, EOP, CXPE and PRE as “efficacy beliefs”

There is a potential problem associated with calling SE, PE, EOP, CXPE and PRE “efficacy beliefs”. Bandura (1997) made a point of clearly distinguishing between efficacy beliefs – beliefs in a person or group’s capacity to perform specific behaviors – and outcome expectancies – perceptions of the likelihood of positive (or negative) outcomes occurring if one were to behave in a certain way. It could be argued that PE, EOP and PRE are better referred to as outcome expectancies, rather than efficacy beliefs. Their conceptualization, and the items used in this dissertation to measure them, are generally focused around the likelihood of given outcomes occurring. For instance, one PE item reads “*If I worked with an organization to influence the decisions of government officials regarding global warming, my actions as an individual *would be* helpful to the overall group effort*” (emphasis added). This is in contrast to SE and CXPE, which are somewhat more focused around the capacity of the groups acting – the individual and the collective, respectively – as opposed to the likelihood of particular outcomes. For example, one CXPE item reads “Organizations taking political action on climate change can have a very large influence on government officials.”

I do not dispute that this distinction is valid; I do not argue that is incorrect to think of PE, EOP and PRE as outcome expectancies. However, I do argue that in discussing the extended EPPM, the use of the umbrella term “efficacy beliefs” is an expedient way to group related variables together, in a way that fits with Witte’s (1992) theoretical rationale for how efficacy beliefs lead to action.

The reason for referring to SE, PE, EOP, CXPE and PRE together as “efficacy beliefs” is based on Witte’s (1992) conception of *perceived efficacy*. Perceived efficacy is described by Witte and Allen as a person’s perception that “they are able to perform an effective recommended response against the threat” (2000, p594). The EPPM conceives of perceived efficacy as the overall cognition comprised of the separate dimensions of self-efficacy and response efficacy, which combine in an additive manner (Witte & Allen, 2000, p595). It is this overall cognition of perceived efficacy, combined with perceived threat, that determines individuals’ responses to threats. The EPPM theorizes that there is a “critical point” that determines whether or not an individual will act adaptively to remove a threat. This critical point occurs “when perceived threat exceeds perceived efficacy” (Witte, 1992, p341); beyond the critical point, individuals become less likely to act to remove a threat, and more likely to engage in maladaptive responses such as denial of the threat.

In order for it to be possible for overall threat perceptions to outweigh efficacy perceptions, or vice versa, the different dimensions of threat and efficacy must be integrated somehow; it would not be possible to determine which outweighed the other if the different dimensions were not integrated to form some overall general impression. Because the overall perception of the availability of an effective response – that encapsulates all its subdimensions – is important, it needs an overall term to refer to it. Additionally, it will be useful to refer to its subdimensions in a way that highlights the fact that they contribute to this overall cognition. Thus, the reason to refer to SE, PE, EOP, CXPE and PRE as “efficacy beliefs” is that this highlights that they are all

subdimensions of what might be called *perceived efficacy for collective climate action* – the overall perception that a feasible and effective political response is available.

Of course, referring to these cognitions as “efficacy beliefs” has the undesirable feature of blurring Bandura’s distinction between efficacy beliefs and outcome expectancies. However, I would argue that the advantages of the “efficacy” terminology outweigh this disadvantage, as long as care is taken to remind the reader that PE, EOP and PRE also fit Bandura’s definition of outcome expectancies.

2.12 Explication of potential confounding variable – Collective identification

Table 2.7. Summary of collective identification characteristics.

Construct name	Collective identification (Ashmore, Deaux & McLaughlin-Volpe, 2004)
Conceptual definition	Extent to which a person considers themselves part of a group, plus emotional significance of group membership
Alternative names	Collective identity (Polletta & Jasper, 2001) Social identity (Tajfel, 1972)
Example measure	Please indicate how much you agree or disagree with the following statement: I strongly identify with members of climate advocacy groups. 1 - <i>Strongly disagree</i> 2 3 4 - <i>Neither agree nor disagree</i> 5 6 7 - <i>Strongly agree</i>

In measuring the relationships of efficacy and threat variables with action, it is important to control for other variables that might also have substantial effects on political action. Theoretical work (e.g. Polletta & Jasper, 2001; Thomas et al., 2009) as well as substantial empirical evidence (e.g. van Zomeren et al., 2008) suggest that one

other important influence on collective action is collective identification with groups that are engaged in political action. In addition, the empirical finding that perceptions of efficacy tend to be positively correlated with collective identification (van Zomeren et al., 2008, p521) suggests that failing to control for this variable may lead to biased estimates of the relationship between efficacy and action. Any correlations between efficacy and action might not be due to the causal influence of efficacy on action, but due to collective identification causing action, and efficacy merely being correlated with identification. Therefore, I included measures of collective identification in the message experiment, in order to control for it. While collective identification is not of central theoretical interest in this dissertation, in order to understand the conceptual nature of the variable and its operationalization in the experiment, it is explained here.

Collective identification is the degree to which an individual perceives themselves to be attached to a group in several important ways (Ashmore, Deaux & McLaughlin-Volpe, 2004; Polletta & Jasper, 2001; van Zomeren, Postmes & Spears, 2008). One of the most succinct definitions of collective identification was made by Henri Tajfel: “that part of an individual’s self-concept which derives from his knowledge of his membership of a social group together with the value and emotional significance attached to that membership” (Tajfel, 1978, p63). This clearly expresses both the core of the construct of collective identification – an individual-level psychological merging of an individual and a group – and its multidimensional nature. Identification does not necessarily only consist of *whether* an individual considers themselves part of a group, or the *extent* to which they consider themselves part of a group. Identification potentially has other dimensions as

well, such as the importance that group membership holds for the individual's overall sense of self, and their level of affective commitment (i.e. strength of emotional connections) to the group (Ashmore et al., 2004).

More dimensions than self-categorization, importance and affective commitment have been suggested. A 2004 review of collective identity literature across multiple disciplines found more than 10 separate dimensions of collective identification (Ashmore et al., 2004). This raises the question of whether all dimensions should be considered essential elements of collective identification, or whether some dimensions can be ignored for most studies. Some guidance can be found from what scholars have generally focused on when measuring collective identification. Many of the studies analysed in a 2008 meta-analysis of collective identity studies focused on the three dimensions of self-categorization, importance and affective commitment (van Zomeren et al., 2008). There is no evidence that this was due to a conscious, theoretically justified decision made by study authors, as opposed to mere face validity of those three dimensions, combined with disciplinary habit. However, while a more thorough and explicit attempt to determine which dimensions are most important has not been made, the studies reviewed in the meta-analysis suggest that a large part of the empirical work on collective identity focuses on these dimensions. Importantly, the finding that measures of these dimensions are empirically correlated with collective action, when controlling for other influences, suggests that using these dimensions will work (van Zomeren et al., 2008).

Although collective identification involves identification *with* a group, the unit of analysis is the individual and not the group (van Zomeren et al., 2008). Collective

identification focuses on each individual's separate *internal, psychological* sense of identification with the group. While it might be fitting to use the term "collective identification" for a group-level sense of identity, as manifested by a group's shared discourse about their own identity, this would be a different construct (Ashmore et al., 2004).

Collective identification is a psychological state that varies with time (van Zomeren et al., 2008). For example, a political party whose leadership made a series of harmful errors might cause many of their members to identify less strongly with the party. Additionally, different dimensions of identification can vary in differing degrees. Someone who starts working as a volunteer for a political party might have their affective commitment toward the group remain the same, but the importance of their group membership increase. Naturally, because individuals are connected in different ways to different groups, collective identification also varies within individuals, with individuals experiencing different forms of collective identification with each group they identify with (Ashmore et al., 2004; van Zomeren et al., 2008).

As might be expected of an individual-level psychological construct, collective identification has a large part of its roots in the social psychology literature (Ashmore et al., 2004). The most common name applied to the construct in this literature is *social identity*. Collective identification as I conceive of it is identical to many authors' conceptions of social identity, which usually also refers to an individual's sense of their membership in a group, combined with importance of that identity and affective commitment (van Zomeren et al., 2008). Indeed, the definition by Tajfel (1978) above

was attached to a construct that he called social identity. However, following terminological suggestions by Ashmore et al. (2004) and Ellemers, Spears and Doosje (2002) I use the term collective identification, for two reasons. First, I use *collective* rather than *social* because using *social* implies that individual, non-collective identities are not social, and this is not true (Ashmore et al., 2004). All identities have a social element, since we can only define our own identity in relation to others (Ashmore et al., 2004). Using the word collective clarifies that the entity identified with is a collective entity, and “collective” is a suitably general term for many different types of groups. Second, I use collective *identification* rather than collective *identity* in order to make a clear distinction between the *content* of a group’s identity (what a group *is*) and an individual’s *connection* (type and extent of *identification*) to that group (Ellemers et al., 2002). As Ellemers et al. (2002) and Ashmore et al. (2004) note, “collective identity” and “social identity” often are used to refer to both of these concepts. I use the term *identification* in order to clarify that the content of a group’s identity is *not* included in collective identification as I define or measure it.

One antecedent to collective identification is one’s own objective similarity to group members on relevant characteristics (Stürmer & Simon, 2004). For example, individuals could be expected to have a stronger sense of identification with African-American activists, all else being equal, if they themselves are of African descent, compared to being of Caucasian descent. Another influence on collective identification is communication and other forms of social interaction (Polletta & Jasper, 2001). People often learn about particular groups not through their own direct experience, but through

the media or conversations with others. The extent to which they end up identifying with any of these groups will depend on what kind of messages they have received about them. Messages portraying the groups negatively will generally reduce identification, while messages portraying the groups positively will increase identification. Some scholars also argue that directly communicating with other group members, and negotiating the meanings of group identity and group norms, is a requirement for forming any sense of lasting identification with a group (Thomas et al., 2009).

The most important consequence of collective identification, for the purposes of this dissertation, is engagement in collective action. Individuals' levels of identification are thought to affect their levels of collective action by causing an "inner obligation" to act together with the members of their group (Stürmer & Simon, 2004). The stronger the sense of identification, the more an individual will feel obligated to act, and the more likely it becomes that they will actually take action.

As noted above, empirical evidence has been found suggesting that collective identification does have a substantial influence on collective action behavior, independent of other beliefs such as efficacy. A meta-analysis of 27 samples found that collective identification was significantly related to collective action, controlling for the relationships of action to perceptions of efficacy and injustice (van Zomeren et al., 2008). The authors do not state how many of the 27 studies included experimental evidence in which randomized interventions changed individuals' levels of identification, and subsequently changed collective action. However, even correlational evidence supports the idea that collective identification has an independent influence on action. For this

reason, I included measures for collective identification in the message experiment in order to control for this additional potential influence on collective action.

3 HYPOTHESES AND RESEARCH QUESTION

3.1 Are efficacy beliefs distinct?

The explications above show that SE, PE, EOP, CXPE and PRE can all be distinguished at a conceptual level. However, this does not necessarily mean these concepts each have a distinct psychological reality for US citizens. One scholar has suggested that many responses to specific survey questions about climate change in fact reflect more general latent beliefs, rather than the more specific beliefs the questions were intended to measure. Kahan (2015, p9) has argued that responses to survey items measuring perceptions such as that global warming is occurring, that humans are causing it, and that it is dangerous, are in fact caused by a more general disposition to form a consistent set of beliefs about global warming – either that it is happening, human-caused, and dangerous, or that none of these are true. Rather than answering based on considered judgment of the specific question’s contents, individuals instead spontaneously generate an answer based on a much more cognitively available belief: their general stance on global warming.

Several scholars have discussed this phenomenon of individuals answering abstract, unfamiliar or technical survey questions based on more immediately available information. Zaller (1992) wrote that opinions and survey responses are usually generated by individuals’ weighing of different “considerations” that are immediately top-of-mind. In the absence of strong motivation to think deeply about their response, individuals will

often “satisfice” by neglecting to think about considerations that do not come to mind immediately. Importantly, Zaller (1992) noted that considerations could take a variety of forms, ranging from well-considered conscious thoughts (such as “Obama has a poor record on civil liberties”) to more diffuse things like emotions or “inarticulate feelings” (p41). He noted that responses to survey questions were likely to be generated by “averaging across the considerations that are immediately salient or accessible” (Zaller, 1992, p49). Therefore, Zaller’s theory would suggest that individuals answering questions about the likelihood of influencing politicians on global warming might respond based on more accessible, more diffuse latent considerations, such as their perception of the ability to influence politicians generally, or the perception of the likelihood that humans will take action on global warming.

This is similar to Kahneman’s concept of attribute substitution (Kahneman & Frederick, 2002). Attribute substitution refers to a general process whereby individuals attempting to make a judgment of a specific property of something (for example, the quality of Obama’s record on civil liberties) use more readily available information (their overall positive affect toward Obama) to make their decision. The more readily available information can be more general and diffuse, as in the previous example of affect toward Obama. However, attribute substitution can also involve substituting a more available, yet concrete and specific piece of information for a less available, more general piece of information. For example, when asked how happy they are with their life in general (information not readily called to mind for some people), they may instead respond based on their happiness with the date they just went on (Kahneman & Frederick, 2002, p53).

The key point is that, similarly to Zaller's point about top-of-mind considerations, what causes individuals' survey responses may be a vaguely appropriate, yet more easily available consideration, rather than a highly specific and appropriate, yet less available consideration. Even for those who have read about climate politics and potentially *could* deliver a well-reasoned judgment of the likelihood of collective action influencing climate policy might still fail to do so if their motivation was low, and a more general affective impression of the likelihood of action came easier to mind.

In order to determine whether individuals' responses to the different types of items measuring efficacy perceptions (SE, PE, EOP, CXPE and PRE) really measure distinct attitudes, confirmatory factor analyses (CFAs) will be conducted. If CFA models with each type of efficacy perception modeled with its own separate variable are found to fit the observed data better than those modeling a smaller number of more general efficacy perceptions, this will be taken as evidence for the discriminant validity of the different efficacy beliefs. Because past research has shown multiple different efficacy beliefs to be conceptually and empirically distinct from each other, H1 is:

H1: Individuals have five kinds of distinct efficacy perceptions (SE, PE, EOP, CXPE and PRE), rather than a smaller number of more general efficacy perceptions.

3.2 Do all efficacy and threat beliefs affect political action?

Assuming each efficacy belief is indeed distinct, the next step in testing whether the extended EPPM models are accurate is to check whether each of the efficacy and threat beliefs have a significant effect on action, controlling for each of the other beliefs. While previous research provides a theoretical rationale for why each of the beliefs could

be expected to have an effect, no previous studies have tested for the effects of all these variables simultaneously. However, there are theoretical reasons to expect a positive effect of each variable, and a large part of the available empirical evidence supports this idea. For this reason, H2 is:

H2: Each of the distinct efficacy perceptions, as well as perceived threat, have an independent positive effect on political action.

3.3 Which efficacy or threat beliefs have the strongest influence on political action?

Neither the EPPM nor Hart & Feldman's suggested extended EPPM make any theoretical predictions about whether any of the types of efficacy, or threat, are more influential than any of the other beliefs. However, there are both theoretical and practical reasons to be interested in the answer to this question. Theoretically speaking, answering this question would help understand which are the most prominent cognitive barriers to, or facilitators of, participation in collective action. If CXPE had a substantially larger effect on action than PRE, for instance, this would imply that people see the effectiveness of desired policy as less of a concern than whether it is possible to get politicians to enact the policy. Such an imbalance could be considered a theoretically interesting form of "policy effectiveness blindness". From a purely rational point of view, both should be important; because an ineffective policy will not have results, even if enacted, desire to try and enact the policy should vary according to effectiveness. Comparing the quantitative size of the effects of each variable will help answer this kind of question.

The literature provides little guidance on how influential the different types of efficacy are likely to be relative to each other. Rosenstone and Hansen (1993) found that external efficacy, defined in the traditional way as the overall responsiveness of the political system, was more strongly associated with voting than internal efficacy. Lee (2006), on the other hand, found that this kind of external efficacy was *negatively* associated with intentions to participate in protest, while collective external efficacy (the ability of citizens to influence government if they act) was positively associated, and internal efficacy was not significantly associated with protest intentions. Finkel and Muller (1998) found that individual external efficacy was a stronger predictor of protest behavior than a measure that multiplied collective external political efficacy with expectation of others' participation. Flood (1993) found that CXPE was a stronger predictor of union members' participation in a union meeting than PE.

In summary, the literature provides little guidance on which variables are most likely to be influential on action. The few studies that have measured the effects of different types of efficacy on political action have used different measures, been conducted in different contexts on different populations, with different outcome measures. While generally speaking, many of the efficacy variables seem to be positively associated with collective action, this is not always the case, and some have been found to be negatively associated. As well as inconsistency in whether significant relationships exist, and which direction they are in, there is substantial variation in the magnitude of the effects each variable has on action. Therefore, there is not enough evidence to make

any hypotheses about which efficacy or threat perceptions will have the largest influence on behavior. For this reason, RQ1 is:

RQ1: Of all the efficacy and threat perceptions that have a significant effect on action, which have stronger effects, and which have weaker effects?

4 CCAM SURVEY – METHOD

4.1 Survey procedure

Data for this section of the analysis come from the Spring 2014 wave of the Climate Change in the American Mind survey, conducted by the George Mason University Center for Climate Change Communication and the Yale Project on Climate Change Communication (Leiserowitz et al., 2014). This is a biannual, nationally representative survey that has been running since 2008. Respondents are drawn from an online, non-volunteer, probability-based panel of 50,000 members, maintained by GfK (formerly Knowledge Networks). Respondents recruited to the panel who do not have internet access are loaned a laptop computer, in order to counteract response bias from only sampling those individuals who already have internet access. Respondents complete the self-administered survey via a web browser.

The data from the Spring 2014 wave of the survey contained questions pertaining to three types of efficacy - SE, CXPE and PRE – where other waves contained, at most, items pertaining to two separate types of efficacy. Therefore, only this survey wave enabled comparison of the independent relationships of these types of efficacy with collective action, controlling for each of the other types of efficacy.

4.2 Measures

Descriptive statistics for these measures can be seen in Table 5.2; Information on missing data is available in Section 5.3.

Self-efficacy (SE)

SE was measured with an item that asked respondents, “If you were to contact a government official about global warming, how confident are you that you would be able to clearly express your views?” Response options consisted of a seven-point scale, labeled at each end with “1 – Not at all confident” and “7 – Completely confident”, as well as separate options for “Not sure” and “Prefer not to answer”. In order for the variable to be modeled as a continuous variable, these latter two responses were treated as missing data, as were cases where no response was recorded. For all other variables in these cross-sectional analyses, “don’t know” answers and refusals to answer were treated as missing data. As described further below, because SEM analyses used a full information maximum likelihood estimator, all cases with missing data were still included in the analysis.

Collective external political efficacy (CXPE)

CXPE was measured with two items. The first asked, “If people who share your views work together, how much do you think they could influence the decisions of government officials regarding global warming?” Responses were on a four-point scale, each point of which was labeled: “Not at all,” “Only a little,” “A moderate amount”, and “A lot.” “Not sure” and “Prefer not to answer” responses were also available, but were treated as missing data.

The second CXPE item asked, “How much influence do you think each of the following has on the decisions that elected officials make about how to deal with global warming?” This was followed by the following list of items, presented to each participant in random order:

- a. Large campaign contributors
- b. Coal, oil, and natural gas companies
- c. Solar, wind, and geothermal companies
- d. Environmentalists
- e. Public opinion polls
- f. Climate scientists
- g. The liberal news media
- h. The conservative news media
- i. People who share your views on global warming
- j. The people in your district or state

Responses were on a four-point scale: “No influence,” “A little influence,” “Some influence,” and “A lot of influence,” with “Don’t know” and “Prefer not to answer” responses also available. From these 10 items, only item i, “People who share your views on global warming,” was selected as a measure of CXPE, as only this item seemed likely to measure *all* individuals’ perceived likelihood of being able to collectively influence politicians on global warming by joining with others. Item d was not selected, as the intention was to measure the perceived efficacy of the group that individuals would hypothetically be joining if they were to collectively act on global warming. Many individuals might consider themselves as potentially likely to act, but would not label the group they would act with “environmentalists”. Similarly, item j, “the people in your district or state”, would not measure the perceived efficacy of groups working to influence politicians to fight global warming for those who perceived majority opinion in

their district or state to be *against* acting on global warming. Cronbach's alpha statistics are not reported for the two CXPE items, or for any other sets of items in this dissertation; this measure is often not a particularly good measure of the unidimensionality of a set of items, as it can have values commonly regarded as "acceptable" merely due to having a large number of items (Cortina, 1993; Schmitt, 1996). Instead, bivariate correlations between items are displayed in Table 5.3, and standardized loadings for each item are displayed in Table 5.6.

Policy response efficacy (PRE)

Before the survey was conducted, I consulted with Edward Maibach and Teresa Myers on the ideal wording for an item measuring PRE. In the end, we requested that the following item be included:

If government officials were to enact policies to dramatically increase the use of renewable energy, and thus dramatically reduce the use of fossil fuels, how much do you think this would reduce global warming?

The response scale would have been a 7-point Likert-type scale, with the two ends of the scale labeled "Not at all" and "A great deal." However, because this item was not included on the survey, PRE for the present study was measured with eight proxy items that asked respondents about the perceived consequences of the US acting on global warming. These items were chosen in the hope that respondents would only report that the US acting on global warming would have positive effects if they also thought that national policies would effectively reduce the threat to citizens. The full list of items

presented was headed up with the text, “If our nation takes steps to reduce global warming, it will...” followed by the following items, in random order:

- a. Help free us from dependence on foreign oil
- b. Improve people’s health
- c. Improve our national security
- d. Create green jobs and a stronger economy
- e. Save many plant and animal species from extinction
- f. Protect god’s creation
- g. Save many people around the world from poverty and starvation
- h. Provide a better life for our children and grandchildren
- i. Prevent the destruction of most life on the planet
- j. Protect the world’s poorest people from environmental harm caused by the world’s richest people
- k. Lead to more government regulation
- l. Cost jobs and harm our economy
- m. Undermine American sovereignty
- n. Cause energy prices to rise
- o. Interfere with the free market
- p. Harm poor people more than it helps them

Responses were on a five-point scale: “Strongly agree,” “Moderately agree,” “Neither agree nor disagree,” “Moderately disagree,” “Strongly disagree”, in addition to “Don’t know” and “Prefer not to answer” responses (which were coded as missing data). From the full list of items, only items b, c, d, e, g, h, i and j (highlighted in red above) were used as proxy measures of PRE. Items k through p, indicating possible negative consequences of global warming action, were not used because an individual might perceive these as likely to occur whether or not they believed that action would reduce the threat of global warming. Therefore they would not serve as useful proxy measures of PRE. Item a was not used for a similar reason – global warming policy could be seen as likely to reduce foreign oil dependence whether or not it was successful in reducing global warming. Finally, item f was not used because responses to it were expected to be confounded by respondents’ religious beliefs (or lack thereof).

Threat

Threat was also measured with a list of items, headed up by the phrase “How much do you think global warming will harm:” and followed by the following list:

- a. You personally
- b. Your family
- c. People in your community
- d. People in the United States
- e. People in modern industrialized countries
- f. People in developing countries
- g. Future generations of people
- h. Plant and animal species

Response options were on a four-point scale: “Not at all,” “Only a little,” “A moderate amount,” and “A great deal,” with “Don’t know” responses also available (and coded as missing). It was expected that these items would tap both components of threat - severity and susceptibility. This was because the question asked about the extent of harm – “how much” – as well as likelihood of occurrence – “do you think global warming *will* harm...”.

Dependent measures

Past action

Respondents’ self-reported political actions were elicited with a list of six items headed up with the phrase, “Over the past 12 months, how often, if ever, have you done the following?” This was followed by the following list of items, always in the same order:

- a. Signed a petition about global warming, either online or in person
- b. Donated money to an organization working on global warming
- c. Donated money to a political candidate because they share your views on global warming
- d. Attended a town hall meeting or rally about global warming

- e. Met with an elected official or their staff about global warming
- f. Volunteered your time to elect a political candidate because they share your views on global warming

Response options were on a four-point scale: “Never,” “Rarely,” “Occasionally”, and “Often”, with “Don’t know” and “Prefer not to answer” options also available (and coded as missing).

Action intentions

These were measured with fourteen items, six of which were similar in content to the political action items. The list of items was headed up with the phrase, “How likely would you be to do each of the following things if a person you like and respect asked you to?” This was followed by the following list of items, with the first twelve items presented in a randomized order, but the last two (items m and n) always presented in those positions:

- a. Write letters, email, or phone government officials about global warming
- b. Write letters, email, or phone a newspaper about global warming
- c. Sign a petition about global warming, either online or in person
- d. Sign a pledge to vote only for political candidates who share your views on global warming
- e. Volunteer your time to an organization working on global warming
- f. Donate money to an organization working on global warming
- g. Donate money to a political candidate because they share your views on global warming
- h. Attend a public meeting or presentation about global warming
- i. Meet with an elected official or their staff about global warming
- j. Volunteer your time to elect a political candidate because they share your views on global warming
- k. Attend a neighborhood meeting to discuss global warming and actions people can take
- l. Host a neighborhood meeting in your home to discuss global warming and actions people can take
- m. Support an organization engaging in non-violent civil disobedience (e.g., sit-ins, blockades, or trespassing) against corporate or government activities that make global warming worse
- n. Personally engage in non-violent civil disobedience (e.g., sit-ins, blockades, or trespassing) against corporate or government activities that make global warming worse

Responses available were on a four-point scale: “Definitely would not,” “Probably would not,” “Probably would,” and “Definitely would,” with “Don’t know” and “Prefer not to answer” options also available (and coded as missing).

Covariates

Ideology

This was measured with an item that asked respondents, “In general, do you think of yourself as...” followed by five options: “Very liberal,” “Somewhat liberal,” “Moderate, middle of the road,” “Somewhat conservative,” and “Very conservative”.

Age

Respondents typed their age in numerals into a text box. This number was entered directly into analyses as a continuous variable.

Gender

Participants indicated whether they were female or male; no other response options were offered. Gender was entered into all analyses as a binary variable, with male coded as 1 and female coded as 2.

Race/ethnicity

Respondents were given five options: “White, Non-Hispanic,” “Black, Non-Hispanic,” “Other, Non-Hispanic,” “Hispanic,” and “2+ Races, Non-Hispanic.” Race was recoded as a binary variable before being entered into analyses, with “White, Non-Hispanic” coded as 0 and all other responses coded as 1.

Education

Respondents' education was coded as a continuous variable with four values: 1-Less than high school, 2-High school graduate, 3-Some college, 4-Bachelors degree or higher.

Income

Respondents were offered 19 separate response options to indicate their annual household income. The ranges of income indicated by each of these options were not all equal in size. Therefore, these were recoded into a variable with eight possible values, all but the highest representing a range of equal size. These values were as follows:

1. "Less than \$5,000" to \$24,999
2. \$25,000 to \$49,999
3. \$50,000 to \$74,999
4. \$75,000 to \$99,999
5. \$100,000 to \$124,999
6. \$125,000 to \$149,999
7. \$150,000 to \$174,999
8. "\$175,000 or more"

Because more than 94% of respondents fell into the lower 7 categories, it was assumed that modeling this variable as a continuous variable would be acceptable, despite the highest category representing a potentially much wider range of income than all the others.

4.3 Position of items in survey

The total number of questions in the survey varied, as some were only asked of those who gave particular answers (e.g. only those who reported disbelief in global warming were asked how certain they were that global warming is not happening). However, the total number of questions was approximately 235. These took respondents

an average of 32 minutes to complete (Leiserowitz et al., 2014). The relative position of each of the items in the survey is displayed in Table 4.1.

Table 4.1. CCAM items and their position in the overall survey.

Variable	Scale Points	Text	Position (out of 235)
Threat 1	4	[You personally] How much do you think global warming will harm:	78
Threat 2	4	[Your family] How much do you think global warming will harm:	79
Threat 3	4	[People In your community] How much do you think global warming will harm:	80
Threat 4	4	[People in the United States] How much do you think global warming will harm:	81
Threat 5	4	[People in modern industrialized countries] How much do you think global warming will harm:	82
Threat 6	4	[People in developing countries] How much do you think global warming will harm:	83
Threat 7	4	[Future generations of people] How much do you think global warming will harm:	84
Threat 8	4	[Plant and animal species] How much do you think global warming will harm:	85
PRE 1	5	[Improve people's health] If our nation takes steps to reduce global warming, it will...	143
PRE 2	5	[Improve our national security] If our nation takes steps to reduce global warming, it will...	144
PRE 3	5	[Create green jobs and a stronger economy] If our nation takes steps to reduce global warming, it will...	145
PRE 4	5	[Save many plant and animal species from extinction] If our nation takes steps to reduce global warming, it will...	146
PRE 5	5	[Save many people around the world from poverty and starvation] If our nation takes steps to reduce global warming, it will...	148
PRE 6	5	[Provide a better life for our children and grandchildren] If our nation takes steps to reduce global warming, it will...	149
PRE 7	5	[Prevent the destruction of most life on the planet] If our nation takes steps to reduce global warming, it will...	150
PRE 8	5	[Protect the world's poorest people from environmental harm caused by the world's richest people] If our nation takes steps to reduce global warming, it will...	151
Past action 1	4	[Signed a petition about global warming, either online or in person] Over the past 12 months, how often, if ever, have you done the following?	158
Past action 2	4	[Donated money to an organization working on global warming] Over the past 12 months, how often, if ever, have you done the following?	159
Past action 3	4	[Donated money to a political candidate because they share your views on global warming] Over the past 12 months, how often, if ever, have you done the following?	160
Past action 4	4	[Attended a town hall meeting or rally about global warming] Over the past 12 months, how often, if ever, have you done the following?	161
Past action 5	4	[Met with an elected official or their staff about global warming] Over the past 12 months, how often, if ever, have you done the following?	162
Past action 6	4	[Volunteered your time to elect a political candidate because they share your views on global warming] Over the past 12 months, how often, if ever, have you done the following?	163

Variable	Scale Points	Text	Position (out of 235)
Action intentions 1	4	[Write letters, email, or phone government officials about global warming] How likely would you be to do each of the following things if a person you like and respect asked you to?	164
Action intentions 2	4	[Sign a petition about global warming, either online or in person] How likely would you be to do each of the following things if a person you like and respect asked you to?	166
Action intentions 3	4	[Sign a pledge to vote only for political candidates who share your views on global warming] How likely would you be to do each of the following things if a person you like and respect asked you to?	167
Action intentions 4	4	[Volunteer your time to an organization working on global warming] How likely would you be to do each of the following things if a person you like and respect asked you to?	168
Action intentions 5	4	[Donate money to an organization working on global warming] How likely would you be to do each of the following things if a person you like and respect asked you to?	169
Action intentions 6	4	[Donate money to a political candidate because they share your views on global warming] How likely would you be to do each of the following things if a person you like and respect asked you to?	170
Action intentions 7	4	[Meet with an elected official or their staff about global warming] How likely would you be to do each of the following things if a person you like and respect asked you to?	172
Action intentions 8	4	[Volunteer your time to elect a political candidate because they share your views on global warming] How likely would you be to do each of the following things if a person you like and respect asked you to?	173
Action intentions 9	4	[Support an org engaging in civil disobedience against corporate or govt activities that make global warming worse] How likely would you be to do each of the following things if a person you like and respect asked you to?	176
Action intentions 10	4	[Personally engage in civil disobedience against corporate or government activities that make global warming worse] How likely would you be to do each of the following things if a person you like and respect asked you to?	177
SE	7	If you were to contact a government official about global warming, how confident are you that you would be able to clearly express your views?	178
CXPE 1	4	If people who share your views work together, how much do you think they could influence the decisions of government officials regarding global warming?	179
CXPE 2	4	[People who share your views on global warming] How much influence do you think each of the following has on the decisions that elected officials make about how to deal with global warming?	201
Pol. Ideology	5	In general, do you think of yourself as... [Very liberal, Somewhat liberal, Moderate/middle of the road, Somewhat conservative, Very conservative]	227

Most other items in the survey were related to global warming, and may have influenced participants' responses. Roughly the first 48 items were unrelated to global warming, but items 49-55 related to taxes on fossil fuels, and items 66-77 related explicitly to the respondents' beliefs about global warming. Therefore, all of the items analyzed in the present study were answered after the participants were already primed with thoughts about global warming and government regulation of fossil fuels.

5 CCAM SURVEY – RESULTS

5.1 Response rate

In calculating response rates for online panel surveys such as those run by GfK, four proportions are combined to give a figure that accurately expresses the sample size as a proportion of all those individuals who in theory *could* have been included in the final sample. These four proportions are the recruitment rate, profile rate, retention rate, and completion rate (Callegaro & DiSogra, 2008). Full description of these terms is available in the article by Callegaro and DiSogra (2008), but they can briefly be described as follows. The recruitment rate represents the proportion of all those individuals who were asked by GfK to join the online panel who gave their initial consent to participate. The profile rate represents the proportion of all those who were recruited who fill out the requested demographic and other details in the profile that all recruited panel members are asked to complete. The retention rate represents the proportion of panel members remaining in the panel when the survey was completed, out of all those who had been present the previous year. Finally, the completion rate represents the proportion of all those panel members who were asked to complete the specific survey of interest who, in the end, did complete the survey. These proportions are all multiplied together to give the cumulative response rate.

The survey in the present study was conducted in April 2014, and had a recruitment rate of 13%, a profile rate of 65%, a retention rate of 35%, and a completion

rate of 48%, which gives a cumulative response rate of 1.2% (again allowing for rounding). The total N for this survey was 1,384 participants.

While this response rate may seem low, a recent study suggests that opt-in Internet panel surveys such as these produce data that are approximately as representative of the general population as other methods with higher response rates, such as mail surveys (Ansolabehere & Schaffner, 2014). The authors conducted three simultaneous surveys in 2010 that were nearly identical, but used different modes of survey completion: opt-in internet panel, telephone, and mail survey. Their results suggested that the only substantial differences may have been due to internet panel surveys overrepresenting those with internet access; however, because GfK makes special effort to recruit those without internet access and supply them with an internet-capable computer, this problem should be reduced for the present study. Therefore, there is good evidence to believe that the present survey data, appropriately weighted, are representative of the US population.

5.2 Exclusion from analysis due to global warming beliefs

It would not make sense to analyze the effects of beliefs in the threat global warming poses, or the effectiveness of political action in dealing with it, for those who do not believe global warming is occurring. There is good reason to believe that item responses for those who disbelieve in global warming would have a qualitatively different meaning, and a substantially less interpretable one, than responses by those who do believe in global warming. Therefore, I decided to restrict this analysis to only those

respondents who believed in global warming. Specifically, this meant those individuals who answered “Yes” to the following question:

Recently, you may have noticed that global warming has been getting some attention in the news. Global warming refers to the idea that the world’s average temperature has been increasing over the past 150 years, may be increasing more in the future, and that the world’s climate may change as a result.

What do you think: Do you think that global warming is happening?

The other answer options were “No” and “Don’t know”; respondents who chose either of these were excluded from the present analysis. Of the 1384 individuals in the total sample, 819 (59%) answered “Yes”, 314 (23%) answered “No”, 247 (18%) answered “Don’t know”, and 4 (0.3%) did not give any response.

To give a clearer understanding of how these excluded respondents differed from those included, a table comparing the two groups on relevant survey responses is presented in Appendix 1.

5.3 Missing data

As noted above, many of the survey items included response options that were coded as missing data. Because the way missing data is dealt with has important implications for the interpretation and validity of subsequent analyses, a brief summary of missing data for the cross-sectional CCAM analysis is reported here.

Across all questions in this analysis, there were three types of response that were coded as missing: “Don’t know” (sometimes labeled as “not sure”), “Prefer not to answer”, and “Refused/no response”. The difference between these latter two responses

is that “Prefer not to answer” was a response that was actually displayed on the screen, whereas “Refused/no response” was what was recorded when the respondent made no response whatsoever to that question item.

I coded “Don’t know” responses as missing data for several reasons. In order to model the variables as ordinal or continuous scales, it was necessary to either replace the variables with a point on the numerical scale (i.e. some form of imputation), code them as missing, or remove any cases with missing data from the analysis altogether (i.e. listwise deletion). Listwise deletion is widely regarded as one of the worst ways to deal with missing data, as it results in huge amounts of information being lost from cases that maybe have only one or two missing values (Peugh & Enders, 2004). Some imputation methods such as hotdeck imputation or multiple imputation have been found to perform well, and lead to relatively unbiased results after replacing missing data (Myers, 2011). However, hotdeck imputation is unreliable when data is missing for 20% or more of responses to a variable; the large number of variables in this analysis with close to 20% missing made this seem unwise. Multiple imputation, while a very strong method, is quite computationally intensive and time-consuming (Allison, 2003; Graham, 2009). Because full information maximum likelihood (FIML) estimation is readily implemented via Mplus, the software used for this analysis, and is generally regarded as equally good as multiple imputation (Peugh & Enders, 2004), it was decided to simply code DK values as missing and use the FIML function in Mplus.

FIML estimation operates by iteratively generating model parameters in a trial-and-error process, until the parameter estimate that gives the highest possible probability

of observing the available data is found (Enders & Bandalos, 2001). This is different to least squares estimation, in which the parameter estimates are based on mathematically solving to obtain the value that provides the lowest overall squared error values, without any kind of iteration. To repeat, FIML parameter estimates are chosen iteratively based on probability, while least squares parameter estimates are chosen mathematically based on lowest squared error. FIML is superior to other missing data methods, such as pairwise deletion, due to its use of all available data for estimating as many parameters as possible (hence the “Full Information” in its name; Enders & Bandalos, 2001).

To illustrate how this works, consider pairwise deletion. In pairwise deletion, in calculating the effect of independent variable X on dependent variable Y, only cases without any missing data on X or Y are used. Cases with missing data on a second independent variable, Z, would still be used to calculate the effect of X on Y, but would not be used to calculate the effect of Z on Y. Conversely, cases with missing data on X, but nothing missing on Z, *would* be used to calculate the effect of Z on Y.

With FIML estimation, data from cases where the X is missing *are* used in estimating the effect of X on Y (Enders & Bandalos, 2001). This is possible due to the relationship between X and other predictors such as Z. In effect, whenever X is missing FIML takes note of observable trends in cases where both X and Z are available. It then calculates what X is likely to be wherever X is missing, and bases its parameter estimates of the X-Y effect on likely values of X, as well as actually observed values of X.

FIML does have the disadvantage of assuming a normal distribution, which not all other estimation methods do. However, studies have found that violations of this

assumption will often not result in large amounts of bias in model parameters (Enders, 2001; Graham & Schafer, 1999; Peugh & Enders, 2004). One analysis in this set of CCAM analyses was performed with Mplus' Weighted Least Squares with Mean- and Variance-adjusted test statistics (WLSMV) estimator (also known as categorical diagonally-weighted least squares or cat-DWLS estimation; Bandalos, 2014). This estimator uses pairwise deletion for cases of missing data. As pairwise deletion results in many parts of the model being based on data from a subset of the overall sample, it can substantially bias the results compared to FIML. This bias could potentially be reduced by imputing values for DK responses, and performing the analysis using the imputed dataset with no data missing. However, this would still potentially introduce another form of bias, as the imputed values would be based on others in the dataset, rather than those respondents themselves. Because this analysis was only used as a robustness check on the main results of the CCAM SEM analyses, and because imputation would at best reduce bias rather than eliminating it, it was decided not to impute values for DK responses, or any other kind of missing data.

Based on these decisions about how to deal with problematic response categories, a summary of missing data for this analysis is displayed in Table 5.1.

Table 5.1. Percentages of each CCAM variable that were coded as missing data.

	Don't know	Prefer not to answer	No response	Total % missing
SE	14	3	0.6	18
CXPE 1	12	2	0.5	15
CXPE 2	12	3	2	17
PRE 1	4	2	1	7
PRE 2	12	2	1	15
PRE 3	8	1	2	11
PRE 4	6	2	1	9
PRE 5	10	2	2	13
PRE 6	4	2	2	7
PRE 7	6	2	1	9
PRE 8	8	2	2	11
Threat 1	5			5
Threat 2	6			6
Threat 3	6			6
Threat 4	5			5
Threat 5	6			6
Threat 6	6		0.1	6
Threat 7	6			6
Threat 8	5			5
Past action 1	4	1	1	6
Past action 2	3	2	2	7
Past action 3	3	2	1	6
Past action 4	2	1	2	5
Past action 5	2	1	1	4
Past action 6	2	2	1	5
Action intentions 1	12	3	1	16
Action intentions 2	9	3	2	13
Action intentions 3	14	3	0.9	18
Action intentions 4	15	2	2	19
Action intentions 5	13	3	2	18
Action intentions 6	13	4	1	18
Action intentions 7	12	3	2	16
Action intentions 8	15	3	1	19
Action intentions 9	12	4	2	18
Action intentions 10	12	4	2	17
Political Ideology			2	2

(Percentages of one or greater have been rounded to the nearest whole number)

There were no missing values for demographic information, as this information is kept on file for all Knowledge Networks respondents after they sign up for the panel. For most other variables, there were substantial amounts of missing data, ranging from 2% for political ideology to 19% for two action intention items. The mean percentage of missing data across all these variables was 11%.

5.4 Descriptive statistics

In order to clarify the nature of participants' responses to the items of interest – efficacy, threat, past action, and action intentions – a summary of descriptive statistics, skew, and kurtosis, is displayed in Table 5.2. Bar graphs of distributions of these variables are available in . Note that for these results, and all results prior to the confirmatory factor analyses in Section 5.7, unweighted data are used. In other words, the results are for the 819 actual individuals who completed the survey, and indicated belief in global warming, without any adjustment in order to make results more similar to a nationally representative sample. From the confirmatory factor analyses onward, weights are used to make the results more nationally representative.

Table 5.2. Descriptive statistics of all CCAM items.

	N	Mean	SD	Skewness	S.E.	Kurtosis	S.E.
SE	673	4.50	2.00	-0.39	0.09	1.94	0.19
CXPE1	700	2.44	0.84	0.04	0.09	2.42	0.19
CXPE2	682	2.39	0.83	-0.05	0.09	2.38	0.19
PRE1	761	3.89	0.99	-0.93	0.09	3.76	0.18
PRE2	699	3.08	1.12	-0.19	0.09	2.57	0.19
PRE3	733	3.75	1.02	-0.82	0.09	3.34	0.18
PRE4	749	3.83	1.07	-0.93	0.09	3.43	0.18
PRE5	716	3.33	1.13	-0.41	0.09	2.62	0.18
PRE6	759	4.10	0.99	-1.25	0.09	4.48	0.18
PRE7	744	3.57	1.20	-0.65	0.09	2.60	0.18
PRE8	727	3.36	1.20	-0.53	0.09	2.52	0.18
Threat1	776	2.45	0.95	0.07	0.09	2.10	0.18
Threat2	773	2.64	0.93	-0.13	0.09	2.14	0.18
Threat3	773	2.69	0.92	-0.17	0.09	2.18	0.18
Threat4	776	2.95	0.93	-0.51	0.09	2.36	0.18
Threat5	771	2.97	0.91	-0.53	0.09	2.43	0.18
Threat6	767	3.15	0.94	-0.78	0.09	2.54	0.18
Threat7	773	3.58	0.76	-1.86	0.09	5.76	0.18
Threat8	778	3.52	0.81	-1.67	0.09	4.97	0.18
Past1	766	1.41	0.84	1.87	0.09	5.19	0.18
Past2	763	1.35	0.76	2.08	0.09	6.17	0.18
Past3	773	1.25	0.67	2.75	0.09	9.60	0.18
Past4	777	1.19	0.59	3.29	0.09	13.28	0.18
Past5	784	1.14	0.52	4.12	0.09	19.78	0.17
Past6	780	1.17	0.59	3.55	0.09	15.01	0.18
Intent1	686	2.24	0.90	0.12	0.09	2.15	0.19
Intent2	711	2.76	0.98	-0.48	0.09	2.27	0.18
Intent3	671	2.41	0.98	-0.05	0.09	1.96	0.19
Intent4	660	2.23	0.86	0.07	0.10	2.19	0.19
Intent5	668	2.20	0.89	0.06	0.10	2.01	0.19
Intent6	670	2.01	0.86	0.41	0.09	2.33	0.19
Intent7	686	2.16	0.85	0.20	0.09	2.30	0.19
Intent8	662	2.06	0.85	0.34	0.10	2.33	0.19
Intent9	673	1.95	0.90	0.51	0.09	2.26	0.19
Intent10	682	1.73	0.80	0.93	0.09	3.27	0.19

Many responses were relatively non-normal. Responses to SE and PRE items tended toward the high end of the distribution. Responses to the two CXPE items tended toward the middle of the scale. Threat responses tended to fall in the middle of the scale for items asking respondents about harm to proximate groups such as their family and community. Threat responses tended toward the high end of the scale for more distant groups such as industrialized countries, developing countries, and plants and animals. Responses to past action items departed the most from normality, with most respondents having never taken each of the political actions. These were the only variables meeting the conditions for “severe” non-normality (West, Finch, & Curran, 1995). Action intentions fell in the middle for easier actions, and toward the low end of the scale for the harder ones.

The non-normality of many variables, and especially the severe non-normality of the past action variables, suggests that it might be problematic to model these variables as continuous, as opposed to ordinal categorical variables. However, I decided to model all variables as continuous rather than categorical, for the following reasons. When modeling categorical data with MPlus, using robust maximum likelihood (MLR) estimation is computationally intense, and does not provide most commonly used fit statistics. MLR estimation is highly desirable for this analysis of CCAM data, as it enables both the use of FIML treatment of missing data, and the use of sampling weights to make the results closer to what would have been obtained from a nationally representative sample. The WLSMV estimator would enable modeling all variables as categorical, and provision of common fit statistics. However, WLSMV estimation uses pairwise deletion to deal with

missing data. Considering the large amount of missing data in the CCAM sample, WLSMV estimation would run the risk of producing substantially biased results compared to MLR estimation (Enders & Bandalos, 2001). MLR has been found to be robust to even relatively severe violations of the assumption of normal data . Because the problem of missing data is thus arguably more severe for this dataset than the problem of non-normality, I decided to use an estimation method that is better at dealing with missing data, as opposed to a different method (WLSMV) that removes the problem of non-normality by modeling the variables as categorical. Using MLR also has the advantage of providing the commonly-used fit statistics that enable measures of absolute fit (whether a model fits well or poorly, compared to an objective ideal standard) as well as relative fit (whether one model fits better or worse than another comparable model). Finally, in order to check whether the results obtained by MLR estimation are robust, I compare the final SEM analysis in Section 5.9 to an analysis with the WLSMV estimator, that treats all latent variable indicators as categorical.

5.5 Bivariate correlations

Table 5.3. Bivariate correlations for all CCAM items.

	SE	CXPE1	CXPE2	PRE1	PRE2	PRE3	PRE4	PRE5	PRE6	PRE7	PRE8	Thr1	Thr2	Thr3	Thr4	Thr5	Thr6	Thr7	Thr8	Past1	Past2	Past3	Past4	Past5	Past6	Int1	Int2	Int3	Int4	Int5	Int6	Int7	Int8	Int9	Int10		
CXPE1	.14																																				
CXPE2	.10	.32																																			
PRE1	.02	.26	.19																																		
PRE2	.07	.15	.10	.40																																	
PRE3	.02	.27	.17	.59	.45																																
PRE4	.03	.26	.17	.60	.38	.58																															
PRE5	.00	.29	.17	.57	.47	.53	.55																														
PRE6	.02	.21	.14	.66	.37	.59	.67	.54																													
PRE7	.03	.31	.19	.58	.46	.56	.68	.59	.60																												
PRE8	.04	.20	.12	.48	.55	.55	.58	.60	.48	.55																											
Threat1	.13	.24	.27	.30	.14	.27	.30	.29	.28	.37	.24																										
Threat2	.14	.22	.24	.28	.15	.28	.30	.29	.31	.35	.27	.86																									
Threat3	.14	.23	.24	.31	.17	.30	.32	.30	.31	.36	.27	.82	.90																								
Threat4	.11	.23	.24	.35	.19	.35	.37	.33	.36	.38	.31	.70	.79	.84																							
Threat5	.11	.20	.23	.33	.16	.32	.38	.29	.34	.38	.31	.67	.75	.80	.92																						
Threat6	.09	.19	.20	.33	.22	.30	.36	.32	.35	.35	.33	.56	.62	.67	.77	.82																					
Threat7	.01	.20	.18	.37	.15	.37	.41	.32	.44	.39	.29	.42	.49	.51	.60	.62	.65																				
Threat8	.03	.23	.19	.37	.17	.38	.41	.34	.40	.39	.32	.45	.51	.54	.60	.63	.69	.85																			
Past1	.21	.17	.11	.21	.20	.24	.16	.21	.19	.21	.25	.18	.20	.22	.21	.22	.22	.14	.17																		
Past2	.20	.12	.13	.19	.22	.20	.15	.18	.12	.18	.22	.14	.21	.22	.20	.21	.19	.09	.13	.67																	
Past3	.21	.10	.13	.05	.11	.07	.02	.09	.04	.04	.10	.08	.13	.15	.11	.13	.11	-.01	.04	.50	.69																
Past4	.14	.08	.16	.02	.08	.03	-.01	.08	.01	.03	.07	.12	.17	.16	.13	.12	.08	-.02	.02	.49	.56	.59															
Past5	.10	.03	.16	-.01	.05	-.01	-.08	.05	-.06	.01	.08	.13	.14	.13	.08	.07	.02	-.05	.00	.44	.54	.60	.84														
Past6	.15	.09	.18	.01	.05	.04	-.04	.05	-.02	.01	.04	.13	.15	.13	.08	.09	.04	-.03	.01	.49	.52	.60	.73	.74													
Intent1	.28	.28	.20	.31	.24	.32	.26	.28	.32	.28	.29	.27	.31	.32	.33	.32	.32	.26	.25	.36	.32	.26	.21	.17	.22												
Intent2	.22	.26	.22	.40	.21	.37	.39	.33	.42	.35	.35	.26	.31	.33	.37	.38	.39	.41	.40	.37	.26	.19	.14	.08	.12	.64											
Intent3	.20	.26	.21	.27	.23	.32	.27	.27	.24	.33	.30	.24	.24	.28	.28	.27	.26	.24	.24	.34	.27	.22	.16	.12	.17	.61	.67										
Intent4	.16	.26	.28	.36	.23	.33	.26	.27	.36	.33	.29	.33	.36	.37	.35	.32	.29	.30	.29	.35	.36	.26	.30	.27	.31	.71	.58	.59									
Intent5	.24	.28	.29	.33	.19	.29	.29	.31	.34	.33	.26	.32	.34	.37	.35	.35	.34	.28	.28	.33	.44	.35	.24	.20	.21	.67	.59	.56	.69								
Intent6	.28	.23	.23	.23	.22	.25	.21	.26	.27	.27	.29	.23	.27	.27	.25	.24	.26	.14	.15	.33	.42	.46	.24	.23	.27	.63	.49	.57	.60	.78							
Intent7	.26	.23	.22	.27	.18	.27	.16	.20	.22	.21	.23	.29	.29	.28	.28	.24	.24	.17	.18	.29	.30	.28	.25	.22	.25	.68	.49	.54	.70	.62	.61						
Intent8	.23	.27	.25	.25	.25	.28	.19	.24	.27	.26	.24	.31	.33	.33	.33	.29	.27	.23	.22	.21	.31	.34	.34	.32	.25	.32	.66	.47	.55	.72	.64	.69	.67				
Intent9	.18	.26	.26	.26	.21	.30	.25	.28	.29	.31	.29	.30	.33	.33	.31	.29	.27	.24	.23	.24	.38	.33	.28	.31	.25	.30	.57	.53	.52	.61	.57	.54	.53	.57			
Intent10	.16	.17	.24	.14	.20	.22	.15	.18	.16	.23	.22	.24	.25	.23	.20	.20	.13	.12	.12	.30	.30	.28	.32	.32	.34	.50	.36	.40	.55	.50	.50	.50	.55	.80			
Ideology	-.12	-.15	-.09	-.24	-.27	-.30	-.26	-.26	-.28	-.28	-.34	-.17	-.22	-.24	-.29	-.29	-.30	-.28	-.30	-.30	-.25	-.22	-.13	-.13	-.14	-.26	-.31	-.21	-.25	-.26	-.24	-.18	-.18	-.32	-.24		

Red numbers in Table 5.3 are significant correlations ($p < .05$). Black numbers are non-significant correlations ($p \geq .05$). Cell backgrounds are shaded according to the absolute strength of correlation, with stronger correlations shaded darker. For political ideology, conservative ideology is coded high. This means that, for example, the negative correlation between ideology and threat means that more conservative people perceive less threat from global warming than more liberal people.

Most items were significantly positively correlated with most other items, meaning that those who perceived greater efficacy (of all types) generally also perceived higher levels of threat from global warming, were more likely to have taken action, and so on. Responses to most items tended to be correlated quite strongly with other items measuring the same construct. A notable exception to this is the two CXPE items, which had a correlation of only .32. Despite this, as shown below, both items loaded adequately

on a latent variable based on these two items; therefore, they were included in the analysis despite their low correlation.

Because the items tended to be correlated with other items measuring the same construct, I proceeded to confirmatory factor analyses of the efficacy items.

5.6 Rationale for use of structural equation modeling (SEM)

There are several reasons why I used confirmatory factor analyses (CFAs) and SEM for the analyses in this dissertation, as opposed to simpler forms of analysis. Firstly, in the message experiment, in order to provide strong evidence for causal effects, I needed to test indirect effects of the messages on political action, as mediated through efficacy, threat and collective identification. The need to measure indirect effects meant ANOVA or regression analyses would not suffice. Instead, SEM, Hayes' (2012) PROCESS macro, or some other analysis capable of testing indirect effects would need to be used. Although SEM is often used for cross-sectional analyses, there is nothing invalid in using it for experiments as well. Indeed, SEM has several features that make it desirable for use in experiments, and several scholars have advocated for its increased use in experimental analyses (e.g. Bollen & Pearl, 2013; Tomarken & Waller, 2005).

There were two main advantages of using SEM instead of PROCESS or another test of indirect effects for the analysis of the message experiment. Firstly, when there are multiple items measuring the same construct, modeling these items as indicators of a latent variable instead of creating an averaged or summed variable allows for more precise measurement of relationships between variables (Byrne, 2013). In SEM, the measurement error for each item is explicitly modeled; when items are averaged, the

measurement error is included in the resulting average, and any calculations of relationships between averaged variables will thus include more measurement error.

The second advantage of SEM is that it allows for testing of how well the proposed structural relationships fit the data. For both the message experiment and CCAM survey, there was some uncertainty regarding the causal directions of the effects of variables on each other. SEM analyses provide goodness-of-fit statistics that give a quantitative measure of how much the observed data patterns deviate from what would be expected based on the proposed structural model. These would not have been available from PROCESS.

There were additional advantages for using SEM to analyze the CCAM survey results as well. Firstly, if SEM was to be used for the message experiment, using the same method to analyze the relationships in the CCAM survey would provide for increased comparability across the two sets of analyses. Secondly, SEM analyses offered the ability to deal with missing data in a superior fashion. As detailed in Section 5.3 above, full information maximum likelihood (FIML) treatment of missing data is superior to methods such as hotdeck imputation when there is a large amount of missing data, as there was in the CCAM survey. The SEM program MPlus makes the use of FIML estimation very straightforward, whereas simpler regression analyses do not.

5.7 Confirmatory factor analyses (CFAs)

Results of the CFAs are below. A brief overview of how latent variable modeling and CFAs work, as well as the interpretation of the meaning of the latent variables used in the present analysis, can be found in Appendix 3.

Confirmatory factor analyses were performed in Mplus 7.31 (Muthén & Muthén, 1998-2012), using robust maximum likelihood estimation (i.e. the MLR estimator). Post-stratification weights were used in order to make the results more similar to a nationally representative sample of believers in global warming. These weights are created by GfK, the survey provider, in a two-stage process (DiSogra, 2009). First, demographic data (age, gender, race/ethnicity, education, US Census region, metropolitan area, internet access, and whether English or Spanish is spoken at home) are used to create a set of weights so that results from the overall 50,000 person panel can be made representative of the US population. These data come from the Current Population Survey conducted by the US Bureau of the Census, and other sources of benchmark data (DiSogra, 2009). After a subsample of the overall panel has been recruited, and the subsample has completed the survey (as was done for the subsample of 1384 individuals who completed the April 2014 CCAM survey), the second stage of the weighting process begins. This involves procedures to correct the first set of weights for individuals in the panel who did not respond to this specific survey, and for other idiosyncrasies of the sampling and survey process (DiSogra, 2009). In the case of the present survey, the weights were specifically created to adjust for the fact that an oversample of 371 Republicans were surveyed in addition to the 1013 individuals recruited in nationally representative proportions.

First CFA – Three efficacy variables

Because SE was only measured by one item, the CFA modeling efficacy beliefs as three separate variables included two latent variables – CXPE and PRE – correlated

with the observed variable, SE. The latent variable for CXPE had two observed indicators, and the latent variable for PRE had eight observed indicators. This model is displayed in Figure 5.1. It should also be noted that all variables were standardized for use in these CFA analyses (but not other analyses), due to many of the items having different measurement scales.

Fit statistics, shown in Table 5.4, indicate acceptable, though mediocre, fit. The root mean square error of approximation (RMSEA) was below the recommended benchmark of .06, and the standardized root mean square residual (SRMR) was below the recommended benchmark of .08 (Byrne, 2013; Schreiber, Nora, Stage, Barlow, & King, 2006). That said, the 90% confidence interval for RMSEA shows we cannot be 90% confident that the statistic truly is below .06. Also, the comparative fit index (CFI) is below the benchmark value of .95 or higher; however, some have argued that CFI values of .90 are acceptable (Bentler, 1990). Going with the philosophy of treating fit indices as guidelines rather than golden rules, this fit can be deemed acceptable, but further results should be interpreted with some caution based on the mediocre fit (Marsh, Hau, & Wen, 2004).

Table 5.4. Comparison of fit statistics for CCAM confirmatory factor analyses.

	3-factor	1 or 2-factor
AIC	19592.682	19650.851
BIC	19756.948	19805.731
Chi-square	152.565	187.492
RMSEA	0.057	0.064
RMSEA 90% CI	0.048-0.067	0.054-0.073
CFI	0.927	0.905
SRMR	0.043	0.056
Free parameters	35	33

As seen in Figure 5.1, factor loadings for all the items were above .5, with the exception of the second CXPE item. Despite being low, I decided this should be left in the model, since only two items measuring CXPE are available for this dataset. Considering that the item's loading is relatively close to .5, and the item text is substantively close to what could be expected for an item measuring CXPE, it seems like the two-item latent variable ought to do a better job of measuring individuals' overall CXPE perceptions than a single item on its own.

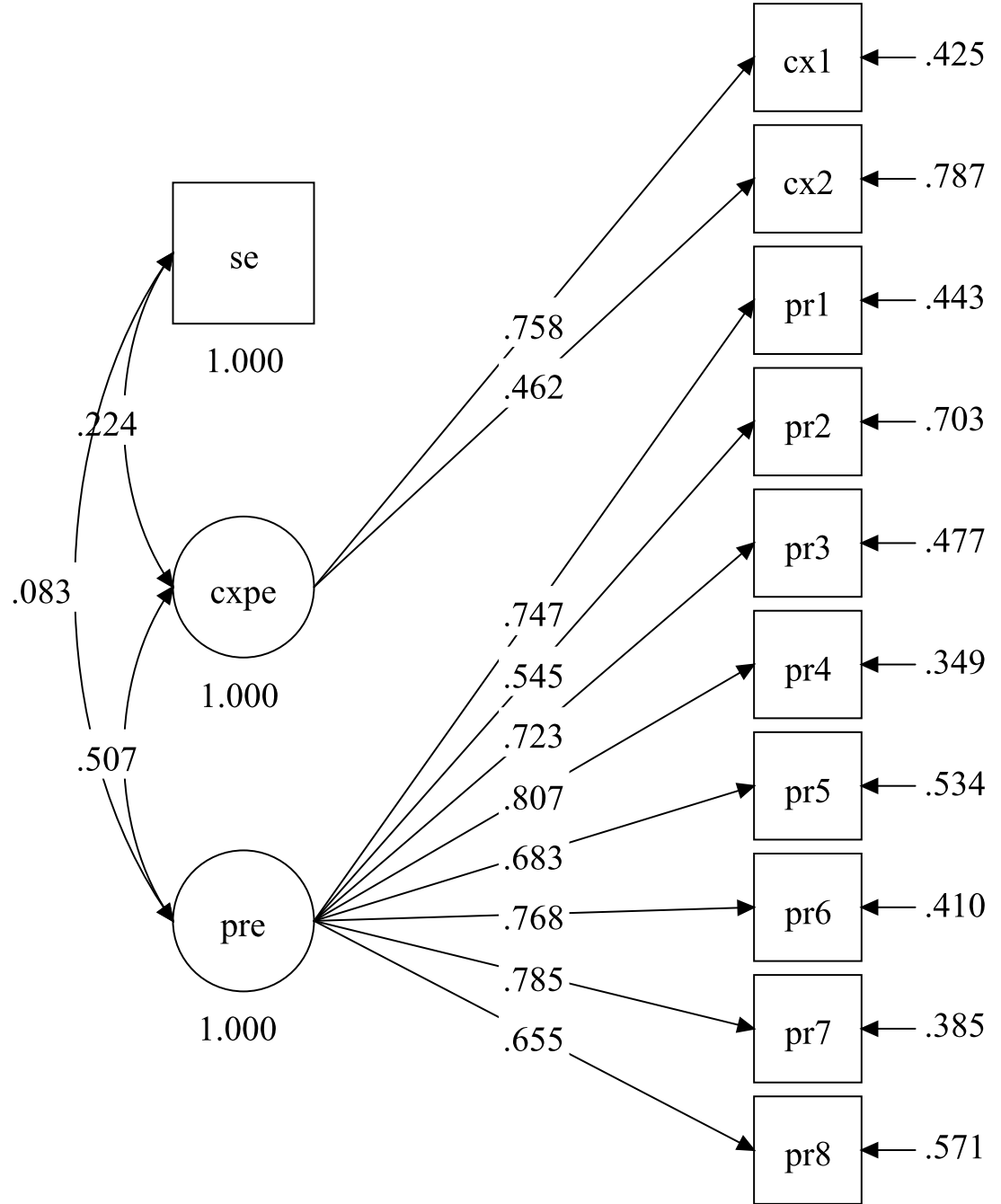


Figure 5.1. Three-factor confirmatory factor analysis of CCAM data.

Circles in Figures 5.1, 5.2 and 5.3 represent latent variables; squares represent observed variables. Numbers on paths from latent variables to indicators are standardized factor loadings. Numbers on bidirectional paths between latent variables and SE are correlations. Numbers to the right of indicators are standardized residual variances – equal to 1 minus the R^2 in variance explained by the latent variable. Numbers below each latent variable are standardized variances – all equal to one due to standardization.

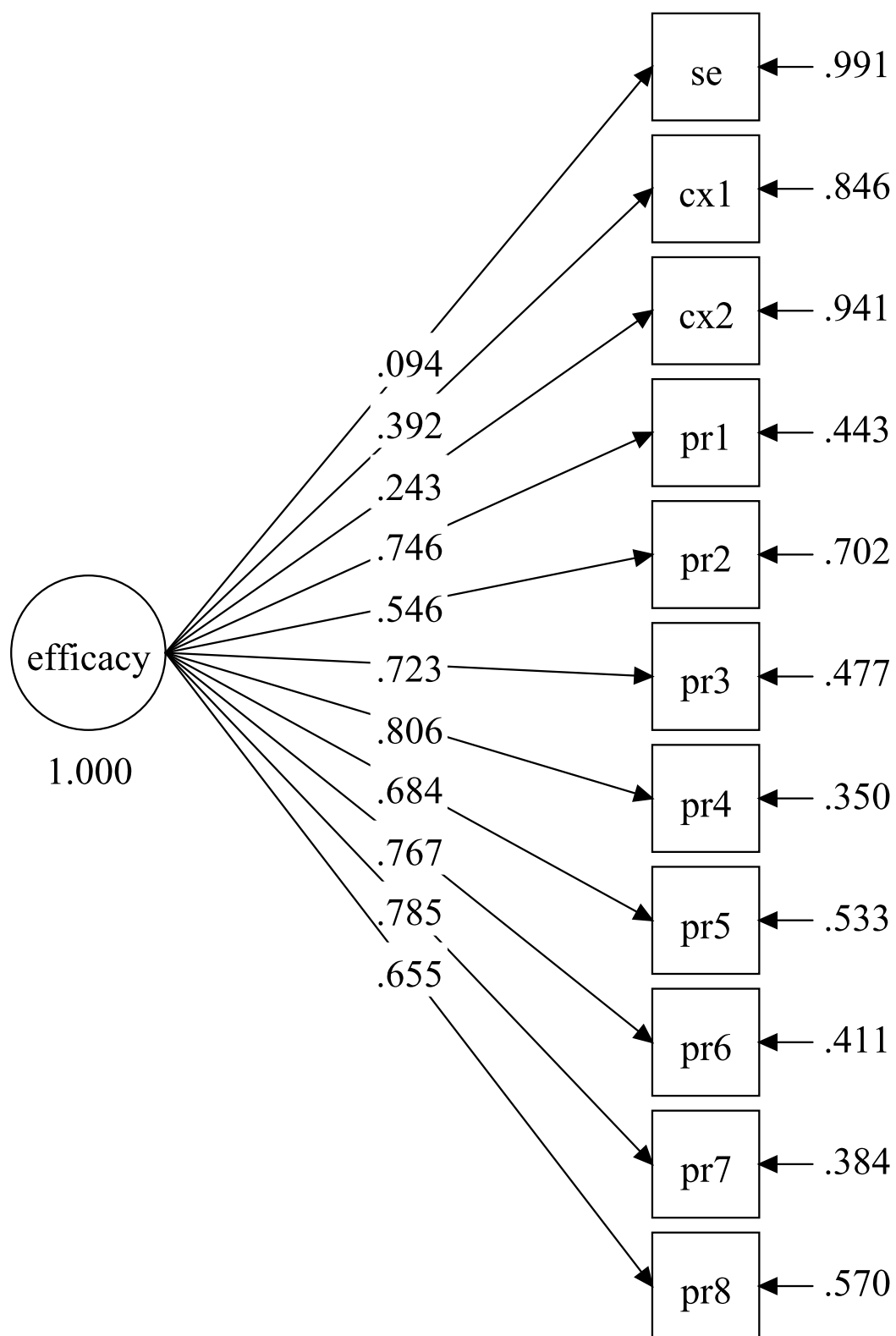


Figure 5.2. One-factor confirmatory factor analysis of CCAM data.

Second CFA – one efficacy variable

A second CFA was conducted to check on concerns that individuals might not really possess differentiated efficacy beliefs about global warming, and might respond to all questionnaire items based on a more diffuse, generalized perception of the easiness with which global warming can be dealt with. For this CFA, all efficacy items were modeled as indicators of a single latent variable, labeled “efficacy” in Figure 5.2. This model displayed slightly worse fit statistics than the 3-factor model. Due to the fact that these models are not “nested” – in other words, neither is a version of the other model with additional restrictions applied – they can only appropriately be compared using the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) statistics (Byrne, 2013). As both of these are lower for the 3-factor model than for the 1-factor model, the 3-factor model fits the data better. While the difference between these statistics cannot be checked for statistical significance as a difference in chi squared statistics can, a commonly used rule of thumb is that differences in BIC of 10 or more constitute very strong evidence of better fit (Credé & Harms, 2015; Raftery, 1995). Given that the BIC difference here is close to 50, this suggests the 3-factor model definitely fits the data better.

The models can also be compared on their factor loadings. For this one-factor model, the SE item has a very small loading, and the CXPE items have noticeably lower loadings than when they were loading on their own CXPE factor. This shows that these items do not perform well as measures of a single generalized efficacy perception. If all

responses to efficacy items were really caused by such a generalized perception – if people really did not distinguish much between any questions about efficacy for fighting global warming – then we would expect any items to be roughly equally good measures of this generalized perception. The fact that the measures are clearly not equally good thus counts against the idea that people only have a single generalized perception of efficacy.

Third CFA – two efficacy variables

A third CFA was conducted to test whether individuals might possess one generalized efficacy belief for their own individual ability to deal with global warming, and a second belief regarding the ability of external groups – such as activists, politicians and society generally – to deal with global warming. The only measure of individual ability in the CCAM data is SE; CXPE and PRE items are modeled as indicators of the latent variable for external groups’ ability to deal with global warming, labeled “external” in Figure 5.3.

This model is mathematically equivalent to the one-factor model; modeling the relationship between the latent “external” variable and SE as a correlation results in mathematically the same thing as modeling this relationship as a factor loading from the “efficacy” variable to SE in Figure 5.2. This means that the fit statistics for the one-factor and two-factor models are identical to each other, and the two-factor model is exactly the same as the one-factor model in its unfavorable fit comparison to the three-factor model. Factor loadings in the two-factor model are also identical to those in the one-factor model, and the correlation between the latent variable and the SE item is identical to the

factor loading for SE obtained in the one-factor model. Therefore, there is no statistical way to compare the one-factor and two-factor models.

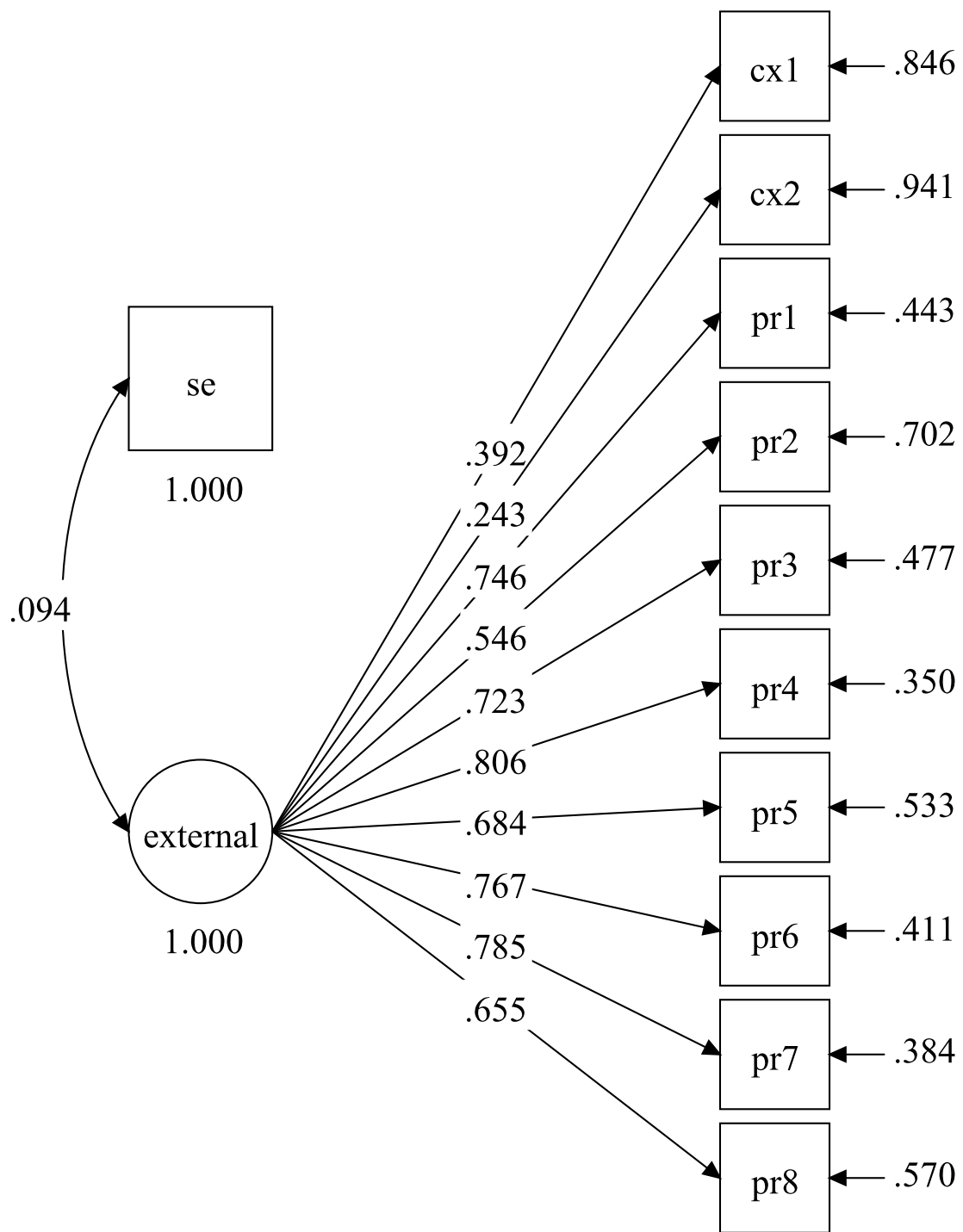


Figure 5.3. Two-factor confirmatory factor analysis of CCAM data.

CFAs – Conclusion

The 3-factor model is superior to the other two alternative models for individuals' efficacy beliefs, and displays acceptable (though mediocre) fit. Therefore, I decided it would be appropriate to proceed with a measurement model that included each type of efficacy (SE, CXPE and PRE) as separate beliefs. While the fit of the 3-factor CFA is somewhat less than would normally be desired, it was close enough to traditional benchmarks to be accepted with caution.

5.8 Measurement model

SEM analyses are superior if, prior to testing the full SEM model, a measurement model is tested that checks for how well all of the latent variables fit together with the indicator items used to measure them (Byrne, 2013). If this is not done, it is difficult for researchers to tell whether any model misfit is due to problems with the “measurement” part of the model (i.e. the relationships between the latent variables and their indicators) or problems with the “structural” part of the model (i.e. the modeled causal relationships between different latent variables). Testing the measurement model first on its own enables the researcher to find measurement model problems and correct them, and thus make it possible to proceed to the SEM analysis with confidence that any resulting model misfit is due to structural problems with the model.

For this analysis, the measurement model consisted of the three efficacy variables (SE, CXPE, PRE) tested in the CFAs, as well as latent variables for threat, past political action, and political action intentions. Threat was measured with 8 items, past action with 6 items, and intentions with 10 items. All latent variables, plus the single observed

variable for SE, were modeled as being correlated with each other. The initial model showed that the fit of the model could be improved by allowing the residual variances for several indicator variables to correlate. This is a step that is often performed to allow for the fact that responses to some items will be related to each other due to factors other than their underlying latent variable (Byrne, 2013; Cortina, 2002). Often this occurs where two survey questions have additional similarities besides the broader latent concept they are designed to measure. In this case, for example, responses to two of the action intention items, in addition to being associated due to both measuring some form of action intention, were further associated due to both referring to civil disobedience. Although some scholars entirely disapprove of allowing error variances to correlate (e.g. Cortina, 2002), when there is a substantively plausible reason to expect two items to be correlated (as with the civil disobedience items), it is common practice to allow correlation (Raykov & Marcoulides, 2012). For this reason, from the first measurement model I tested onward, I used model modification indices (reported automatically in Mplus) to select the error correlation that would result in the largest improvements to model fit, and re-ran the model with this correlation allowed. This was only done if the correlation made substantive sense (as with the civil disobedience items); if an error correlation would greatly improve the model, but did not make substantive sense, I instead allowed the next-largest correlation that did make substantive sense. These steps were repeated until all error correlations that made substantive sense, and resulted in non-trivial improvements to model fit, had been allowed. In total, this resulted in ten error

correlations being allowed. Details of these error correlations are displayed in Appendix 4.

Due to the complexity of the measurement model being difficult to display in a single diagram, the final measurement model results, with all 10 error correlations freed, are instead displayed below in table form. Most fit statistics (Table 5.5) suggest the measurement model fits the data adequately. RMSEA and SRMR are within the traditionally acceptable range; in contrast to the CFA results, the 90% confidence interval for RMSEA does not include any values outside the acceptable range. CFI is still below the traditional minimum acceptable value of .95; however, again, because some scholars see statistics of .90 or higher as acceptable, and the other fit statistics suggest good fit, overall the model is acceptable (Bentler, 1990; Marsh et al., 2004). Standardized factor loadings (Table 5.6) are all above .5. Correlations between latent variables, and the observed SE variable, are displayed in Table 5.7. Because this model showed acceptable fit to the data, I proceeded to the full SEM analysis.

Table 5.5. Fit statistics for CCAM measurement model.

AIC	49929.56
BIC	50536.272
Chi-square	1434.258
RMSEA	0.045
RMSEA 90% CI	0.043-0.048
CFI	0.922
SRMR	0.068

Table 5.6. Standardized factor loadings for CCAM measurement model.

CXPE1 Collective external efficacy 1	0.68
CXPE2 Collective external efficacy 2	0.51
PRE1 - Improve people's health	0.75
PRE2 - Improve our national security	0.54
PRE3 - Create green jobs	0.72
PRE4 - Save plant & animal species	0.81
PRE5 - Save people from poverty	0.68
PRE6 - Better life for children & grandchildren	0.77
PRE7 - Prevent destruction of most life	0.79
PRE8 - Protect poor from environmental harm	0.65
Threat1 Perceived threat to you personally	0.73
Threat2 Perceived threat to your family	0.80
Threat3 Perceived threat to your community	0.87
Threat4 Perceived threat to people in USA	0.96
Threat5 Perceived threat to people in industrialized countries	0.93
Threat6 Perceived threat to people in developing countries	0.77
Threat7 Perceived threat to future generations	0.60
Threat8 Perceived threat to plant & animal species	0.59
Past action 1 - Signed a petition	0.59
Past action 2 - Donated to organization	0.69
Past action 3 - Donated to political candidate	0.75
Past action 4 - Attended meeting or rally	0.94
Past action 5 - Met elected official	0.93
Past action 6 - Volunteered time to candidate	0.88
Intent1 Contact government officials	0.84
Intent2 Sign a petition	0.66
Intent3 Sign a vote pledge	0.70
Intent4 Volunteer time to organization	0.85
Intent5 Donate money to organization	0.77
Intent6 Donate money to candidate	0.75
Intent7 Contact government officials	0.80
Intent8 Volunteer time to candidate	0.81
Intent9 Support organization's civil disobedience	0.71
Intent10 Engage in civil disobedience	0.63

Table 5.7. Correlations between latent variables for CCAM measurement model.

	SE	CXPE	PRE	Threat	Past action
CXPE	0.25				
PRE	0.09	0.54			
Threat	0.17	0.36	0.39		
Past action	0.14	0.17	-0.05	0.14	
Intention	0.31	0.50	0.39	0.41	0.37

[Note that SE is not a latent variable in Table 5.7.]

5.9 Structural Equation Model (SEM)

The SEM model was set up according to Figure 5.4, with SE, CXPE, PRE and threat all modeled as having causal effects on the two outcome variables - past action and action intentions. To control for the effects of political ideology and demographic variables (age, gender, race, education and income), these were also modeled as influencing past action and action intentions. SE, CXPE, PRE and threat were modeled as correlated with each other. The residual errors for the two outcome variables, past action and action intentions, were also allowed to correlate (as it is reasonable to expect factors beyond those included in the model to be responsible for the correlation between past action and intentions).

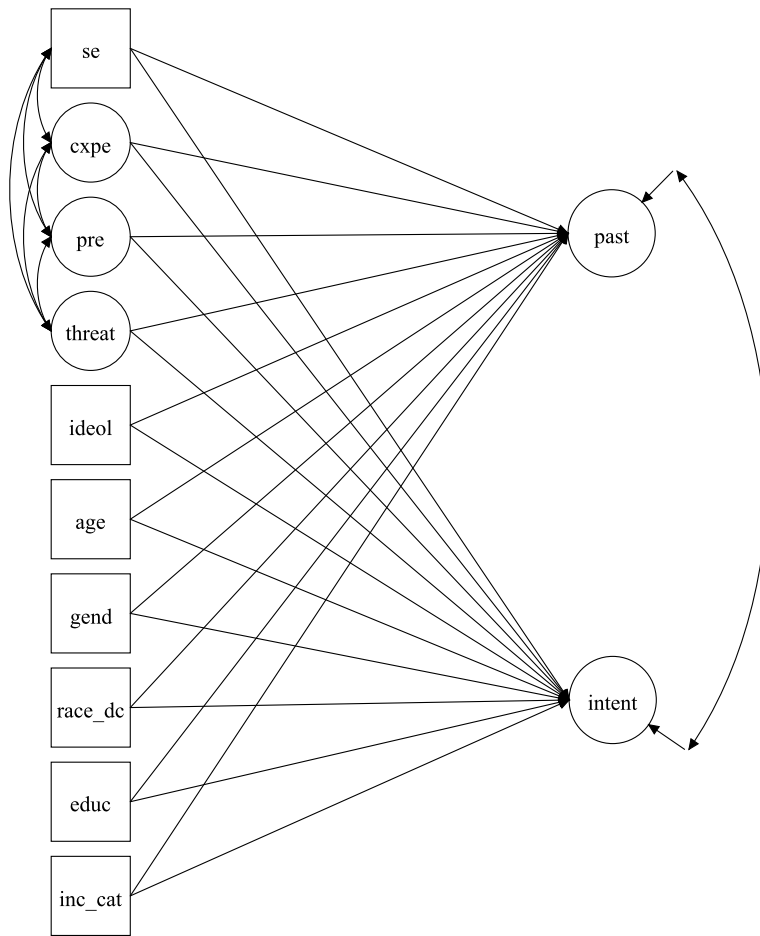


Figure 5.4. Full structural equation model for CCAM data.

Regression coefficients and correlations from this model are displayed below in Table 5.9. The variable abbreviations in Figure 5.4 are as follows: se=Self-efficacy. cxpe=Collective external political efficacy. pre=Policy response efficacy. threat=Perceived threat. ideol=Political ideology (conservative coded high). age=Age (in years). gend=Gender (dichotomous, male=1, female=2). race_dc=Race (dichotomous, white only=0, all other categories=1). educ=education category (4 categories, from “less than high school” to “Bachelor’s degree or higher”). inc_cat=Income category (8 categories, from “less than \$25,000” to “\$175,000 or higher”).

Fit statistics (Table 5.8) reveal that this model, like the measurement models, is an acceptable fit for the data (although just barely). The RMSEA estimate is within the acceptable range, and the 90% confidence interval for this estimate suggests we can be 90% confident the true value is acceptable as well. The SRMR, at 0.081, is unacceptable by common benchmarks, although only just (the acceptable benchmark being 0.08 or lower; Byrne, 2013). CFI, at 0.9, is substantially below the commonly accepted benchmark of .95, although it just meets the more liberal benchmark of 0.9 suggested by Bentler (1990) as acceptable in some cases. Even if we adopt the philosophy that fit statistics should be used as guidelines rather than golden rules, this level of fit is definitely on the borderline of being unacceptable (Marsh et al., 2004).

Despite this level of fit, additional adjustments were not made to the model. Model modification indices revealed that none of the adjustments that made substantive sense would have added substantially to model fit. Therefore, I decided it would be more appropriate to keep the model with its current level of parsimony, and interpret the results with caution appropriate to the level of fit already obtained.

Table 5.8. Fit statistics for CCAM SEM models.

	MLR	WLSMV
AIC	49205.003	-----
BIC	49865.886	-----
Chi-square	1993.41	1849.802
RMSEA	0.046	0.044
RMSEA 90% CI	0.044-0.049	0.041-0.046
CFI	0.9	0.98
SRMR	0.081	-----
WRMR	-----	1.609

Model results are displayed in Figure 5.5 below. Due to visual clutter making it difficult to display all parts of the model, latent variable indicators and the covariate variables (ideology, demographics) have been omitted from this diagram, although they were all included in the model that produced the results displayed. Coefficients for the effects of covariates on outcome variables are included in Table 5.9; information on factor loadings and item residuals is not included, as these have already been dealt with in the section above on the measurement model. For the sake of conveying the most important relationships visually, only these have been included in Figure 5.5.

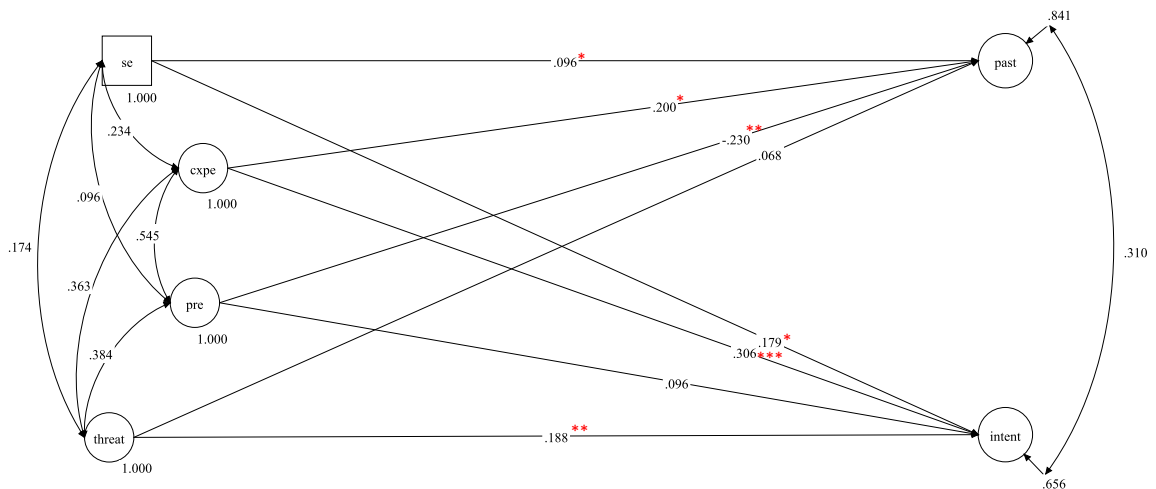


Figure 5.5. SEM model for CCAM data, using MLR estimation, and only showing main variables of interest.

Numbers on paths from efficacy and threat variables to outcome variables in Figure 5.5 are standardized linear regression coefficients. Numbers on double-headed arrows between efficacy and threat variables are correlations. The “1.000” values next to

efficacy and threat variables are standardized variances. Numbers next to the small arrows pointing to past action and action intentions are standardized residual variances – equal to 1 minus the R^2 in variance explained by the effects of efficacy variables, threat, political ideology, and demographic variables. The number next to the double-headed arrow between these residual variances is the correlation between these residuals. Red asterisks next to regression paths represent statistical significance, $*=p<.05$. $**=p<.01$. $***=p<.001$. Although most of the correlations, residuals and the residual correlation are statistically significant, these have not been marked with asterisks in order to reduce clutter and maintain visual focus on the structural paths of primary interest.

The diagram shows that the paths from the three efficacy variables to past political actions were all significant, with SE and CXPE having a positive influence, and PRE having a negative influence. The effect of threat on past action was positive, but not statistically significant. For action intentions, the results were somewhat different. The paths from SE and CXPE to action intentions were again significant and positive. However, the influence of PRE was positive and non-significant, whereas the influence of perceived threat was positive and significant.

SEM Robustness check with WLSMV estimator

As noted earlier, due to the past action items being severely non-normal, and several other items being more moderately non-normal, I decided to perform a robustness check by testing the same SEM model as above, but changing from MLR to WLSMV estimation. Although this meant that missing data would be dealt with by pairwise deletion rather than FIML, and thus potentially distort the relationships in the model,

using the WLSMV estimator allowed me to define all the latent variable indicators as ordinal categorical variables, including the severely non-normal past action variables. Rather than modeling the influence of latent variables on their indicators via linear regression, categorical treatment of indicators models the influence of latent variables via ordered probit regression, as would normally be done with a simple regression involving an ordered categorical DV (Muthén & Muthén, 1998-2012).

Analyzing the data as categorical, besides being generally recommended for items with fewer than 5 response categories, removes the problem of non-normality, as categorical treatment of data does not assume that variables have either univariate or multivariate normality (Muthén & Muthén, 1998-2012; Rhemtulla et al., 2012). The logic behind this robustness check was that by comparing the MLR results above with results from a WLSMV model, it would be possible to see to what extent the models diverge when using an estimator that deals with non-normal data well and missing data more poorly, compared to an estimator that deals with missing data well and non-normal data more poorly. Although I have more confidence overall in the MLR estimates, due to the high level of missing data in this analysis, the WLSMV analysis allows us to see how the model might be different if the MLR estimator was giving some unrealistic estimates.

Fit statistics (Table 5.8) do not allow direct comparison of the two models, as fit statistics derived via different types of estimation are not calculated in the same metric (Muthén & Muthén, 1998-2012). However, generally the statistics for the WLSMV model alone indicate good fit. Similarly to the MLR model, the RMSEA is within an acceptable range. The CFI of .98 suggests very good fit; however the weighted root mean

square residual (WRMR) is significantly above the recommended benchmarks of being below either 0.9 or 1 (Yu, 2002). Despite this problem with WRMR, the model fit is likely still acceptable. WRMR is a relatively recently developed statistic, and one of the creators of MPlus recommends ignoring it if all the other fit indices indicate good fit (Muthén, 2010). The benchmark recommendations for WRMR are based on a single study (Yu, 2002) that only looked at models with either binary or continuous indicators, rather than the ordered categorical variables used in the present study. Given that the study's author herself concluded that "suitable cutoff criteria for some fit indices are strongly dependent on models" (Yu, 2002, p159), and the models used to determine the cutoffs of .9 or 1 were different to mine, these cutoffs should not be used too strictly. The model tested by Yu (2002) that was closest to those from the present study even suggested that a cutoff value of 1.1 might still be relatively appropriate, and no higher cutoff values were tested. Therefore, there is not strong evidence that a WRMR of 1.6 necessarily indicates poor fit.

Table 5.9. Standardized coefficients for CCAM SEM models.

		MLR		WLSMV		Coefficient difference (WLSMV minus MLR)
		Statistic	p-value	Statistic	p-value	
: Past on	SE	0.10	0.029	0.16	0.009	0.07
	CXPE	0.20	0.042	0.20	0.045	0.00
	PRE	-0.23	0.003	-0.06	0.426	0.17
	Threat	0.07	0.185	0.08	0.238	0.01
	Ideology	-0.18	<0.001	-0.32	<0.001	-0.14
	Age	-0.05	0.251	0.00	0.984	0.05
	Gender	-0.05	0.406	-0.23	0.027	-0.18
	Race	0.23	0.001	0.38	0.001	0.15
	Education	-0.12	0.012	-0.06	0.408	0.07
	Income	-0.06	0.106	-0.04	0.534	0.02
: Intentions	SE	0.18	0.029	0.17	<0.001	0.01
	CXPE	0.31	<0.001	0.29	<0.001	-0.02
	PRE	0.10	0.241	0.11	0.043	0.02
	Threat	0.19	0.002	0.17	<0.001	-0.02
	Ideology	-0.18	<0.001	-0.29	<0.001	-0.11
	Age	-0.05	0.251	0.01	0.893	0.06
	Gender	-0.05	0.406	-0.02	0.825	0.03
	Race	0.23	0.001	0.47	<0.001	0.24
	Education	-0.12	0.012	0.06	0.243	0.18
	Income	-0.06	0.106	<0.001	0.999	-0.06

Table 5.10. R² statistics for CCAM SEM models.

	MLR	WLSMV
Past action	0.16	0.26
Intentions	0.34	0.42

Comparison of the MLR and WLSMV models supports the idea that the MLR model is roughly accurate for the primary variables of interest. Of the eight coefficients associated with the efficacy or threat variables, none change sign from positive to negative or negative to positive. Only two coefficients for these variables change

substantially in their effect size (the effects of SE and PRE on past political action become larger and smaller, respectively). Only two coefficients change in statistical significance. The negative effect of PRE on past action, which was significant in the MLR model, is not significant in the WLSMV model. The effect of PRE on action intentions, which was not significant in the MLR model, is significant in the WLSMV model.

However, the WLSMV model throws a few specific results from the MLR model into question. Clearly the result that changes the most depending on which estimator is used is the effect of PRE on past action. Although the effect is negative in both cases, the WLSMV results suggest we can be at least somewhat less confident that this effect is large and significant. The two models agree that SE has a significant positive effect on past action; the WLSMV results suggest this effect may be somewhat larger than the MLR results suggest. Finally, the WLSMV results also suggest that the effect of PRE on action intentions, though equally small as in the MLR model, may nonetheless be statistically significant.

6 CCAM SURVEY – DISCUSSION

6.1 Results of test of H1

Individuals have five kinds of distinct efficacy perceptions (SE, PE, EOP, CXPE and PRE), rather than a smaller number of more general efficacy perceptions.

Results of the CFAs support the idea that each of the three efficacy beliefs – SE, CXPE and PRE – are distinct cognitions. Thus, H1 is supported. The CFA with CXPE and PRE modeled as separate latent variables, each correlated with each other and with the single observed item for SE, fit the data better than models where the same items loaded on only one or two latent efficacy variables. This supports one part of the extended EPPM models – the idea that each of the efficacy variables involved are distinct cognitions.

6.2 Results of test of H2

Each of the distinct efficacy perceptions, as well as perceived threat, have an independent positive effect on political action.

Because the CCAM analysis uses cross-sectional survey data, no strong evidence can be provided for any of the variables having a causal effect on political action; the best that can be hoped for is examining the correlational relationships to check whether these are consistent with what we would see if the efficacy and threat variables did have a causal effect on action. Therefore, in a sense, the CCAM analysis provides a test of a

slightly altered version of H2: All of the efficacy and threat variables are significantly related to action.

All of the efficacy and threat variables were significantly related to at least one of the outcome variables – past action or action intentions. However, PRE showed a significant negative relationship with past action, something contrary to what would be expected from the extended EPPM models. If the PRE items used in this analysis really are valid measures of PRE, this result would be evidence against the extended EPPM models – both the Hart & Feldman (2014) model and my own suggested extensions – being correct.

However, there is substantive reason to suspect these measures may not be valid measures of PRE. Recall that PRE was intended to be measured in this analysis (and was measured in the message experiment) with items of roughly the form “How much can government policy reduce global warming?” Because this question was not included in the CCAM survey, the items used in this analysis were used as proxy measures of PRE. The items asked about participants’ agreement that positive consequences would occur “if our nation takes steps to reduce global warming”. Because the “nation taking steps” might be interpreted to mean government policy, and because positive consequences occurring could be taken as a sign that that government policy was successful in reducing global warming, it was hoped that these would tap into PRE roughly as effectively as the originally hoped-for item. However, there are reasons to suspect the participants may not have interpreted the items in this way. It is also plausible that participants interpreted the “nation taking steps” as *non*-governmental action, such as individuals or corporations

voluntarily reducing energy use. This would explain the negative relationship between the PRE variable and political action: those individuals who believe it is possible to effectively solve global warming without policy action would be less likely to bother taking difficult political action designed to lead to policy change.

As no analyses have been conducted that might provide empirical evidence on which of these two interpretations were used by participants, we can only speculate on which is correct. However, the existence of another plausible interpretation for the PRE items should make us at least acknowledge the possibility that the items may not have measured PRE.

If the items did not measure PRE, H2 would be supported. The negative relationship between PRE and past action would not be evidence against the extended EPPM models being correct. Other than that one coefficient, all the results of the CCAM analysis are entirely consistent with these models: the variables that were measured correctly – SE, CXPE and threat – were all positively related to action (although threat was not significantly related to past action). Thus, if we are suspicious enough of the validity of the PRE measures, the results of this analysis support the idea that the Hart & Feldman (2014) extended EPPM model is correct. The results would be equally supportive of my suggested expansion of their model, although the additional two efficacy variables I added – PE and EOP – were not measured. Overall then, the evidence relevant to H2 provides mixed support for these two extended EPPM models. The results would have provided full support for H2 if we could be sure that the PRE items did not in

fact measure PRE, but because we cannot be sure of this fact, the support is better described as mixed.

6.3 Answer to RQ1

Of all the efficacy and threat perceptions that have a significant effect on action, which have stronger effects, and which have weaker effects?

Similarly as for H2, the cross-sectional nature of the CCAM dataset means that the results can only be used to answer an altered version of RQ1: “Which of the efficacy and threat variables are most strongly related to political action?” These results show that CXPE is most strongly related to action, with SE and threat roughly equal in second place. Although the coefficient for the relationship of threat to past action is not statistically significant, it is of roughly similar size to the relationship of SE to past action.

As noted above, it is unclear whether the PRE items in this analysis actually measured PRE. If they did, the results would show that PRE had the most powerful relationship to past action of all the variables – a relationship opposite in direction to that which would be expected by the extended EPPM models. However, if the items did not measure PRE, the result here would have no bearing on our conclusion about the relationship of PRE to action. Thus, while the results clearly suggest that CXPE is more strongly related to action than either SE or threat, it is unclear precisely how large, and in what direction, the influence of PRE is.

It is worth noting that if one looks at the coefficients for variables other than PRE, the coefficient for the relationship of all these variables with action intentions is always

larger by about 0.1. This is consistent with the idea that efficacy and threat variables have a larger influence on intentions than on behavior. Such a finding would be entirely consistent with general findings that intentions are easier to change than behavior (Milne, Sheeran, & Orbell, 2000; Webb & Sheeran, 2006).

6.4 Limitations

One important limitation to these results is the non-normality of the data, especially the severe non-normality of the data for past action. As maximum likelihood estimation assumes normally distributed data, the results given for the CFAs and SEM model by the MLR estimator may not be accurate. As noted in the method section, on balance, the MLR estimator is the best estimate we have, given the large proportion of missing data. However, the results for the WLSMV estimation give us some idea of how the true model might differ in the worst-case scenario where the MLR estimation really was giving distorted results. If this were the case, the conclusions for H2 and RQ1 would need to be revised; PRE would no longer have a significant negative relationship to past action, but a smaller non-significant negative relationship to past action, and a significant positive relationship to action intentions. However, these possibilities represent a worst-case scenario; the MLR estimates remain our best guess of the true relationships, given the dataset we have.

The mediocre values obtained for one fit statistic – CFI – also suggest we should be wary of assuming that the estimates obtained for these models are precisely accurate. All other fit statistics suggested good fit, however. Therefore, we are justified in assuming the estimates are roughly accurate.

6.5 Summary

The CCAM results generally support the extended EPPM models, with the exception of the result for PRE, whose meaning is difficult to interpret with certainty. All other variables appear to be significantly related to collective action, with CXPE most strongly related. The results also provide strong evidence supporting the idea that each of the efficacy variables are distinct from each other.

7 RATIONALE FOR MESSAGE EXPERIMENT

This message experiment was conducted to build upon the results of the CCAM survey in two important ways. First, conducting an experiment made it possible to get stronger evidence for the causal direction of the effects of interest. If experimentally manipulated changes in threat and efficacy are associated with differences in the dependent variables, this provides stronger evidence that threat and efficacy influence political action, rather than individuals' levels of political action influencing their levels of threat and efficacy.

The second advantage of the message experiment was not related to its experimental design. As well as the opportunity to test the effects of randomly assigned messages, the experiment provided the opportunity to improve on shortcomings in the way variables were measured in the CCAM study. Many of these shortcomings were largely due to the fact that the CCAM survey was not designed primarily in order to test my hypothesis and research questions, but to be a poll of a nationally representative sample of Americans. Most importantly, this meant that several of the variables I wished to analyze – especially PE, EOP, and collective identification – were not measured. Also, the PRE items in the CCAM survey were phrased in a way that was less face-valid than could be desired. SE and CXPE were only measured with one and two items, respectively, which makes measurement substantially worse than if at least three items

were used (Byrne, 2013). Additionally, many of the items had four-point measurement scales, which also tends to increase measurement error relative to scales of five points or more (Rhemtulla et al., 2012).

The third important feature offered by the message experiment is the ability to see the extent to which efficacy and threat can be manipulated with ecologically valid message stimuli. This feature was not important for testing my hypotheses or research question. H1 relates to the structure of efficacy beliefs, and H2 and RQ1 relate to the relationships between efficacy beliefs, threat beliefs and action. Strictly speaking, in testing H2 and answering RQ1, the content of the messages does not matter; it only matters that the messages influence efficacy and threat, thus making it possible to draw stronger conclusions about the direction of causality from the results. However, the content of the messages *is* important to the broader goal of understanding how communication practitioners might use efficacy and threat-based messages to encourage political action. Even if efficacy and threat have very large relationships to action, this would not matter in real-world contexts if the kind of messages that communication practitioners typically use do not result in large effects on efficacy or threat. The relatively realistic stimuli used in Study 2 give a rough estimate of how much similar stimuli could be expected to influence efficacy and threat perceptions in real-world use.

8 MESSAGE EXPERIMENT - METHOD

8.1 Survey vendor - Amazon Mechanical Turk

The experiment took place on 11th and 13th April, 2015. Participants were approximately 678 individuals recruited via Amazon Mechanical Turk; as detailed in Appendix 6, data from 525 of these individuals was used in the final analysis. A pilot sample of 12 participants was run through the experiment on April 10th, to check that the experiment was working properly; information relating to these participants is not discussed in this document. The first 100 proper experimental participants were run through the experiment on April 11th, with the remainder being run through the experiment on April 13th. Both of these sets of participants saw exactly the same experimental materials. Full details of the sample population are presented below, and in Appendix 6.

Amazon Mechanical Turk (hereafter Mturk) is an online marketplace where individuals are paid to perform a wide variety of tasks, from completing academic surveys, to transcribing scanned images of business cards, to tagging pornographic videos with descriptive category terms (Egelman, Chi, & Dow, 2014; Irani, 2015). Some scholars argue that surveys conducted in Mturk are unlikely to give valid, generalizable results in almost all circumstances (Gelman, 2013; Kahan, 2013); however, others argue that it is a flawed but useful venue for research, whose specific flaws should be taken into account, rather than rejected outright (Berinsky, Huber, & Lenz, 2012; Leeper &

Mullinix, 2015; Searles & Ryan, 2015). Evidence has been found suggesting that Mturk may actually provide better data than more expensive survey providers such as GfK for at least some non-trivial purposes (Weinberg, Freese, & McElhattan, 2014).

Participants were each paid \$1 to complete the experiment. Given that median completion time was about eight minutes, the median participant received a pay rate of about \$7.50 per hour. This was above the US minimum wage of \$7.25 and the recommended minimum ethical rate of \$6 per hour endorsed by We Are Dynamo, a website and community advocating for rights of MTurk workers, run by Stanford and UC San Diego faculty members (Dynamo, 2015).

8.2 Experimental procedure

After being recruited to take part in the experiment, participants were given a link to a survey delivered via the Qualtrics survey platform. Clicking on this link brought participants to the informed consent form. After indicating their consent, participants were first asked to answer questions about their age (to confirm that they were aged 18 years or over), and their views on whether global warming is real (and two other controversial issues). Next, participants were asked questions regarding their civic engagement – specifically, whether they had voted in the 2012 Presidential and 2014 midterm elections, and whether they had signed a petition in the last 6 months. (Full text of these items, as well as experimental messages and other survey questions, is displayed below).

After these initial questions, participants were randomly assigned to the control group or to one of three message conditions. Those in the message conditions were

presented with a roughly 450-word message on global warming that encouraged political action. Messages were designed to mimic advocacy emails sent by real environmental and climate advocacy organizations. Control group participants did not read any message and proceeded directly to the subsequent survey measures.

Post-message measures consisted of about 55 items (some items were not shown, depending on responses) measuring threat and efficacy perceptions, political action intentions, and other quantities. These included an attention check item, presented in the block of questions immediately after the messages. If participants failed this attention check, they were ejected from the survey and no further responses were recorded.

Those respondents that completed the survey were presented with a randomized numerical code, which they entered into the Mturk interface to prove that they had completed the survey. All participants who thus established survey completion and entered their code were paid \$1.00 electronically within 36 hours.

8.3 Messages

The three experimental messages can be found below. They were designed to be similar in format, length and content to actual advocacy emails by organizations such as the Sierra Club, 350.org, and so on. An email best practices guide by one of the Sierra Club's online directors recommends 200-400 words (Bergen, 2010). Therefore, the word lengths of 455-465 had reasonable ecological validity. I also highlighted certain important passages with bold text, as is done in many of these emails, and as recommended in the best practices guide (Bergen, 2010).

In order to test for causal effects of manipulating variables from the extended EPPM, messages were required to contain content designed to increase both perceived threat and one type of efficacy. Therefore, as seen below, each of the messages contains content relating to the threat of climate change in the earlier part of the message, and content relating to the effectiveness of action in the latter part of the message. Thus, the PE message contained content designed to boost threat and content designed to boost PE; the CXPE message contained content designed to boost threat and content designed to boost CXPE; and the PRE message contained content designed to boost threat and content designed to boost PRE.

Elements of the messages were designed based on newspaper articles relating to climate change, newspaper articles relating to energy politics, a newsletter article and emails from advocacy organizations, posts from blogs on climate and energy politics, and academic journal articles on energy policy. Two word-for-word quotes were used in the messages. Details of these quotes and other aspects of message construction are available in Appendix 7.

For several reasons, I focused the messages on state-level political action. Significant federal actions on climate change are unlikely in the short term; however, progress is being made at the state level; and many experts see state-level action as one of the most important ways to achieve progress overall (Center for Climate and Energy Solutions, 2011; Lester & Hart, 2011; Rabe, 2006; Skocpol, 2013). By focusing on state-level action, I hoped that people might be more likely to be persuaded that they could contribute to effective political action, and that political action might influence

politicians. In other words, I hoped the possibility of the PE and CXPE messages effectively boosting PE and CXPE would be higher. Because state-level policies can have larger impacts than city-level or other local policies, it was hoped that the messages might have a higher chance of boosting PRE. In short, keeping messages focused on state level action had the advantage of keeping the type of action constant across all three messages, while offering the best overall chance of each message actually significantly influencing people's efficacy perceptions.

Because messages containing anecdotes about specific, concrete places and actions seemed more likely to be persuasive, and are also more often used in real emails by advocacy organizations, I decided to focus messages on a particular state, rather than talk about the effectiveness of state-level political action in the abstract. I decided to use Kansas as the state focused on, for two reasons. Firstly, although some states such as California have stronger policies on climate change and renewable energy, it seemed that messages about this kind of state would be less effective, since recipients might see California and similar states as special cases, and unlikely to represent what might be possible in their own state. Kansas, as a red state (New York Times, 2014), is likely to be a counterintuitive example of clean energy success, and thus more likely to persuade people that if political action can be effective in Kansas, it can be effective in their own state. Secondly, I was already somewhat familiar with the history of clean energy policy in Kansas, and had found my own perceptions of efficacy for policy success boosted by reading about it. I thus knew it would not be too difficult to create factually accurate messages that stood a reasonable chance of also boosting efficacy.

The messages all mentioned a fictional advocacy organization, Climate Action Kansas, and all featured testimony from the fictional Elliott Crompton, “campaign director” for the organization.

[Participative efficacy message – 455 words]

In November 2014 a new report was released by the Intergovernmental Panel on Climate Change (IPCC), the world's foremost group of climate scientists and other experts. Below is how the Washington Post summarized the findings of the report:

The United States is already suffering the impacts of climate change. One particularly dangerous future impact will be on the highly productive land of the nation's breadbasket, which is crucial to American economic prosperity. If nothing is done to prevent further climate change, much of the American Southwest and Great Plains will become an agricultural wasteland similar to the devastating Dust Bowl conditions of the 1930s that forced millions of Americans from their homes.

The gathering risks of climate change are so profound that they could stall or even reverse generations of progress against poverty and hunger... failure to reduce emissions could threaten society with food shortages, the flooding of major cities, and mass extinction of plants and animals.

Fortunately, we know how to prevent this dire threat. Recent successes prove that **citizens like you can work together to convince elected officials to act on climate.** These officials can enact policies that will reduce the threat of climate change.

You don't need to be wealthy, a professional activist, or an ideological fanatic to make a significant contribution to climate advocacy. "Regular individuals like Angela Harris from Wichita are the reason we succeeded in keeping Kansan politicians committed to clean energy in 2014," says Elliot Crompton, campaign director for advocacy group Climate Action Kansas. "Angela works a full 9 to 5 selling kitchen equipment, has two kids, and never worked on a political campaign before. But she still contributed a lot of help.

"Because we had a substantial number of new members like Angela join last year, giving what they could in time or money, it transformed our ability to reach out to other Kansans and influence state officials. Each time someone like Angela decides to contribute, it boosts our capacity measurably."

The evidence is clear: **individuals like you can make a significant contribution to advocacy organizations' efforts.**

Because you can make a significant contribution to advocacy groups' efforts, **you can help protect Americans from a dangerously changed climate.**

Please [click here](#) to contribute to political action in your state. You will be shown a list of campaigns working right now, along with a page where you can sign up to volunteer your time or money to help these groups.

As the world's leading scientists hold up a danger sign, hundreds of thousands of Americans are pointing the way to a solution to the threat of climate change. This is not a time for cynicism and despair -- it's a time for hope, determination, and action.

Join us.

[Collective external political efficacy message – 465 words]

In November 2014 a new report was released by the Intergovernmental Panel on Climate Change (IPCC), the world's foremost group of climate scientists and other experts. Below is how the Washington Post summarized the findings of the report:

The United States is already suffering the impacts of climate change. One particularly dangerous future impact will be on the highly productive land of the nation's breadbasket, which is crucial to American economic prosperity. If nothing is done to prevent further climate change, much of the American Southwest and Great Plains will become an agricultural wasteland similar to the devastating Dust Bowl conditions of the 1930s that forced millions of Americans from their homes.

The gathering risks of climate change are so profound that they could stall or even reverse generations of progress against poverty and hunger... failure to reduce emissions could threaten society with food shortages, the flooding of major cities, and mass extinction of plants and animals.

Fortunately, we know how to prevent this dire threat. Recent successes prove that **citizens like you can work together to convince elected officials to act on climate**. These officials can enact policies that will reduce the threat of climate change.

"Climate advocates were critical in demonstrating public support for clean energy here in Kansas," says Elliot Crompton, campaign director for advocacy group Climate Action Kansas. "This support helped the state legislature enact strong clean energy policy in 2009."

Crompton says demonstrating continued support after 2009 has been just as important. "We make sure that whenever opponents of climate action speak to Kansas legislators, this is matched by testimony from citizens, local landowners and businesspeople about the many benefits the clean energy policy has brought them."

Kansas being a clean energy leader surprises some people, as the state is home to Koch Industries, one of the most powerful oil companies in the country, with massive influence on state politics. "The fact that our clean energy policy still stands, despite Koch Industries' attempts to repeal it, shows how powerful local climate advocacy is," says Crompton.

The evidence is clear: **climate advocacy groups can effectively influence government policy on climate change**.

Because climate advocacy groups can influence government policy on climate change, **you can help protect Americans from a dangerously changed climate**.

Please [click here](#) to contribute to political action in your state. You will be shown a list of campaigns working right now, along with a page where you can sign up to volunteer your time or money to help these groups.

As the world's leading scientists hold up a danger sign, hundreds of thousands of Americans are pointing the way to a solution to the threat of climate change. This is not a time for cynicism and despair -- it's a time for hope, determination, and action. **Join us.**

[Policy response efficacy message – 458 words]

In November 2014 a new report was released by the Intergovernmental Panel on Climate Change (IPCC), the world's foremost group of climate scientists and other experts. Below is how the Washington Post summarized the findings of the report:

The United States is already suffering the impacts of climate change. One particularly dangerous future impact will be on the highly productive land of the nation's breadbasket, which is crucial to American economic prosperity. If nothing is done to prevent further climate change, much of the American Southwest and Great Plains will become an agricultural wasteland similar to the devastating Dust Bowl conditions of the 1930s that forced millions of Americans from their homes.

The gathering risks of climate change are so profound that they could stall or even reverse generations of progress against poverty and hunger... failure to reduce emissions could threaten society with food shortages, the flooding of major cities, and mass extinction of plants and animals.

Fortunately, we know how to prevent this dire threat. Recent successes prove that **citizens like you can work together to convince elected officials to act on climate**. These officials can enact policies that will reduce the threat of climate change.

Policies enacted by elected officials can substantially reduce the threat of global warming. Several state-level clean energy policies have already reduced carbon dioxide emissions by a substantial amount. For example, in May 2009 the Governor of Kansas signed into law a policy requiring that 20% of the state's electricity should come from clean energy sources by the year 2020. "Experts agree this policy was critical in helping Kansas' wind power capacity since 2009 grow about four times as quickly as the previous eight years," says Elliot Crompton, campaign director for advocacy group Climate Action Kansas.

"Because the clean energy from wind replaces dirty energy from fossil fuels, the total wind energy created in Kansas in 2013 helped prevent climate change about as much as taking a million cars off the road," says Crompton.

The evidence is clear: **when elected officials enact pro-climate policies, these can effectively reduce the threat of climate change**.

Because pro-climate policies can reduce the threat of climate change, **you can help protect Americans from a dangerously changed climate**.

Please [click here](#) to contribute to political action in your state. You will be shown a list of campaigns working right now, along with a page where you can sign up to volunteer your time or money to help these groups.

As the world's leading scientists hold up a danger sign, hundreds of thousands of Americans are pointing the way to a solution to the threat of climate change. This is not a time for cynicism and despair -- it's a time for hope, determination, and action.

Join us.

8.4 Measures

Descriptive statistics for these measures can be seen in Table 9.6; Information on missing data is available in Section 9.3.

Pre-message measures

Age check

This item was included to check whether participants met the condition of being at least 18 years old. If they chose any response that indicated they were younger than 18, they were ejected from the survey.

What is your age in years?

- ☐ Under 14
- ☐ 14-17
- ☐ 18-24
- ☐ 25-39
- ☐ 40 and over

Views on global warming and other controversial topics

In order to find out participants' views on global warming before the messages could influence any of their answers, I placed a question on global warming early in the survey. However, If I had posted only a question on global warming, this could have caused problems. Surveys on Mturk commonly use screener questions early in the survey, in order to screen out participants who are not from the survey's target population. This can distort responses if participants, instead of reporting their actual views, try to guess the "correct" answer that will allow them to complete the survey and

get paid. If the question on global warming was presented on its own, participants may have been less likely to select their actual views. In order to reduce the chance of this happening, two other questions on controversial topics were also presented, in the hope that participants would see them as regular questions rather than questions for screening out participants. Even if participants were still suspicious that at least one of the questions was being used to screen out participants, having all of the questions be related to controversial topics may have made it more difficult to tell which topic was of most interest to the researchers.

Please indicate which of the following statements is closest to your view.

- ☐ Global warming IS happening.
- ☐ Global warming is NOT happening.

- ☐ Vaccines ALWAYS cause autism.
- ☐ Vaccines SOMETIMES cause autism.
- ☐ Vaccines NEVER cause autism.

- ☐ Gun violence in the USA is MOSTLY due to individuals' choices.
- ☐ Gun violence in the USA is EQUALLY due to individuals' choices and laws around gun ownership.
- ☐ Gun violence in the USA is MOSTLY due to laws around gun ownership.

Prior civic engagement

To assess participants' level of civic engagement prior to the experiment, I included two items on past voting behavior from the American National Election Study. These are designed to reduce over-reporting of voting by those who in fact did not vote

(Gerber & Rogers, 2009). The question on petition-signing was not from the National Election Study; I included it in order to have a measure of the kind of non-electoral participation that the messages would be encouraging.

Now, we would like to ask a few questions about your interest and participation in politics.

In talking to people about elections, researchers often find that a lot of people were not able to vote because they weren't registered, they were sick, or they didn't have time.

How about you—did you vote in recent elections?

More specifically, did you vote in the 2012 Presidential election?

- ☐ I did not vote, and did not consider voting
- ☐ I thought about voting but did not
- ☐ I usually vote in this kind of election, but didn't this time
- ☐ I am sure I voted

Did you vote in the 2014 midterm elections?

- ☐ I did not vote, and did not consider voting
- ☐ I thought about voting but did not
- ☐ I usually vote in this kind of election, but didn't this time
- ☐ I am sure I voted

Have you signed any kind of petition in the last 12 months?

- ☐ Yes
- ☐ No

Post-message measures

About 55 post-message items were presented to participants. The full text of all items not shown here is available in Appendix 5. Only the items that were analyzed in the present study are presented immediately below. Unless otherwise noted, the order of all items for each construct was randomized. For example, all three self-efficacy items were always presented together, but it was randomized which of the three items would be

presented first, second or third. Information on the order in which different blocks of items were presented is noted below, after the items.

Self-efficacy

Please indicate how much you agree or disagree with each of the following statements.

	++++++ Strongly disagree 1	++++++ 2	++++++ 3	Neither agree nor disagree 4	++++++ 5	++++++ 6	++++++ Strongly agree 7
If I wanted to, I have great confidence that I could contribute time to a group acting politically on climate change.	☐	☐	☐	☐	☐	☐	☐
I would find it easy to contribute some time each week to an organization taking political action on climate change, if I really wanted to.	☐	☐	☐	☐	☐	☐	☐
If I wanted to contribute money to a group taking political action on climate change, I would find it easy to do so.	☐	☐	☐	☐	☐	☐	☐

Participative efficacy

Please indicate whether you agree or disagree with each of the following statements.

	+++++++ Strongly disagree 1	+++++++ 2	+++++++ 3	Neither agree nor disagree 4	+++++++ 5	+++++++ 6	+++++++ Strongly agree 7
I believe that I, as an individual, can provide an important contribution to groups working to influence politicians' actions on climate change.	☐	☐	☐	☐	☐	☐	☐
If I worked with groups trying to influence politicians on climate change, I think my contribution would make a very large difference to the overall group effort.	☐	☐	☐	☐	☐	☐	☐
If I worked with an organization to influence the decisions of government officials regarding global warming, my actions as an individual would be helpful to the overall effort.	☐	☐	☐	☐	☐	☐	☐

Expectation of others' participation

How confident are you that, over the next 12 months, a number of Americans will contribute time or money to organizations taking political action on climate change?

Specifically, how confident are you that...

	+++++++ Not at all confident 1	+++++++ 2	+++++++ 3	+++++++ Moderately confident 4	+++++++ 5	+++++++ 6	+++++++ Extremely confident 7
At least 1% will contribute to organized political efforts?	☐	☐	☐	☐	☐	☐	☐
At least 10% will contribute to organized political efforts?	☐	☐	☐	☐	☐	☐	☐
At least 50% will contribute to organized political efforts?	☐	☐	☐	☐	☐	☐	☐
At least 80% will contribute to organized political efforts?	☐	☐	☐	☐	☐	☐	☐

Collective external political efficacy

Please indicate how much you agree or disagree with each of the following statements.

	++++++ Strongly disagree 1	++++++ 2	++++++ 3	Neither agree nor disagree 4	++++++ 5	++++++ 6	++++++ Strongly agree 7
Government officials are likely to be strongly influenced by the actions of climate change advocacy organizations.	☐	☐	☐	☐	☐	☐	☐
Organizations taking political action on climate change can have a very large influence on government officials.	☐	☐	☐	☐	☐	☐	☐
If members of climate advocacy groups work together, they can influence the decisions of government officials regarding global warming.	☐	☐	☐	☐	☐	☐	☐

Policy response efficacy

How confident are you that...

	++++++ Not at all confident 1	++++++ 2	++++++ 3	++++++ Moderately confident 4	++++++ 5	++++++ 6	++++++ Extremely confident 7
...federal government policies can help reduce climate change?	☐	☐	☐	☐	☐	☐	☐
...state government policies can help reduce climate change?	☐	☐	☐	☐	☐	☐	☐
...local government policies can help reduce climate change?	☐	☐	☐	☐	☐	☐	☐

Perceived threat

How harmful do you think climate change is likely to be for...

	+++++++ Not harmful at all 1	+++++++ 2	+++++++ 3	+++++++ Moderately harmful 4	+++++++ 5	+++++++ 6	+++++++ Extremely harmful 7
You personally	☐	☐	☐	☐	☐	☐	☐
Your family	☐	☐	☐	☐	☐	☐	☐
People in your state	☐	☐	☐	☐	☐	☐	☐
People elsewhere in the United States	☐	☐	☐	☐	☐	☐	☐

Collective identification with climate advocacy groups

Please indicate how much you agree or disagree with each of the following statements.

	+++++++ Strongly disagree 1	+++++++ 2	+++++++ 3	Neither agree nor disagree 4	+++++++ 5	+++++++ 6	+++++++ Strongly agree 7
I strongly identify with members of climate advocacy groups.	☐	☐	☐	☐	☐	☐	☐
I do not see myself as a member of a group working for political action on climate change.	☐	☐	☐	☐	☐	☐	☐
I feel strong ties with groups working to influence politicians' decisions on climate change.	☐	☐	☐	☐	☐	☐	☐

Political ideology

Politically speaking, do you think of yourself as...

- ☐ Very liberal
- ☐ Somewhat liberal
- ☐ Moderate, middle of the road
- ☐ Somewhat conservative
- ☐ Very conservative

Demographics

How old are you? Please type your answer here:

Please indicate your gender:

- ☐ Male
- ☐ Female

Please specify your ethnicity:

- ☐ Hispanic or Latino
- ☐ Not Hispanic or Latino

Please specify your race. (Check all that apply)

- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White

What is your total annual household income, before taxes?

- ☐ \$24,999 or less
 - ☐ Between \$25,000 and \$49,999
 - ☐ Between \$50,000 and \$74,999
 - ☐ Between \$75,000 and \$99,999
 - ☐ Between \$100,000 and \$124,999
 - ☐ Between \$125,000 and \$149,999
 - ☐ Between \$150,000 and \$174,999
 - ☐ \$175,000 or more
-

What is the highest degree or level of school you have completed?

If currently enrolled, mark the previous grade or highest degree received.

- ☐ Did not finish high school
- ☐ High school graduate
- ☐ Some college/tech
- ☐ College graduate
- ☐ Graduate school or other post graduate qualification

Dependent measures

Information seeking intentions (plus attention check)

Participants that failed the attention check were ejected from the survey and were not paid, nor were their responses used in any analyses. For this reason, I placed the attention check item early in the survey, in order to avoid wasting the time of people who were going to be ejected from the survey anyway. This item was placed within the first set of dependent measures, information seeking intentions, presented immediately after the messages. It is displayed third in the list of items below. This is the position the attention check was always presented in; however, the order of the other three items was randomized.

Please indicate how much you agree or disagree with each of the following statements.

	++++++ Strongly disagree 1	++++++ 2	++++++ 3	Neither agree nor disagree 4	++++++ 5	++++++ 6	++++++ Strongly agree 7
I will try to seek information about climate change advocacy groups in the near future.	☐	☐	☐	☐	☐	☐	☐
Within the next 30 days, I will seek information about which groups taking political action on climate change are most effective.	☐	☐	☐	☐	☐	☐	☐
If you are paying attention, please select "2" for this statement.	☐	☐	☐	☐	☐	☐	☐
Soon, I intend to find out more about groups acting to influence politicians' decisions on climate change.	☐	☐	☐	☐	☐	☐	☐

Political action intentions

Please indicate how much you agree or disagree with each of the following statements.

	++++++ Strongly disagree 1	++++++ 2	++++++ 3	Neither agree nor disagree 4	++++++ 5	++++++ 6	++++++ Strongly agree 7
At some point over the next 30 days, I will contribute money to an organization working to influence politicians' decisions on climate change.	☐	☐	☐	☐	☐	☐	☐
Within the next 6 months, I intend to volunteer for an organization taking political action on climate change.	☐	☐	☐	☐	☐	☐	☐
It is extremely likely that I will contribute to political action on climate change in the next 6 months.	☐	☐	☐	☐	☐	☐	☐

Email-address-leaving

Next, we would like to ask about your interest in signing up to find out more about how you can contribute to climate action. If you are interested in contributing to political action on climate in your state, please enter your email address below.

Within 24 hours, you will be sent a short email that summarizes the work of one or more organizations working in your state. This will include a brief description of the work they are doing in your state, what they are requesting of members, links to find out more, and contact details for organizational staff who can answer any questions you have.

This action is completely voluntary and your choice to enter or not enter your email address will not affect your reward for the study in any way.

If you would like to receive this email, please enter your email address here:

Order of presentation

Immediately after the messages (or after initial items for control participants), participants were presented with the dependent measures. All participants were presented with the information seeking intentions first, political action intentions second, and the email address item third. Following the dependent measures, all other items were presented in a semi-randomized order. Each of the five types of efficacy items was paired with a set of non-efficacy questions, and these blocks were presented in alternating order. This was done in order to prevent participants from answering multiple blocks of efficacy items in a row, which would risk causing them to answer one set of efficacy items without differentiating them from the other items, due to the similar question content. The order of these pairs of blocks was randomized; within each block, the efficacy items were always presented second, after the other items. The items following these blocks

were presented in the same order to all participants: threat, political knowledge, fear, political ideology, party identification, and demographics.

To help illustrate the sequence more clearly, the order of all experimental materials can be depicted as follows. Details of all items not described above, such as political knowledge, can be found in Appendix 5.

- a. Pre-message measures
- b. Messages (for those not in control condition)
- c. Information seeking intentions & attention check
- d. Political action intentions
- e. Email address
- f. The following five pairs of blocks, presented in random order:
 1. Issue importance, followed by self-efficacy
 2. Climate science knowledge block 1, followed by participative efficacy
 3. Political knowledge block 1, followed by expectations of others' participation
 4. Climate science knowledge block 2, followed by collective external political efficacy
 5. Collective identification with climate advocates, followed by policy response efficacy
- g. Threat
- h. Political knowledge block 2
- i. Fear
- j. Political ideology
- k. Party ID
- l. Demographics

9 8. MESSAGE EXPERIMENT - RESULTS

9.1 Participants

In total, 678 responses were obtained, 636 of which completed the survey properly and were paid. Some incomplete responses were retained in the dataset and analyzed. The process by which the 678 responses were reduced to the 525 actually analyzed was based on which responses seemed likely to be valid responses from separate individuals (e.g. responses did not come from the same Amazon worker account, and did not take an excessively short time to finish the survey), and on respondents' self-reported belief in global warming. This process is detailed in Appendix 6. Unfortunately, response rates cannot be calculated for Mturk samples, since it is impossible to tell the precise number of people who were offered a chance to complete a study. Amazon do not give out information on how many people have viewed the notices recruiting people to studies. Additionally, even if Amazon did give out this information, many Mturk workers find out about studies through online forums, meaning that official response rate data would not include a substantial number of participants who find out about the studies outside the official website.

9.2 Checking randomization across message conditions

In order to ensure participants assigned to the different experimental conditions were not significantly different prior to receiving the messages, tables and chi squared tests for political ideology and prior civic engagement are displayed below. For the chi

squared test for ideology, due to low expected cell counts in the “very conservative” condition, categories were collapsed to three – liberal, moderate and conservative. None of the chi squared tests were significant, suggesting the groups were roughly equivalent on all these characteristics.

Table 9.1. Differences in political ideology of participants assigned to different experimental conditions.

	Control	PE message	CXPE message	PRE message	Total
Very liberal	22%	28%	21%	19%	22%
Somewhat liberal	37%	36%	44%	44%	40%
Moderate	25%	25%	22%	28%	25%
Somewhat conservative	13%	11%	12%	9%	11%
Very conservative	3%	0%	2%	1%	1%

Table 9.2. Differences in prior civic engagement of participants assigned to different experimental conditions.

	Control	PE message	CXPE message	PRE message	Total
Voted in 2012 Presidential election	74%	69%	72%	71%	72%
Voted in 2014 midterm election	49%	47%	53%	45%	48%
Signed petition in last 12 months	34%	30%	33%	26%	31%

Table 9.3. Chi squared tests of differences in participant characteristics across experimental conditions.

	Chi sq.	df	p value
Ideology (3 categories)	4.56	6	0.60
Voted in 2012 Presidential election	0.79	3	0.85
Voted in 2014 midterm election	1.75	3	0.63
Signed petition in last 12 months	2.67	3	0.45

Table 9.4. Average time reading messages for participants in different experimental conditions.

	PE message	CXPE message	PRE message
Mean time	2m24s	2m34s	3m15s
Median time	1m23s	1m35s	1m30s

Time spent reading messages was also compared, in case this may have affected how individuals responded to the messages. A one-way ANOVA, looking at only those not in control group, with message time as the DV and message condition as the group variable, was not significant, $F(2,391)=0.73$, $p=.48$.

Based on the message lengths of 455-465 words, and median reading times displayed above, assuming they read the entire message, the median participant would have been reading somewhere between 293 words per minute and 330 words per minute, relatively close to the average reading speed of 300 words per minute (Reichle, Rayner, & Pollatsek, 2003). This suggests that most of the participants indeed read the entire message, without skimming.

9.3 Missing Data

As the only response options offered to participants in this experiment were points along the continuous scale, the only type of missing data that occurred was when participants did not give any response at all. This resulted in a substantially lower proportion of responses that had to be coded as missing, compared to the CCAM analysis.

Table 9.5. Percentages of responses coded as missing data for each variable from the message experiment.

Variable	Percentage missing (No response given)
Self efficacy 1	0.4
Self efficacy 2	0.4
Self efficacy 3	0.4
Participative efficacy 1	0.4
Participative efficacy 2	0.6
Participative efficacy 3	0.4
EOP1 Confidence 1% will participate	0.8
EOP2 Confidence 10% will participate	0.8
EOP3 Confidence 50% will participate	0.8
EOP4 Confidence 80% will participate	0.6
Collective external political efficacy 1	0.4
Collective external political efficacy 2	0.4
Collective external political efficacy 3	0.4
PRE1 Policy response efficacy 1	0.4
PRE2 Policy response efficacy 2	0.4
PRE3 Policy response efficacy 3	0.6
Threat1 Perceived threat to you	0.6
Threat2 Perceived threat to your family	0.8
Threat3 Perceived threat to your state	0.8
Threat4 Perceived threat to rest of USA	0.6
cID1 Identification with climate activists 1	0.6
cID2 Identification with climate activists 2	0.4
cID3 Identification with climate activists 3	0.4
Info seeking intentions 1	0
Info seeking intentions 2	0
Info seeking intentions 3	0
Political action intentions 1	0.2
Political action intentions 2	0
Political action intentions 3	0
Political ideology	1
Age	1.3
Gender	1
Income	1
Education	1

9.4 Descriptive statistics

Descriptive statistics for focal variables are displayed in Table 9.6. Bar graphs showing distributions for these variables are available in Appendix 8.

Table 9.6. Descriptive statistics for message experiment items.

	N	Mean	SD	Skewness Statistic	Std. Error	Kurtosis Statistic	Std. Error
SE1 Self efficacy 1	523	4.08	2.01	-0.18	0.11	1.77	0.21
SE2 Self efficacy 2	523	4.17	1.83	-0.31	0.11	2.03	0.21
SE3 Self efficacy 3	523	3.81	1.88	-0.02	0.11	1.83	0.21
PE1 Participative efficacy 1	523	4.14	1.70	-0.38	0.11	2.26	0.21
PE2 Participative efficacy 2	522	3.83	1.68	-0.07	0.11	2.16	0.21
PE3 Participative efficacy 3	523	4.47	1.65	-0.60	0.11	2.60	0.21
EOP1 Confidence 1% will participate	521	5.47	1.55	-0.89	0.11	3.02	0.21
EOP2 Confidence 10% will participate	521	3.98	1.70	-0.03	0.11	2.11	0.21
EOP3 Confidence 50% will participate	521	2.15	1.27	1.16	0.11	4.29	0.21
EOP4 Confidence 80% will participate	522	1.44	1.00	2.98	0.11	12.82	0.21
CXPE1 Collective external efficacy 1	523	5.14	1.31	-0.97	0.11	4.09	0.21
CXPE2 Collective external efficacy 2	523	4.84	1.42	-0.67	0.11	3.12	0.21
CXPE3 Collective external efficacy 3	523	4.58	1.44	-0.42	0.11	2.72	0.21
PRE1 Policy response efficacy 1	523	5.12	1.64	-0.78	0.11	2.89	0.21
PRE2 Policy response efficacy 2	523	4.90	1.69	-0.62	0.11	2.57	0.21
PRE3 Policy response efficacy 3	522	4.52	1.80	-0.34	0.11	2.11	0.21
threat1 Perceived threat to you	522	4.51	1.69	-0.15	0.11	2.14	0.21
threat2 Perceived threat to your family	521	4.63	1.67	-0.22	0.11	2.16	0.21
threat3 Perceived threat to your state	521	4.94	1.51	-0.32	0.11	2.33	0.21
threat4 Perceived threat to rest of USA	522	5.25	1.45	-0.55	0.11	2.63	0.21
cID1 Identification with climate activists 1	522	3.57	1.77	0.13	0.11	2.05	0.21
cID2 Identification with climate activists 2 (reverse coded)	523	4.60	1.91	-0.43	0.11	1.98	0.21
cID3 Identification with climate activists 3	523	3.37	1.76	0.27	0.11	2.09	0.21
inseek1 Info seeking intentions 1	525	4.02	1.81	-0.21	0.11	1.98	0.21
inseek2 Info seeking intentions 2	525	3.72	1.88	0.08	0.11	1.92	0.21
inseek3 Info seeking intentions 3	525	3.94	1.82	-0.20	0.11	1.98	0.21
intent1 Political action intentions 1	524	2.71	1.73	0.75	0.11	2.53	0.21
intent2 Political action intentions 2	525	2.99	1.86	0.50	0.11	2.02	0.21
intent3 Political action intentions 3	525	2.55	1.72	0.85	0.11	2.62	0.21
Valid N (listwise)	513						

Table 9.7. Percentage of message experiment participants who left their email address.

	Frequency	Percentage
Did not enter email address	408	78%
Entered email address	117	22%
Total	525	100%

Means for all efficacy and threat variables were roughly at the midpoint, or slightly above it. Means for collective identification with climate activists, and for the two action intention variables, were slightly below the midpoint. Most participants did not leave their email address, with only 22% doing so.

Examination of the graphs of distributions show that many variables are skewed to one side or the other. However, most variables did not deviate strongly from normality; only the fourth EOP items is outside the upper bounds of 2 for kurtosis and 7 for skewness (West et al., 1995).

9.5 Bivariate correlations

Table 9.8. Bivariate correlations for all message experiment items.

	SE1	SE2	SE3	PE1	PE2	PE3	EOP1	EOP2	EOP3	EOP4	CXPE1	CXPE2	CXPE3	PRE1	PRE2	PRE3	Thr1	Thr2	Thr3	Thr4	clD1	clD2	clD3	Seek1	Seek2	Seek3	Int1	Int2	Int3	Email
SE2	.49																													
SE3	.47	.83																												
PE1	.29	.45	.43																											
PE2	.30	.43	.43	.79																										
PE3	.30	.44	.41	.84	.79																									
EOP1	.19	.14	.08	.19	.25	.24																								
EOP2	.23	.23	.19	.28	.31	.26	.67																							
EOP3	.18	.22	.24	.30	.32	.21	.23	.61																						
EOP4	.13	.16	.23	.27	.28	.16	-.03	.28	.74																					
CXPE1	.20	.26	.24	.51	.46	.55	.24	.24	.14	.06																				
CXPE2	.19	.24	.24	.54	.50	.52	.21	.25	.20	.15	.77																			
CXPE3	.14	.21	.24	.50	.50	.50	.18	.25	.19	.13	.77	.79																		
PRE1	.12	.22	.17	.42	.37	.44	.24	.25	.14	.07	.38	.28	.28																	
PRE2	.16	.25	.19	.48	.42	.49	.24	.30	.18	.10	.42	.34	.33	.88																
PRE3	.16	.26	.22	.48	.45	.49	.22	.30	.23	.15	.45	.40	.39	.73	.88															
Threat1	.15	.24	.21	.36	.35	.33	.16	.24	.20	.14	.28	.26	.24	.36	.39	.41														
Threat2	.13	.24	.20	.34	.33	.33	.16	.24	.19	.14	.28	.24	.22	.35	.39	.41	.94													
Threat3	.10	.22	.17	.31	.29	.30	.12	.19	.17	.11	.26	.22	.21	.38	.41	.40	.85	.88												
Threat4	.16	.25	.18	.30	.28	.30	.16	.18	.13	.06	.29	.23	.22	.42	.42	.39	.72	.75	.84											
Coll. ID 1	.26	.42	.38	.52	.51	.53	.15	.30	.29	.23	.34	.33	.32	.41	.44	.44	.42	.41	.41	.43										
Coll. ID 2	.17	.31	.28	.41	.42	.40	.13	.29	.30	.24	.28	.29	.29	.29	.34	.34	.29	.27	.26	.26	.60									
Coll. ID 3	.27	.45	.41	.55	.55	.57	.15	.32	.35	.27	.34	.35	.33	.41	.43	.45	.39	.39	.38	.38	.87	.62								
Info. Seek 1	.26	.40	.39	.60	.55	.58	.20	.31	.30	.23	.40	.39	.41	.39	.44	.46	.41	.41	.38	.39	.68	.58	.68							
Info. Seek 2	.25	.38	.40	.57	.53	.54	.17	.32	.34	.28	.38	.38	.39	.39	.43	.46	.40	.40	.38	.37	.68	.56	.68	.90						
Info. Seek 3	.26	.37	.38	.55	.51	.54	.19	.30	.27	.20	.40	.39	.36	.38	.43	.44	.37	.37	.34	.39	.67	.58	.67	.91	.87					
Intent. 1	.24	.45	.50	.56	.55	.53	.07	.26	.36	.37	.30	.34	.34	.27	.31	.36	.34	.34	.30	.28	.63	.56	.68	.67	.68	.66				
Intent. 2	.23	.41	.41	.56	.54	.56	.15	.30	.33	.29	.37	.37	.34	.35	.40	.43	.39	.38	.36	.34	.67	.59	.69	.72	.73	.72	.81			
Intent. 3	.33	.38	.39	.49	.48	.44	.13	.33	.46	.39	.29	.32	.30	.24	.26	.31	.33	.33	.29	.27	.56	.50	.58	.60	.64	.61	.72	.75		
Email	.09	.21	.20	.23	.21	.28	.08	.14	.11	.03	.19	.13	.12	.23	.24	.22	.21	.20	.16	.18	.30	.27	.33	.38	.37	.40	.34	.40	.31	
Ideology	.02	-.12	-.06	-.17	-.14	-.15	-.07	-.09	-.07	-.03	-.09	-.06	-.06	-.26	-.20	-.12	-.23	-.25	-.28	-.31	-.30	.19	-.27	-.24	-.20	-.21	-.20	-.22	-.14	-.10

Numbers in red in Table 9.8 are statistically significant ($p < .05$). Numbers in black are not statistically significant. Cell backgrounds are shaded according to the strength of correlation.

Most items were significantly correlated with most other items. Most items were especially highly correlated with other items measuring the same construct; with the exception of EOP measures, correlations between items for the same construct ranged from .47 to .94. Each EOP measure, however, was only highly correlated with the other EOP items adjacent to it; the first with the second but not the third or fourth, the second with the first and third but not the fourth, and so on. This means that, for instance, individuals' answers about whether 1% of Americans would act on global warming was

highly correlated with their answer about whether 10% would participate, but not whether 50% or 80% would participate.

Because the items seemed to be mostly relatively normal, and correlated in the expected ways, I decided to proceed to confirmatory factor analyses to check how well the latent variables of each construct explained the data. However, I approached these analyses with some caution due to the non-normality and poor correlations of EOP items.

9.6 Confirmatory factor analyses (CFAs)

For the confirmatory factor analyses of efficacy variables, as with the CFAs for the CCAM analysis, a decision had to be made about whether to treat the data as continuous or categorical, and which kind of estimator to use. Although a large portion of the data are non-normal, making categorical treatment ideal, categorical models in Mplus do not give fit statistics that allow comparison of non-nested models (AIC and BIC) without a large amount of computation. Because all the items used for the experiment are on 7-point scales and in all except one case do not depart from normality severely (West et al., 1995), I decided to treat the data as continuous for the CFAs, and use Mplus' robust maximum likelihood (MLR) estimator, so that AIC and BIC statistics could be computed, and the different CFA models appropriately compared. Research has shown that MLR is robust to violations of normality, and often gives unbiased results provided items have 5-point scales or greater (Bandalos, 2014; Rhemtulla et al., 2012). With appropriate caution due to the problems with EOP items, I decided that treating the variables as continuous and using MLR in order to get AIC and BIC statistics was appropriate.

A full description of the initial CFAs I conducted is available in Appendix 9. The first two CFAs I conducted for the message experiment gave improper results. The first CFA that did not give improper results was the third five-factor CFA I conducted. A diagram depicting the model is shown in Figure 9.1. As with the CCAM analysis, I also ran other CFAs with a smaller number of factors to test whether participants' responses to the efficacy items could be explained by a smaller number of more general latent efficacy variables. Specifically, I ran a one-factor model, with all efficacy responses modeled as caused by a single efficacy factor; a two-factor model, with SE and PE loading on an "internal" factor, and EOP2, CXPE and PRE loading on an "external" factor; and a three-factor model, with SE and PE loading on an "internal" factor, EOP2 and CXPE loading on an "external" factor (representing the efficacy for groups external to the individual participant affecting policy), and PRE separated on its own. Because the efficacy for policy reducing global warming is "external" to the individual participant, but is qualitatively different from EOP and CXPE in that it does not focus on the outcome of influencing policy, it seemed appropriate to test whether a model with these three factors fit the data. The fit statistics based on these four models are displayed in Table 9.11; diagrams for all the additional models are displayed in Appendix 9.

Table 9.9. Comparison of fit statistics for message experiment CFAs.

	5-factor	1-factor	2-factor	3-factor
AIC	20123.674	21655.575	21084.388	20725.579
BIC	20315.441	21808.989	21242.064	20891.777
Chi-square	85.293	1239.786	863.522	579.555
RMSEA	0.041	0.205	0.171	0.141
RMSEA 90% CI	0.028-0.055	0.195-0.215	0.161-0.181	0.130-0.151
CFI	0.986	0.595	0.723	0.82
SRMR	0.023	0.12	0.111	0.088
Free parameters	45	36	37	39

Comparing the models, differences in AIC and BIC (with the 5-factor model lower than all the others) show the 5-factor model is a much better fit for the data. BIC differences of more than 10 are generally regarded as evidence of much better fit, and the 5-factor model has a BIC lower than all other models by at least 500 (Raftery, 1995). Although the other fit statistics cannot be directly compared to each other due to the different models not being nested within each other, qualitatively speaking the 5-factor model is the only one with adequate RMSEA, CFI and SRMR by conventional standards. Thus, it is justified to proceed with the 5-factor model of efficacy for the measurement model.

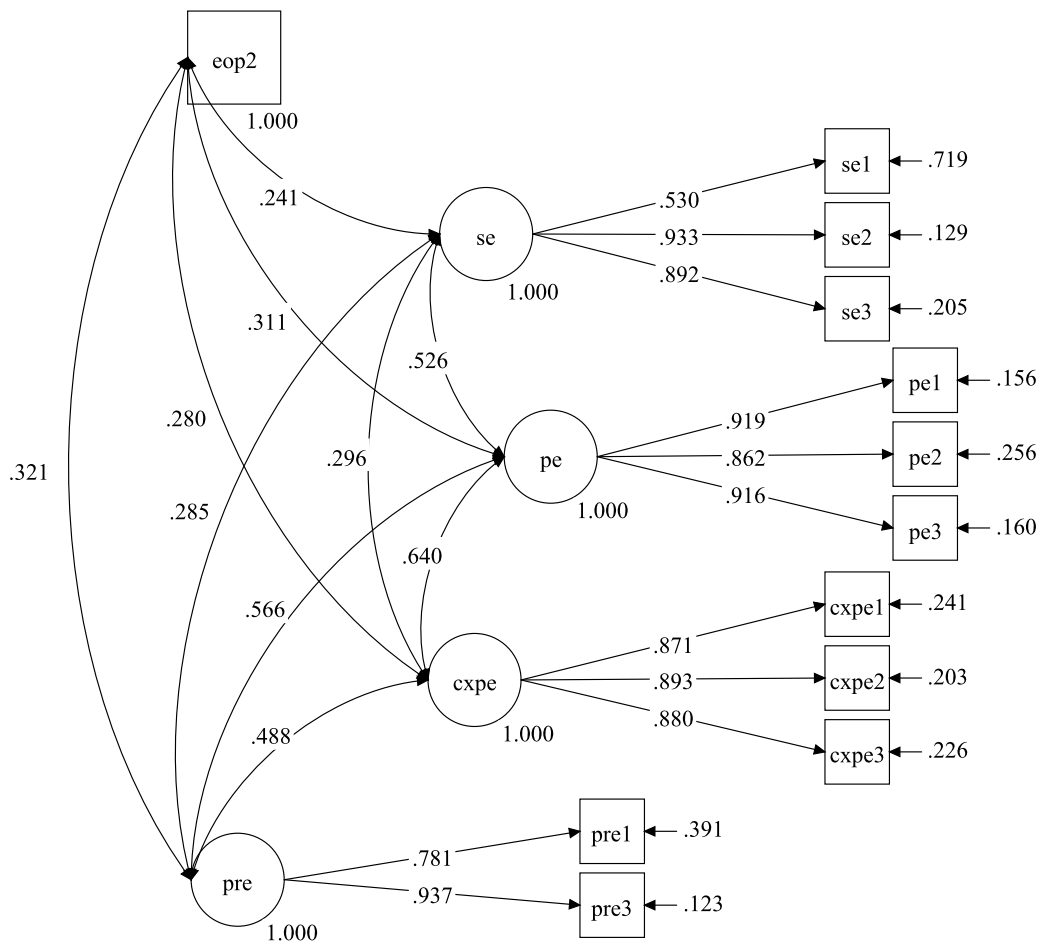


Figure 9.1. Five-factor confirmatory factor analysis of message experiment data.

Key to abbreviations in Figure 9.1: se=Self-efficacy. pe=Participative efficacy. eop2=Expectations of others' participation. cxpe=Collective external political efficacy. pre=Policy response efficacy.

Circles represent latent variables, squares represent observed variables. Numbers on paths from latent variables to indicators are standardized factor loadings. Numbers on bidirectional paths between latent variables and EOP2 are correlations. Numbers to the right of indicators are standardized residual variances – equal to 1 minus the R^2 in

variance explained by the latent variable. Numbers below each latent variable are standardized variances – all equal to one due to standardization.

9.7 Measurement model

The CFA models were conducted with all items treated as continuous, using the robust maximum likelihood estimator (MLR). However, for the measurement model and SEM analyses, I treated all latent variable indicators as categorical, and used the WLSMV estimator, for the following reasons. In order to obtain AIC and BIC fit statistics, and thus be able to compare the different CFA models, MLR estimation was required. However, MLR estimation would have been difficult to use for the SEM analysis of the experimental data, as one of the outcome variables – whether or not individuals left their email address – is categorical. As noted in the analysis of the CCAM data, MLR estimation cannot simultaneously model variables as categorical and provide commonly used fit statistics. Because I needed to model at least one outcome variable as categorical, and also needed to check the fit of the models, I decided to use the WLSMV estimator, which does provide most fit statistics, even with categorical data. WLSMV estimation was not used in the CCAM analysis, because it handles missing data with pairwise deletion, which can result in biased model results, especially when there is a lot of missing data. However, because there were only very small amounts of missing data for the experiment (with at most 1.3% of data missing for any particular variable), it is unlikely that WLSMV estimation in this case will strongly distort the results.

Because the SEM thus required WLSMV estimation in order to deal with the email address variable, and the fit statistics of the measurement model need to be directly

comparable to those of the SEM, it was necessary to use WLSMV for the measurement model as well. Therefore, for this measurement model analysis, all latent variable indicators (for SE, PE, CXPE, PRE, threat, collective identification with climate advocates, information seeking intentions, and political action intentions) were treated as categorical. EOP2 was treated as an observed continuous variable, as MPlus does not allow treatment of observed variables as categorical (Muthén & Muthén, 1998-2012). The fit statistics of the measurement model are presented in Table 9.12. The size and complexity of the measurement model made it difficult to create a visual diagram where all the information was clearly visible. Instead, model results are shown in tabular form. Standardized factor loadings are shown in Table 9.13, and a matrix of correlations between latent variables (and two observed variables – EOP2 and email-address-leaving) is shown in Table 9.14.

Table 9.10. Fit statistics for message experiment measurement model.

Chi-square	693.118
RMSEA	0.057
RMSEA 90% CI	0.052-0.062
CFI	0.991
WRMR	0.785

Table 9.11. Standardized factor loadings for message experiment measurement model.

SE1 Self efficacy 1	0.60
SE2 Self efficacy 2	0.94
SE3 Self efficacy 3	0.92
PE1 Participative efficacy 1	0.93
PE2 Participative efficacy 2	0.88
PE3 Participative efficacy 3	0.93
CXPE1 Collective external efficacy 1	0.90
CXPE2 Collective external efficacy 2	0.91
CXPE3 Collective external efficacy 3	0.90
PRE1 Policy response efficacy 1	0.82
PRE3 Policy response efficacy 3	0.95
Threat1 Perceived threat to you	0.96
Threat2 Perceived threat to your family	0.98
Threat3 Perceived threat to your state	0.94
Threat4 Perceived threat to rest of USA	0.89
Identification with climate activists 1	0.94
Identification with climate activists 2	
(reverse coded)	-0.77
Identification with climate activists 3	0.95
Info seeking intentions 1	0.96
Info seeking intentions 2	0.96
Info seeking intentions 3	0.92
Political action intentions 1	0.91
Political action intentions 2	0.95
Political action intentions 3	0.85

The only potential problem with measurement model fit was that the upper end of the 90% confidence interval for RMSEA was slightly above the traditional cutoff of .06. But since this is only slightly over that limit, and all the other fit statistics showed excellent fit, the model was deemed acceptable. The model modification indices suggested that there were no changes to be made to the model that both made substantive sense, and would have made substantial improvements to model fit. Therefore, I decided to proceed to SEM analysis without any changes to the model.

Table 9.12. Correlations between latent variables for message experiment measurement model.

	SE	PE	EOP2	CXPE	PRE	Threat	Collective ID	Info seeking	Action Intentions
PE	0.58								
EOP2	0.28	0.33							
CXPE	0.35	0.68	0.30						
PRE	0.30	0.60	0.33	0.53					
Threat	0.28	0.42	0.24	0.36	0.52				
Collective ID	0.52	0.68	0.37	0.45	0.55	0.47			
Info seeking	0.51	0.69	0.34	0.52	0.55	0.48	0.82		
Action Intentions	0.59	0.72	0.36	0.47	0.47	0.44	0.84	0.87	
Email	0.31	0.38	0.19	0.25	0.39	0.30	0.47	0.59	0.55

9.8 Structural equation model (SEM)

Figure 9.2 below displays the SEM analysis for the experiment. Because of the complexity of the model, many details are not displayed, so that the basic structure of the model can be seen. Boxes representing all of the latent variable indicators, as well as all numbers, have been left off the model. In addition, political ideology and demographic variables have been left off the model, although they were included in the analysis. Square boxes representing dummy variables for each of the messages, compared to the control condition, are displayed down the left-hand side of the figure. The circles and single box displayed in the central column of the figure represent the five efficacy variables, perceived threat, and collective identification with climate activists. The square box represents EOP2 (as it is measured with a single item); the circles represent latent variables for all the other constructs. Dependent variables are displayed down the right-hand side of the figure. The square box represents whether or not participants left their

email address. The two circles represent information seeking intentions and political action intentions.

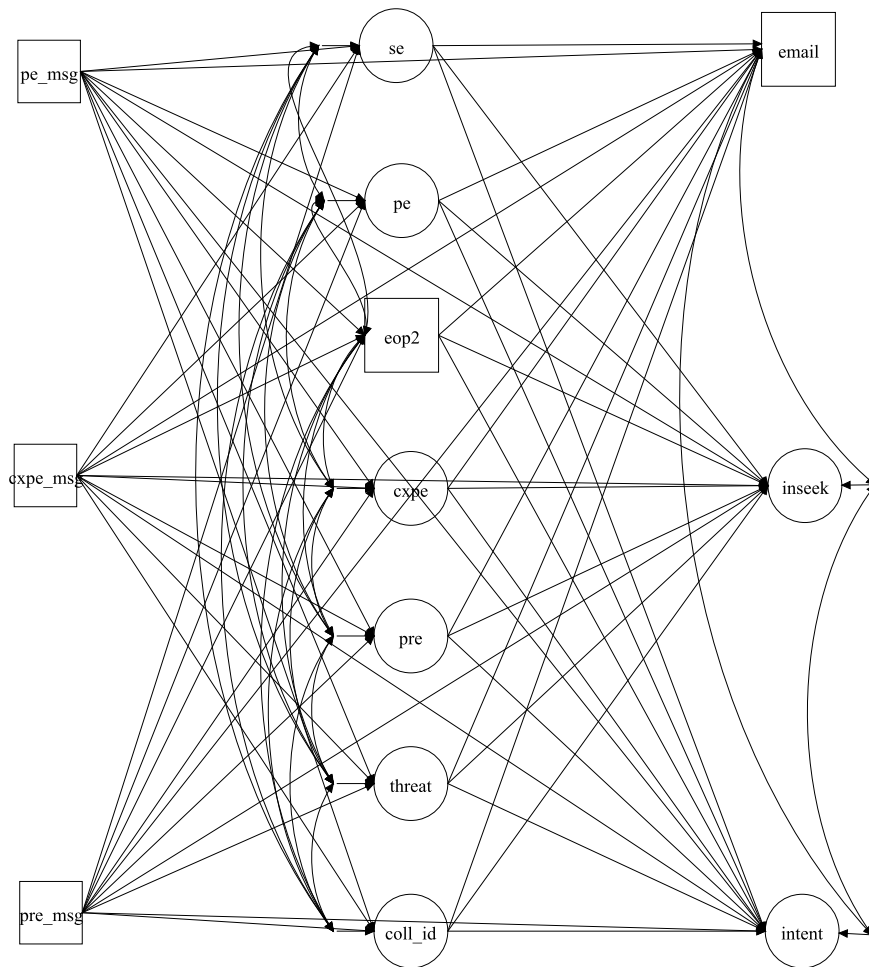


Figure 9.2. Full SEM model for message experiment data.

Key to abbreviations in Figure 9.2: *pe_msg* = Participative efficacy message. *cxpe_msg* = Collective external political efficacy message. *pre_msg* = Policy response efficacy message. *se*=Self-efficacy. *pe*=Participative efficacy. *eop*=Expectations of others' participation. *cxpe*=Collective external political efficacy. *pre*=Policy response

efficacy. coll_ID = Collective identification with climate activists. email=Email-address-leaving. inseek=Information seeking intentions. intent=Political action intentions.

The large number of paths between variables makes it somewhat difficult to see exactly what is affecting what in the model; hopefully a brief verbal explanation will help clarify this. The message variables on the left-hand side of the diagram were modeled as having a causal effect on both the variables in the central column (efficacy, threat, and collective identification) as well as on the dependent variables on the right-hand side (email-address-leaving, information seeking intentions, and political action intentions). The variables in the central column were only modeled as having an effect on the dependent variables. All the variables in the central column – efficacy, threat, identification – were modeled as having correlated residual variances. In other words, they were modeled as being correlated with each other above and beyond that correlation that is explained by the effects of the messages. Finally, email-address-leaving, information seeking intentions and political action intentions were also modeled as having correlated residuals. This means that they were expected to be correlated with each other beyond that correlation that can be explained by the effects of the messages and the effects of the efficacy, threat and collective identification variables. Finally, although this is not shown on the diagram, political ideology and the demographic variables (age, gender, race, education and income) were modeled as only having effects on the dependent variables of email-leaving, information seeking and political action intentions. These variables were included to control for any influence they might have had on the effects of efficacy and threat on action.

Table 9.13. Fit statistics for message experiment SEM model.

Chi-square	1042.043
RMSEA	0.051
RMSEA 90% CI	0.047-0.055
CFI	0.988
WRMR	1.145
Free parameters	268

Fit statistics (Table 9.13) show that the model fits well. The only fit statistic that might give some reason for concern is the WRMR, which is higher than the cutoff levels of 0.9 or 1.0 recommended for some situations (Yu, 2002). However, as noted for the CCAM SEM analysis that also displayed high WRMR, this is not enough reason to reject the model. The recommended benchmarks are based on analyses that were dissimilar to the present analysis, and the author of the study from which the benchmarks came herself noted that the appropriateness of different cutoff values is strongly dependent on the specific models analyzed (Yu, 2002). For this reason, and because the other fit indices indicated excellent fit, I accepted this model as valid.

9.9 Descriptive differences between message conditions

Before exploring the modeled effects in detail, in order to give an intuitive sense of how participants varied across the different message conditions, in Table 9.16 means for each of the different variables are displayed in a separate column for each experimental condition. Instead of displaying latent variable means, which can be slightly difficult to interpret, the means have been created by averaging across all the item

responses for each participant. The only exception to this is expectation of others' participation, which was measured with a single item. All the variables were measured with 7-point scales, so 1 is the minimum, 7 is the maximum, and 4 is the midpoint. Numbers in red or orange represent statistically significant and marginally significant differences, respectively. These are based on the results of the bias-corrected bootstrap confidence intervals for message effects, as explained below in Sections 9.14 and 9.15. For red numbers, the 95% bootstrap confidence interval for the message's effect on that variable did not include zero. For orange numbers, the 90% confidence interval did not include zero.

Table 9.14. Descriptive differences between experimental conditions.

	Control		Participative efficacy message		Collective external efficacy message		Policy response efficacy message	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Self efficacy	4.0	1.7	4.0	1.6	4.2	1.6	4.0	1.6
Participative efficacy	4.0	1.6	4.3	1.5	4.2	1.6	4.1	1.6
Expectation of others' participation	3.9	1.7	3.9	1.7	4.2	1.7	3.9	1.7
Collective external efficacy	4.7	1.2	4.8	1.4	5.0	1.3	4.8	1.3
Policy response efficacy	4.7	1.6	4.7	1.6	5.0	1.6	5.0	1.6
Perceived threat	4.7	1.5	4.9	1.5	4.9	1.4	4.9	1.4
Identification with climate activists	3.9	1.0	3.8	0.9	3.9	0.8	3.8	0.9
Info seeking intentions	3.4	1.9	3.9	1.7	4.3	1.7	4.0	1.7
Political action intentions	2.4	1.7	2.8	1.5	3.0	1.6	2.8	1.6
Percentage leaving email address	21%		18%		30%		19%	

Participants who read the CXPE message had higher levels of CXPE. All conditions were above the midpoint, indicating more agreement than disagreement that climate advocates could influence politicians' decisions; those in the CXPE message condition were slightly higher above the midpoint. There were no significant message effects on any of the other mediator variables. Each of the messages had significant or marginally significant positive effects on both information seeking intentions and political action intentions. Those in the control condition were below the midpoint for information seeking, indicating more disagreement than agreement with statements that they were likely to seek information about climate activism; those in each of the message

conditions were at the midpoint, indicating they neither agreed nor disagreed with the idea that they would seek information. Those in the control condition were further below the midpoint on political action intentions, indicating that they generally did not intend to take political action; those in the message conditions also did not intend to take action, on average, but their intentions were slightly less negative. Finally, the messages had no statistically significant effects on the likelihood of participants leaving their email address. Participants in the CXPE message condition were about 9% more likely to do so than participants in the control condition – quite a substantive difference. However, this difference was not statistically significant, even at “marginally significant” levels; the 90% confidence interval for the total effect of the CXPE message on email-leaving included zero. Therefore, we cannot be confident that the higher levels of email-leaving in this condition were not due to chance.

9.10 Description of direct, indirect, and total effects

In analyzing message effects in models with mediation variables, it is important to distinguish between the direct effects, indirect effects, and total effects of the messages. These concepts are depicted visually in Figure 9.4. The direct effect is the effect of the message on the outcome, controlling for all the mediators; it is that portion of the message effect that is *not* mediated by any variable in the model. Indirect effects are effects of messages transmitted through a specific mediator (or set of mediators). Total effects are the sum total of all influences a message has on an outcome variable: every single indirect effect, plus the direct effect.

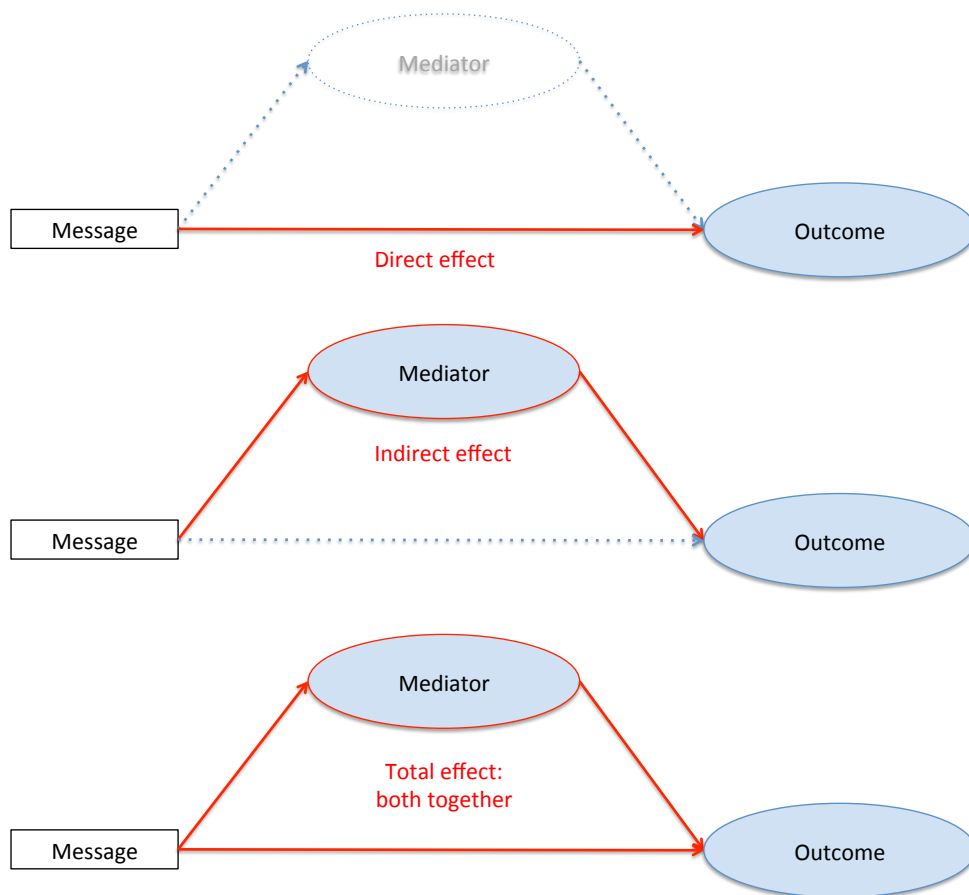


Figure 9.3. Illustration of the concepts of direct effect, indirect effect, and total effect.

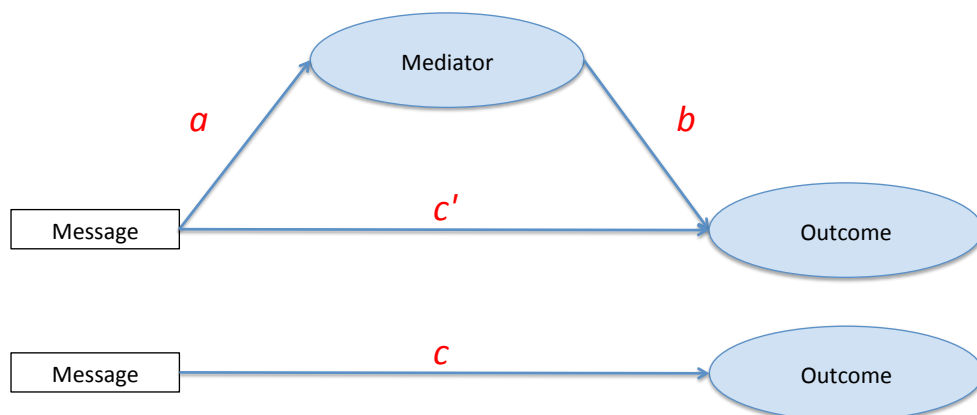


Figure 9.4. Illustration of mediation analysis terminology: a , b , c' and c paths.

In notation often used in mediation analysis, the effects of messages on mediators are known as the a paths, the effects of mediators on outcomes are known as the b paths, the indirect effects are known as the ab paths (i.e. a and b paths multiplied together), the direct effects of the messages are known as the c' paths, and the total effects of the messages are known as the c paths (Hayes, Preacher, & Myers, 2011). These are depicted in Figure 9.5. The letter for the direct and total effects is the same because the c and c' paths are between the same variables; representing the direct effect with c' recognizes that c' is the same path as c , controlling for the effect of the mediators.

In exploring the effects of the messages and mediator variables on outcomes, I proceed in the following order. First, I look at all the direct effects of the messages on the mediators, and on all the outcome variables (i.e. all the a paths and c' paths). Second, I look at the relationships of the mediator variables to outcome variables (i.e. all the b paths). Finally, I look at the indirect effects and total effects (i.e. the ab paths and c paths). Exploring the indirect and total effects last in the sequence is helpful as they are composite effects, that combine the influence of a , b and c' paths. Thus, their meaning is easier to understand after first exploring the components that make them up.

9.11 Message effects – a and c' paths

Effects of the messages on mediators (a paths) and direct effects on outcome variables (c' paths) are displayed in Table 9.17. Note that the message effects on the outcome variables (information seeking, action intentions and email-address-leaving) displayed in Table 9.17 are direct effects of the messages, rather than total effects.

Table 9.15. Message effects - *a* and *c'* paths.

	PE message		CXPE message		PRE message	
	Coefficient	p value	Coefficient	p value	Coefficient	p value
SE	.01	.93	.09	.52	-.06	.63
PE	.12	.38	.09	.48	.01	.94
EOP2	-.04	.78	.19	.14	.04	.79
CXPE	.11	.42	.27	.04	.11	.42
PRE	-.10	.46	.15	.26	.23	.09
Threat	.08	.55	.11	.39	.14	.28
Coll. ID	.03	.84	.17	.20	.15	.25
Info seeking	.19	.01	.29	.000	.16	.04
Action intentions	.17	.06	.24	.01	.19	.02
Email	-.12	.49	.18	.27	-.17	.30

Numbers are standardized regression coefficients. As an example, the coefficient for the effect of the PE message on information seeking means that reading the PE message increased information seeking by .19 standard deviations, compared to being in the control condition.

The messages all had significant direct effects on information seeking intentions and political action intentions, although the direct effect of the PE message on action intentions was only marginally significant. None of the direct effects on email-leaving was significant. The effect of the CXPE message on CXPE was significant, and the effect of the PRE message on PRE was marginally significant ($p < .10$). The discrepancy between the significance of this effect on PRE and the one noted above in Table 9.16 is due to the effect in Table 9.16 being calculated with bootstrap confidence intervals, while the effect in Table 9.17 is calculated in the more usual way, with standard errors and p-values. Because the effect is at the outside limits of what is often considered “marginally

significant”, changes to how the p-value or confidence interval is calculated can make the difference between it falling inside or outside this range.

9.12 Mediator and covariate effects on DVs – *b* paths

Effects of the mediator variables (*b* paths) and covariates (political ideology, demographics) are displayed in Table 9.18. Note that in contrast to Table 9.17, where the efficacy, threat and collective identification variables were dependent variables being affected by the messages, in Table 9.18 they are independent variables, and the dependent variables – information seeking intentions, political action intentions, and email-address-leaving – are displayed along the top row of the table.

Table 9.16. Mediator and covariate effects on DVs: *b* paths.

	DV 1: Info seeking	p value	DV 2: Intention	p value	DV 3: Email	p value
SE	.04	.20	.12	.000	.09	.25
PE	.14	.004	.27	.000	.06	.64
EOP	.00	.93	.01	.76	-.01	.91
CXPE	.08	.049	-.03	.56	-.08	.36
PRE	.04	.26	-.09	.03	.18	.04
Threat	.06	.02	.03	.28	.05	.48
Collective ID	.57	.000	.59	.000	.27	.002
Political ideology	-.22	.000	-.24	.000	-.15	.01
Age	.01	.79	-.05	.29	.10	.12
Gender	.12	.19	.13	.18	-.04	.78
Race	.19	.08	.36	.001	.07	.65
Education	-.01	.82	-.04	.44	-.07	.28
Income	.05	.29	.05	.33	.000	.995

Values are standardized linear regression coefficients. Although email-address-leaving is a dichotomous variable, coefficients for email-leaving are also standardized coefficients that can be interpreted in the regular way. This is because they reflect how changes in the predictor variables affect changes in an underlying continuous latent variable that influences decisions to leave or not leave one's email address. For example, the coefficient for the effect of PRE on email-leaving means that holding all other variables constant, a standard deviation increase in PRE would be associated with a .18 standard deviation increase in latent propensity to leave one's email address.

We see from this table that collective identification with climate activists had the largest positive effect on all three outcome variables. The only other variable that had a significant effect on email-leaving was PRE; its effect was somewhat smaller than that of collective identification. PRE also had a significant effect, but a negative one, on political action intentions. After collective identification, PE had the largest effect on both information seeking and political action intentions. SE had the third largest effect on political action intentions, but had no significant effect on either of the other variables. CXPE had the third largest effect on information seeking intentions, but no significant effect on anything else. Perceived threat had a significant effect on information seeking intentions, but no other significant effects. EOP did not have any significant effects.

The covariate with the largest effect on outcome variables was political ideology. More conservative participants showed lower levels of information seeking intentions, lower political action intentions and lower rates of email-leaving. Of all the demographic variables, only race had a significant effect on any outcome variables. Those who reported some race or ethnicity other than white had significantly higher political action

intentions, and marginally significantly higher information seeking intentions, compared to those whose only race/ethnicity was white.

9.13 Residual correlations & R² statistics

Table 9.17. Residual correlations between mediator variables.

	SE	PE	EOP2	CXPE	PRE	Threat
PE	.57					
EOP2	.25	.31				
CXPE	.34	.68	.28			
PRE	.29	.58	.30	.51		
Threat	.27	.38	.21	.33	.48	
Collective ID	.52	.66	.35	.44	.52	.42

Table 9.18. Residual correlations between dependent variables.

	Info seeking	Action Intentions
Action Intentions	.52	
Email	.38	.38

Residual correlations for the mediator variables are shown in Table 9.19; these represent the correlations between these variables that remain after the correlations due to the effects of the messages are accounted for. Residual correlations for the DVs are shown in Table 9.20; these represent the correlations between these variables that remain after the correlations due to the effects of the messages, mediators, political ideology, and demographic variables are accounted for.

Table 9.19. R² statistics for message experiment SEM model.

SE	.003
PE	.003
EOP2	.008
CXPE	.010
PRE	.017
Threat	.003
Collective ID	.005
Info seeking	.713
Action intentions	.783
Email	.277

R squared values for all mediator variables and outcome variables are displayed in Table 9.21. Although email was modeled as a dichotomous value, the r squared statistic presented above represents the same ordinary type of r squared statistic as is used for continuous variables. Mplus calculates this value based on a latent continuous variable – individuals’ propensity to leave their email address – that is modeled as underlying individuals’ dichotomous decisions to leave or not leave their email (Muthén & Muthén, 1998-2012). Therefore, the value can be interpreted as the percentage of variance in this underlying latent variable that is explained by the effects of the messages, efficacy and threat variables, collective identification, political ideology, and demographics.

9.14 Indirect effects – *ab* paths

In order to check the size and statistical significance of indirect effects, the SEM analysis was run again using 1000 bootstrap resamples in order to calculate bias-corrected bootstrap confidence intervals for the indirect effects. Bootstrapping is an alternative method for calculating inferential statistics that does not use assumptions about the sampling distribution to make inferences (Hayes et al., 2011). It involves taking

a random sample of cases from within the dataset, estimating the SEM model based on these cases, storing the results, and then repeating this process with a new random sample a large number of times (for the present analysis, 1000 times). Within each of these “resamples”, individual cases are sampled with replacement, and the total number of cases is kept the same as the original sample size. In other words, since the present sample was of 525 cases, each of the 1000 resamples also had a sample size of 525. However, depending on the random resampling process, each individual case might be included any number of times – in theory, anywhere from zero to 525 times. The theory behind this is as follows. Because the sample that was originally taken should be relatively similar to other similar samples that might have been taken from the same population, the resampling process is similar to what would be achieved by taking many real samples from the actual population (Hayes et al., 2011). The more resamples are taken, the closer the resampling process comes to mimicking the results that would be obtained from a study of the full population (although obviously it can never match the full population perfectly).

Bootstrap confidence intervals are regarded as one of the best ways to test indirect effects, since the nature of indirect effects makes their sampling distributions inherently non-normal, and bootstrapping allows one to test these effects without assuming normality (Hayes et al., 2011). Statistical significance is tested by checking whether confidence intervals for the statistics include zero, rather than by using p-values. Bias-corrected bootstrap confidence intervals are more likely to contain the true indirect effect than intervals without bias correction (Hayes et al., 2011).

The bootstrap analysis revealed that none of the indirect effects in the model were significant at the 95% confidence level. Only one indirect effect was significant at the 90% confidence level: the effect of the PRE message on email-address-leaving, mediated through PRE. For space reasons, only the effects of the PRE message on email-address-leaving are displayed in Table 9.22; all other indirect effect results are available in Appendix 10.

Table 9.20. Bootstrap confidence intervals for effects of PRE message on email-address-leaving.

		95% CI	90% CI	Estimate	90% CI	95% CI
		lower limit	lower limit		upper limit	upper limit
Total effect		-.49	-.40	-.10	.22	.30
Total indirect effect		-.06	-.04	.08	.20	.21
Specific indirect effects	SE	-.06	-.05	-.01	.01	.02
	PE	-.03	-.02	.001	.04	.05
	EOP2	-.02	-.02	.000	.01	.02
	CXPE	-.11	-.07	-.01	.01	.01
	PRE	-.01	.001	.04	.12	.15
	Threat	-.01	-.004	.01	.06	.06
	Coll. ID	-.02	-.01	.04	.14	.15
Direct effect		-.54	-.48	-.18	.10	.16

Each of the specific indirect effects in the table refers to the portion of the message's effect that is mediated through that specific variable. The specific indirect effect for SE is a measure of the extent to which showing someone the PRE message increases their likelihood of leaving their email address by increasing their level of self-efficacy. The specific indirect effect for PE is the extent to which the likelihood of email-leaving is increased by the message increasing participative efficacy, and so on. The total indirect effect is the sum total of all seven specific indirect effects. The direct effect is the

effect the PRE message has on the likelihood of email-leaving that is *not* mediated by any of the variables in the model. Finally, the total effect is the sum of the total indirect effect and the direct effect; note that its value, $-.10$, is equal to the total indirect effect ($.08$) plus the direct effect ($-.18$).

The estimate for the effect of the PRE message on email-leaving, mediated through PRE, is $.04$ (highlighted in orange). This number is a probit regression coefficient, making it difficult to interpret directly; its effect on the probability of a participant leaving their email address depends on levels of all other variables in the model. However, it can be illustrated by giving an example of the probability change that would occur due to this indirect effect for a specific type of participant. An average control condition participant, at average levels of efficacy, threat and collective identification, has a probability of about 21% of leaving their email address. If that person was instead shown the PRE message, with all variables other than PRE and message condition held constant, their probability of leaving their email address would increase to about 22% due to the indirect effect through PRE – a change of 1%. However, note that the total effect of the PRE message is negative; while the indirect effect through PRE is positive, the overall effect of receiving the PRE message compared to the control condition is negative.

9.15 Total effects – *c* paths

The total effects of each message on the three outcome variables are presented in Tables 9.21, 9.22 and 9.23.

Table 9.21. Bootstrap confidence intervals for total effects of messages on information seeking intentions.

	95% CI lower limit	90% CI lower limit	Estimate	90% CI upper limit	95% CI upper limit
PE message	-.01	.03	.24	.48	.51
CXPE message	.19	.23	.44	.67	.72
PRE message	.04	.07	.28	.51	.55

Table 9.22. Bootstrap confidence intervals for total effects of messages on political action intentions.

	95% CI lower limit	90% CI lower limit	Estimate	90% CI upper limit	95% CI upper limit
PE message	-.03	.000	.22	.44	.48
CXPE message	.09	.12	.35	.58	.61
PRE message	-.01	.03	.25	.48	.52

Table 9.23. Bootstrap confidence intervals for total effects of messages on email-address-leaving.

	95% CI lower limit	90% CI lower limit	Estimate	90% CI upper limit	95% CI upper limit
PE message	-.47	-.43	-.13	.19	.26
CXPE message	-.08	-.03	.25	.55	.61
PRE message	-.49	-.40	-.10	.22	.30

Coefficients are unstandardized linear regression coefficients (for information seeking intentions and political action intentions) and unstandardized probit regression coefficients. The linear coefficients are in the metric of the latent variables, i.e. the same 7-point strongly agree-strongly disagree scale that participants responded to. To illustrate what this means, consider the example of the CXPE message's total effect on information seeking – the coefficient of .44. This means that the total effect of reading the CXPE message, compared to being in the control condition, is a 0.44 increase on the 7-point

scale for information seeking intentions. As with the indirect effect of PRE discussed above, the interpretation of the probit regression coefficients is somewhat more complicated, as they are in the metric of changes in z-scores, and their effect on the probability of email-leaving depends on the values of all other variables in the model. Again, an example of what the CXPE coefficient of .25 would mean for an average control condition participant is helpful. Recall that the average control condition participant has a probability of about 21% of leaving their email address. If they instead were to have read the CXPE message, with all other variables held constant, their probability of leaving their email address would increase by about 8% to 29% (although, as the table shows, this effect is not statistically significant).

Across all three outcome variables, the CXPE message consistently has the largest total effect, and its effects on both information seeking intentions and political action intentions are significant at the 95% level. However, the CXPE message effect on email-leaving is not significant. The PRE message has the next largest total effects on information seeking and action intentions, although they are not substantially larger than the effects of the PE message, and only the effect on information seeking is significant at the 95% level. The PE message has marginally significant total effects on both information seeking and action intentions. Both the PE and PRE messages have negative total effects on email-leaving, although this figure is not statistically significant (i.e., the 90% confidence intervals for both effects include zero).

9.16 Visual summary of significant message effects on DVs

In order to more clearly summarize which effects of the messages are significant, and which are not, all significant and marginally significant effects are depicted in Figure 9.6. Red paths represent statistically significant effects (95% bootstrap CI does not include zero), while dotted orange paths represent marginally significant effects (90% bootstrap CI does not include zero). The diagram hopefully reinforces the idea that with the exception of the marginally significant effect through PRE, none of the messages had any significant indirect effects through the main variables of interest (i.e. efficacy and threat variables). All other significant effects were direct effects – unmediated by any of the variables in the model. Although the CXPE message had a significant effect on CXPE, this change did not have any further influence on information seeking, action intentions or email-address-leaving; therefore, the effect on CXPE is not depicted here.

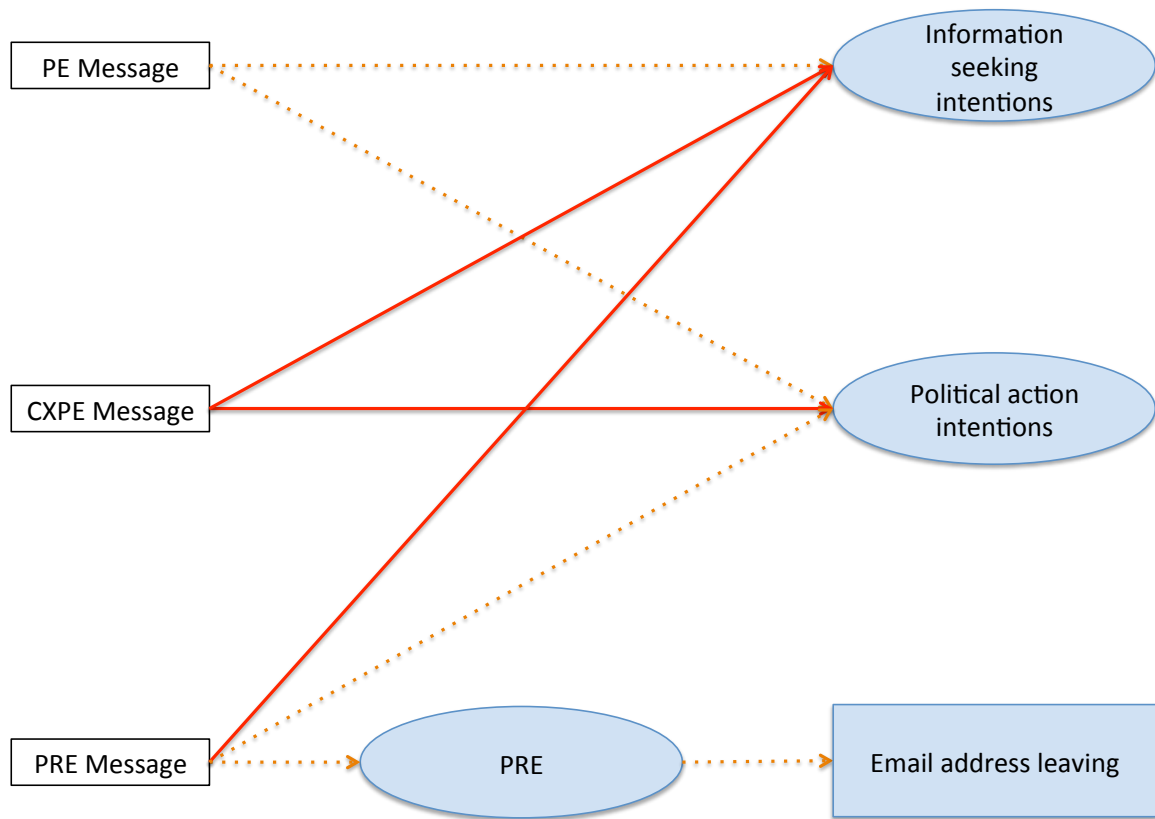


Figure 9.5. Visual summary of significant message effects on outcome variables.

9.17 Visual summary of significant efficacy & threat effects on DVs

Figure 9.7 depicts all significant effects of efficacy, threat and collective identification variables (on the left-hand side of the diagram) on the three outcome variables (on the right-hand side). Red lines indicate statistically significant positive effects; the blue line from PRE to political action intentions indicates a statistically significant negative effect. There were no marginally significant effects to be depicted. As the diagram shows, all variables except EOP had at least one significant effect on one of the outcome variables; only collective identification with climate activists had a significant effect on all three.

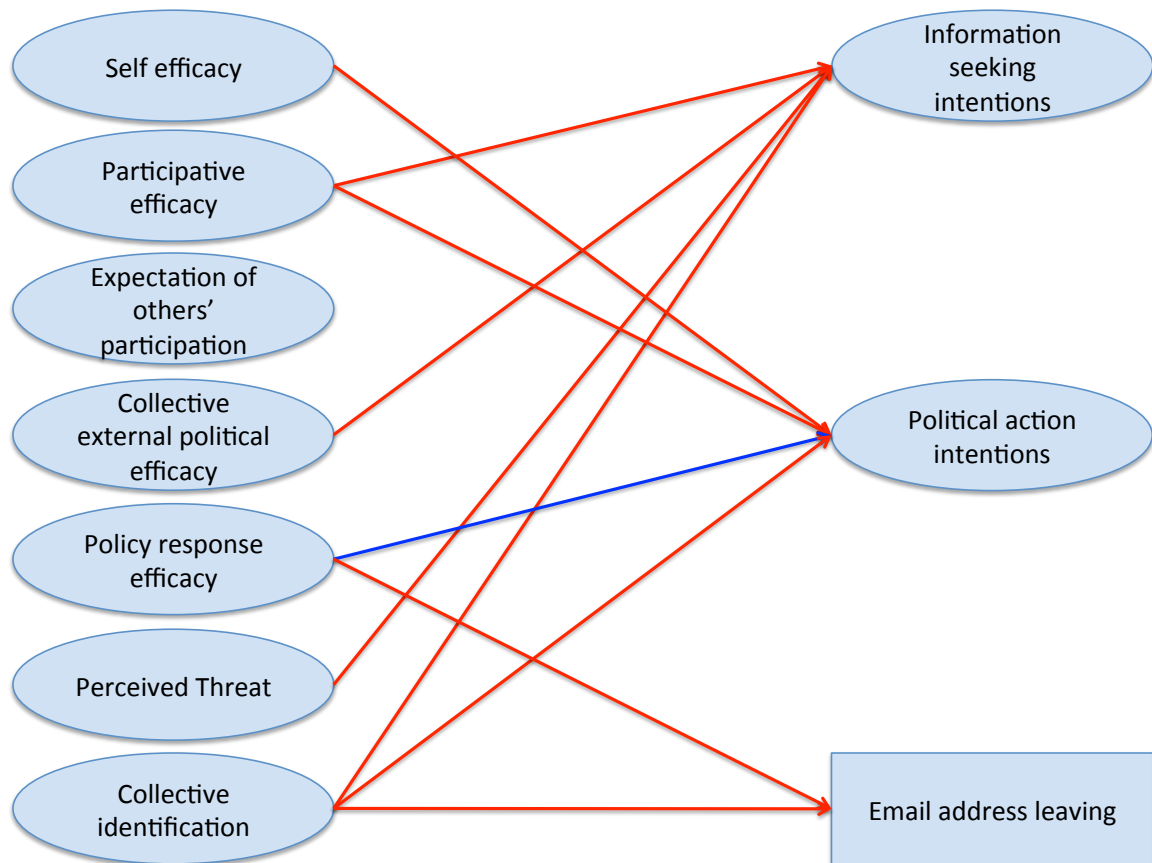


Figure 9.6. Visual summary of significant efficacy, threat and identification effects on outcome variables.

9.18 Comparison of the results of the CCAM survey and message experiment

In order to facilitate comparison of results across the two studies, Table 9.26 combines the coefficients for the *b* paths of both the CCAM analysis and message experiment. Additionally, Table 9.27 displays the *b* path coefficients for the message experiment that are obtained both when collective identification is controlled for (as in prior analyses) and when it is not controlled for. As discussed in Section 11.1, these

results are important in understanding the overall conclusions to be drawn from the two studies.

Table 9.24. Comparison of effects of efficacy, threat, and collective identification on outcome measures, across CCAM analysis and message experiment.

	CCAM Past action	CCAM Action intentions	Experiment Action intentions	Experiment Info seeking	Experiment Email-leaving
SE	.10	.18	.12	.04	.09
PE	----	----	.27	.14	.06
EOP	----	----	.01	.00	-.01
CXPE	.20	.31	-.03	.08	-.08
PRE	-.23	.10	-.09	.04	.18
Threat	.07	.19	.03	.06	.05
Collective ID	----	----	.59	.57	.27

Figures in Table 9.24 are standardized regression coefficients. Data come from SEM analyses described in Sections 5.8 and 9.8, and are the same as coefficients displayed in Tables 5.9 and 9.18.

Table 9.25. Effects of variables in message experiment, with and without controlling for collective identification.

	Controlling for Collective ID			Not controlling for Collective ID		
	Action intentions	Info seeking	Email-leaving	Action intentions	Info seeking	Email-leaving
SE	.12	.04	.09	.23	.14	.14
PE	.27	.14	.06	.52	.39	.17
EOP	.01	.00	-.01	.08	.07	.02
CXPE	-.03	.08	-.08	-.07	.04	-.10
PRE	-.09	.04	.18	.01	.13	.23
Threat	.03	.06	.05	.10	.13	.08
Collective ID	.59	.57	.27	----	----	----

Figures in Table 9.25 are standardized regression coefficients. Figures in the left-hand side of the table come from SEM analysis described in Section 9.8, and are the same as coefficients displayed in Table 9.18. Figures on the right-hand side come from a new version of that analysis, identical except for removing collective ID from the model.

10 MESSAGE EXPERIMENT - DISCUSSION

10.1 Results of test of H1

Individuals have five kinds of distinct efficacy perceptions (SE, PE, EOP, CXPE and PRE), rather than a smaller number of more general efficacy perceptions.

The results show that efficacy beliefs are distinct. The CFA with each type of efficacy modeled as a separate variable fit the data better than CFAs with responses to multiple types of efficacy questions modeled as being caused by smaller numbers of latent efficacy variables. The data strongly support the idea that efficacy perceptions can be considered distinct, rather than caused by generalized latent perceptions. Thus, H1 is supported.

10.2 Results of test of H2

Each of the distinct efficacy perceptions, as well as perceived threat, have an independent positive effect on political action.

The results do not support the idea that each of the efficacy and threat perceptions have an independent impact on action. An important distinction to make here is the distinction between a statistically significant *relationship*, and a statistically significant *effect*. All of the efficacy and threat variables, except EOP, had a statistically significant relationship with at least one of the outcome measures. However, due to the failure to achieve significance for most of the mediation effects tested, the experiment's results do not provide strong evidence that any of these variables have a causal influence on action. Thus, apart from the marginally significant indirect effect mediated through PRE, we are

for the most part left in the same situation as for the CCAM analysis. That is, we are left with correlational results, which allow us to make tentative conclusions about the potential for significant causal effects.

In the strictest sense, H2 is clearly not supported. The complete lack of a relationship between EOP and action suggests that the efficacy and threat variables do not *all* have an influence on action. However, the more important question of which variables do affect action and which do not is slightly more difficult. Although the highest level of evidence for causality was not achieved for any of the relationships, there was substantial evidence to make us suspect that PRE may have a causal effect on action. For SE, PE, CXPE and threat, the evidence was more equivocal, but not so weak as to rule them out entirely as influences on action. The results failed to provide even faint support for the idea that EOP is a substantial influence on action. Below, I explain the reasons for these conclusions in more detail.

Firstly, we do have marginally significant evidence that PRE influenced individuals' decisions to leave their email address. The indirect effect is key in establishing causality, since this shows that variation in PRE caused by a randomly assigned message had a causal effect on email-leaving. For any relationships between efficacy, threat and outcomes not caused by randomly assigned messages, we do not have strong evidence for the causal direction of the relationship. The PRE effect on email-leaving is thus unique in that we have some evidence, however marginal, for its causal direction.

However, the failure to find significant indirect effects for variables other than PRE should not in itself be taken as evidence against the idea that these variables have a causal effect on action. Indirect effects provide strong evidence of causal order; however, failure to find them is not evidence against that causal order. Rather, it just means that we must be satisfied with making the same kinds of conclusions about causality that one normally makes with correlational data. In other words, we can conclude that there is likely to be no causal effect where there is no correlation, and conclude that there is at least potential for a substantial causal effect wherever there is a substantial correlation (Weinstein, 2007).

All the efficacy and threat variables apart from EOP displayed a significant positive correlation with at least one of the outcome variables. Because the size and significance of each of these relationships differs depending on the specific outcome measure used, our conclusions about whether each of these variables truly does influence action depend on our conclusions about how good the outcome measures are. If we were of the opinion that only the email-leaving measure in the experiment was a good measure of collective action, then we would say we had failed to find evidence that any of the variables except PRE were related to action. If we were of the opinion that all outcome measures are equally valid, the results are inconclusive.

My own judgment on the matter is as follows. For outcome measures, measures of behavior are better than measures of intention for determining which variables affect political action in the real world (Krupnikov & Levine, 2014). The closest we have to a true behavioral measure is the measure of email-address-leaving. It is not as good a

measure as would be obtained in a true field experiment, where the participants did not know they were being studied. However, as it resulted in actually receiving an email to one's email address, it constituted both an acceptance of the cost of having a (potentially irritating) email delivered, as well as a willingness to reveal one's real email address, something that many Mturk workers are unwilling to do (Dynamo, 2015). While these costs are hardly similar to the levels of effort involved in engaging in real political action, they are certainly closer to it than reporting intentions to engage in action at some point in the future. In addition, they have some ecological validity in that leaving one's email address is similar to what one does when one signs a petition sent via email by an advocacy group; it involves affirming some level of support for the group's cause, and as more emails are sent to those who sign petitions, it involves increasing the likelihood of receiving more emails from these groups. Therefore, the email-leaving measure is better evidence for which variables lead to action in the real world than any of the intention measures.

Taking all this into account, we have the strongest reason to believe that PRE may have an effect on political action. It is the only one of the threat and efficacy variables that is significantly positively related to the best measure of political action. In addition, due to the marginally significant indirect effect of the PRE message on email-leaving through PRE, there is stronger evidence for the causal direction of this relationship than there is for any of the other variables. The negative relationship between PRE and action intentions is difficult to explain, and complicates the story of PRE's relationship to action somewhat, as discussed further below. However, while this inconsistent result is worthy

of further investigation, the superiority of email-leaving as a measure of behavior means that the strength of evidence for the PRE-action relationship is still the strongest of all the efficacy and threat variables.

Although the evidence for the effects of all other variables on action is not as strong, we are justified in thinking a variable is more likely to have an effect on action if it is correlated with action intentions or information seeking intentions in the experiment, compared to those variables that did not show such a relationship. For this reason, after PRE, the evidence for PE's effect on action is second strongest. PE is related to both action intentions and information seeking intentions, controlling for all other variables in the experiment. The evidence for the effect of SE on action is third-strongest, and the evidence for the effects of CXPE is fourth-strongest. Because intentions to take action are closer substantively to actual political action than intentions to seek information, SE's significant effect on action intentions rank it above CXPE's significant effect on information seeking intentions.

The fifth-highest level of evidence is for the effect of threat on action. It had a significant relationship with information seeking intentions, although the size of this relationship was rather small. Finally, the weakest evidence was found for the effect of EOP on action; EOP was not significantly related to any of the outcome variables, and the coefficients for its effects were tiny.

10.3 Answer to RQ1

Of all the efficacy and threat perceptions that have a significant effect on action, which have stronger effects, and which have weaker effects?

To a large extent, the answers provided for RQ1 are similar to H2. If there had been a large set of variables that were significantly related to action, but differed in the size of their relationships, then the answers to RQ1 might have required more detailed discussion beyond the content discussed regarding the results for H2. However, as it turned out, there were no variables that had clear, unambiguous evidence for their causal effects on action. Instead, there was a continuous scale of the strength of evidence for a relationship that tracked nearly exactly with the size of the correlations between each of the efficacy and threat variables with action. Therefore, just as the evidence is strongest that PRE affects action, followed in order by PE, SE, CXPE, threat and EOP, the size of the relationships is in this order also.

In a way, it makes little sense to talk about the relative size of effects when we are not even confident of causal effects at all. Still, we can go by the same logic used in the results for H2. Wherever we have evidence of a large correlation, there is more potential for a large effect than where there is a small correlation, or none at all (Weinstein, 2007). Thus, though we cannot be confident that the effects are larger, we are justified in suspecting some effects may be more likely to be large than others.

By this logic, PRE is clearly the variable for which we can be most confident in suspecting a large effect on behavior. There is marginally significant evidence it has a causal effect on behavior, and of the efficacy and threat variables, it has the strongest relationship with the best measure of behavior. These two facts justify considering PRE to be in a class separate from other variables in terms of likelihood of a large effect.

Comparing the sizes of the effects for variables other than PRE is a somewhat harder task than comparing the evidence for the significance of their effects in the results for H2. Should a non-significant correlation with a better measure of action be considered stronger evidence of an effect than a significant correlation with a worse measure of action? In fact, the ordering of variables is roughly the same as the results for H2, whether we consider non-significant correlations with email to be stronger evidence for effect size than significant correlations with information seeking or action intentions. After PRE, the variables with the largest relationships to all measures of action from the experiment are SE and PE. These two are followed by CXPE and threat, which both have weaker relationships to the outcome measures in the experiment. Finally, the relationships between EOP and the outcome measures are weakest of all.

Thus, our primary conclusion about RQ1 should be that we cannot be confident of the relative sizes of *any* of the causal effects. However, the correlational evidence suggests we can be relatively more confident in suspecting that PRE might have a large effect, followed by SE and PE, then CXPE and threat, and finally EOP.

10.4 Summary

The results for the experiment do not strongly support either of the extended EPPM models – either that of Hart & Feldman (2014) or my own suggested revision. The results do provide evidence that the five efficacy variables (SE, PE, EOP, CXPE and PRE) can be considered distinct variables. However, the results suggest that EOP is not related to collective action, making my suggested extension to the EPPM appear to be incorrect. Support for the Hart & Feldman (2014) model is mixed at best, with all but one

of the variables in their model failing to show a significant relationship to the best measure of collective action (email-leaving). Results provide the most support for PRE being a substantial influence on collective action. Evidence for the size of the relationships of all other variables to action is weaker.

11 GENERAL DISCUSSION

11.1 Comparison of results of two studies

In making conclusions about what can be learned from the two studies overall, it is important to take the design of each study, as well as other factors, into account.

Because H1 relates to the structure of efficacy beliefs, rather than anything to do with causal effects, both the CCAM survey and message experiment were equally able to test H1. However, this is not the case for H2 and RQ1, which related to the causal effects of threat and efficacy beliefs on political action. Based on design alone, the CCAM survey was more limited than the message experiment in its ability to test H2 and answer RQ1. While correlations can provide evidence of at least the potential for a causal effect, they cannot provide strong evidence of causal effects.

The message experiment, on the other hand, did have the potential to provide strong evidence of causal effects of efficacy and threat beliefs on action. However, the fact that the messages generally failed to have significant effects on the variables they were designed to boost means that the potential advantage of the message test study, based on its experimental design, mostly failed to be realized in practice. The marginally significant effect of the PRE message on email-leaving, mediated through PRE, does provide marginal support for the idea that PRE has a causal effect on collective action. The failure to find any indirect effects of the CXPE message on action, despite the CXPE message significantly increasing CXPE, provides some additional reason to be suspicious

that CXPE may not have a causal effect on action. However, aside from these two results, the effects of the randomized messages can provide no strong evidence of causal effects.

These two message effects – the indirect effect of the PRE message, and the effect of the CXPE message on CXPE – do not tell us much about most of the variables of interest. In order to make broader conclusions about what can be learned from the studies, we can examine the SEM coefficients for the relationships of the efficacy and threat variables to political action (i.e. the b paths in mediation analysis notation). Even when looking at the message experiment SEM, because these effects do not incorporate the influence of any randomly assigned treatment, they provide only correlational evidence of the relationships of interest. However, they can provide evidence of the potential for causal effects, just as with the results of the CCAM survey.

When looking only at b paths, the CCAM survey and message experiment are in one sense equal. The coefficients provide no more evidence for causality based simply on having been obtained from an experimental study. This means we must refer to factors other than study design (i.e. experimental vs. cross-sectional) in deciding which effects to weight more heavily in our overall conclusions about how the variables affect political action.

Indeed, there are many places where the two studies do disagree. The results of the two studies both support H1. Both sets of results support the idea that each of the efficacy variables is distinct. However, for H2 and RQ1, the two studies provide somewhat contradictory results; see Table 9.26, above. The CCAM analysis suggests that all efficacy variables, as well as threat, have a significant relationship to collective action

(with the exception of the indeterminate result for PRE). This largely supports the extended EPPM models. However, the experimental analysis suggests that threat and efficacy variables are not all significantly related to collective action. The studies also disagree regarding the relative strength of the different relationships, with CXPE most strongly related to action in the CCAM analysis, and PRE most strongly related to action in the experimental analysis. Taking both sets of results into account, what overall conclusions should be made for H2 and RQ1? In making decisions of how highly to weight the different sets of results, it is useful to compare the features of the CCAM survey and message experiment side by side. These features are useful for comparing the SEM coefficients from the b paths for the two studies, and are only intended to be used for this purpose. The superiority or inferiority of the studies in terms of sample representativeness, item wording and so on does not affect the fundamental difference between the two studies in terms of experimental vs non-experimental design.

Table 11.1. List of reasons to trust results from CCAM analysis or message experiment.

<i>Reasons to trust CCAM</i>	<i>Reasons to trust experiment</i>
More nationally representative	More variables controlled for
Larger sample size	Items measured with seven-point scales
More items for PRE, threat and action intentions	Less missing data
	Better model fit
	Item wording superior for PRE
	More items for SE and CXPE

I argue that of the two samples, the findings of the experiment are stronger than those of the CCAM analysis. Perhaps the most important reason for this is that more variables are controlled for in the experiment. Failure to control for important variables can result in the true relationships between the variables being distorted; evidence that this is likely to be true for the present case specifically is found in Table 9.27. Table 9.27 shows the coefficients from the experiment's SEM analysis, with and without controlling for collective identification. Note that when collective identification is not controlled for, many of the correlations are substantially larger, and some that were not significant become significant. This provides evidence that all the correlations observed in the CCAM analysis are unreliable in their size and significance due to not having controlled for collective identification. This alone is reason to have substantial doubts in the CCAM analysis results for both statistical significance and effect size. Combined with the other advantages of the experiment, such as its use of seven point scales and less missing data, even more weight should be given to the experiment's results. Table 11.1 above lists the advantages of each sample, in roughly descending order of importance.

The experiment's main problem is that it is not nationally representative. The much larger number of liberals and lower number of moderates certainly should give us suspicion that the results obtained for the experimental sample would not generalize to the broader US population of people who believe in global warming. However, in terms of deciding which of the samples to trust more, it makes sense to trust results that might not represent the broader population over results that we know likely do not represent the broader population. As Table 9.27 shows, we can be relatively confident that the failure

to control for collective identity means the CCAM results do not represent the true relationships between efficacy, threat and collective action. Without similar conclusive evidence that over-representing liberals distorts the relationships of interest, we can at least give the results of the experiment the benefit of the doubt.

11.2 Summary of results for H1, H2 and RQ1

Recall that the hypotheses and research questions are:

H1: Individuals have five kinds of distinct efficacy perceptions (SE, PE, EOP, CXPE and PRE), rather than a smaller number of more general efficacy perceptions.

H2: Each of the distinct efficacy perceptions, as well as perceived threat, have an independent positive effect on political action.

RQ1: Of all the efficacy and threat perceptions that have a significant effect on action, which have stronger effects, and which have weaker effects?

Essentially the conclusions reached based on the two studies together are almost the same as those reached in the discussion section for the experiment. To recap, these are that efficacy beliefs appear to be distinct; not all efficacy and threat variables are significantly related to action, and it is unclear whether any of the significant relationships are causal; PRE seems to have the strongest relationship to action, EOP the weakest, with other variables somewhere in between.

While the results of the experiment thus represent our best guess of the true relationships of interest, the CCAM results should not be completely ignored. While the strengths and weaknesses of the two samples clearly favor the experiment, the experimental sample does have the key weakness of being non-representative of the

broader population of US citizens who believe in climate change. The fact that a much more representative sample gave substantively different results means that we should interpret the results of the experiment more cautiously than if the CCAM analysis were not available to us.

11.3 Implications for theory

The results for H1 and H2 suggest that my proposed model for an extended EPPM, that includes five efficacy beliefs as well as threat, does not accurately describe reality. One of the conditions required for that model to be accurate is that H1 is supported, with evidence suggesting that all five efficacy variables are distinct. The results show that this condition has been met. However, the second condition is that each of these variables have an independent effect on action. Although we still cannot be sure which variables do affect action, we have strong evidence suggesting that EOP at least does not affect action. Therefore, the model including five efficacy beliefs is not accurate.

The results of this dissertation also fail to provide support for the extended EPPM suggested by Hart & Feldman (2014), which includes only three kinds of efficacy beliefs: SE, CXPE and PRE. If their model were accurate, we would expect to see significant positive relationships of SE, CXPE, PRE, and threat with action. In the results for the experiment, while we see some evidence of such a relationship for PRE, the relationships of CXPE and threat to action are weak at best, and the coefficient for the relationship of CXPE to the best measure of action is actually negative. If one accepts that the PRE items may not accurately measure PRE, the results for the CCAM analysis might seem to be more supportive of the Hart & Feldman (2014) model. SE, CXPE and threat all show

significant relationships to action. However, due to the failure to control for other efficacy variables and collective identification with climate activists, we cannot take the CCAM results as providing much support for their model.

Absence of strong evidence is not evidence of absence, and the present results do not rule out the possibility that the Hart & Feldman (2014) model does accurately describe reality. If there were strong interaction effects between threat and one or more forms of efficacy, this might explain why the main effects tested in the experimental analysis found relatively weak relationships for CXPE and threat to action. However, even if all three efficacy variables and threat are related to action, as noted in the answer to RQ1 above, the data should make us suspicious that not all of these effects are substantively meaningful.

Aside from extended EPPM models, the experimental results also cast doubt on the more general theoretical idea that perceived threat is a strong motivator for political action on global warming. At least when one restricts the population analyzed to those individuals who already believe in global warming, variation in perceived threat does not appear to be associated with much variation in political action. It is possible that this is partly due to a ceiling effect; the sample for the experiment mostly reported threat levels toward the upper end of the scale. If it had been possible to report perceived threat levels higher than “Extremely harmful”, we might have seen a larger relationship between perceived threat and action. However, it seems more likely that perceiving global warming to be extremely dangerous, as opposed to just moderately dangerous, is not one of the decisive factors in encouraging someone to take political action.

This result should not be taken as evidence against the proposition made by some scholars that the EPPM might be effectively extended to other kinds of collective threats, such as threats to public health or social policies (e.g. Myers & Goodall, 2006; Roberto et al., 2009; Smith et al., 2007). It might be the case that global warming is relatively unique in that perceptions of the threat it poses do not resonate on much of an emotional level (Weber, 2010). The present results should also not be taken against the idea that perceived threat might motivate behavior that is less demanding than political action, such as interpersonal discussion, which would in itself contribute potentially important engagement with the issue.

The fact that the largest relationship between efficacy and action was found for PRE has important implications for our understanding of what motivates collective action on global warming. If this result was found to replicate in future studies, this would imply that perceiving global warming policies as able to solve the problem is more important in encouraging action than any other form of efficacy, including the perception that these policies are likely to be achieved.

Aside from theoretical considerations relevant to EPPM models, the results of the present studies have relevance for broader models of psychological influences on collective action. Models such as the SIMCA (van Zomeren et al., 2008) and Norm Alignment Model (Thomas et al., 2009) should consider adding additional specificity to their conceptualization and measurement of efficacy. The results of this dissertation provide evidence that PRE, and potentially other specific forms of efficacy, may have

unique effects on action, at least when the action in question is designed to solve problems via encouraging policy change.

The results of the present study seem to go against Klandermans' model's (1984) prediction that EOP should have an important effect on action. The results have little bearing on the adequacy of Klandermans' model generally, as higher-order interactions between threat and multiple types of efficacy are central to the predictions of that model, and no interactions were tested in the present analysis. However, the weak relationships between threat and action found in the present study can make us suspicious that Klandermans' model might not explain much variation in collective action on global warming either.

Although collective identification was not a primary focus of this dissertation, due to not being part of the EPPM, the finding of the strong relationship between collective identification and action is important. Both the Social Identity Model of Collective Action (van Zomeren et al., 2008) and the Norm Alignment Model (Thomas et al., 2009) see collective identification as centrally important conceptually in explaining collective action. Broadly speaking, the strong relationship of collective identification to action found in the experimental part of this dissertation is in alignment with both these models.

However, these models make no quantitative prediction about the relative sizes of the effects of collective identification and efficacy on action. A meta-analysis by van Zomeren and colleagues (2008) even found that the direct effect of identification on action was slightly smaller than the effect of efficacy, when averaged across the 27 different samples analyzed. The present study thus builds on these previous studies by

showing that collective identification may be quantitatively more important than other motivations for the specific issue of global warming.

Finally, just because several types of efficacy and threat had weak relationships to action in the context of the present study, this does not mean that these should be assumed to be theoretically unimportant in explaining collective action on global warming in other contexts. Both analyses in this dissertation attempted to use perceived threat and efficacy to explain variation in collective action across a broad range of individuals. The fact that specific variables do not appear to have large effects when averaged across the broad population does not mean that these variables do not have large causal effects for the smaller subset of individuals who engage with the issue in more depth, across a longer time period. More focused studies on individuals who engage with the issue in-depth would need to be conducted in order for conclusions to be made about the importance of threat and efficacy in this context.

11.4 Implications for practitioners

I would hesitate to provide any strong positive recommendations for communication practitioners based on the results of the present studies. The studies did not provide any strong evidence of substantial, positive causal effects on collective action. Therefore, even for the variables most strongly related to collective action, we cannot be confident that messages designed to boost these variables would have a substantial effect on collective action.

At most, I would feel comfortable recommending a focus on one kind of variable over another. If a practitioner wanted guidance on which kinds of perceptions to try and

boost through their messages, I would be comfortable stating that messages designed to boost collective identification or PRE seem like they would be at least relatively more likely to work than messages designed to boost EOP or threat. However, I would try to be absolutely clear that all that can be said is that collective identification or PRE messages are relatively less likely to fail than other messages; being less likely to fail does not mean they are likely to succeed. Further studies demonstrating stronger evidence of causal effects on collective action would be needed in order to recommend a focus on any particular variable as likely to have a positive effect.

While there was no strong evidence of the causal effects of any particular efficacy or threat variable on action, there was strong evidence that all of the message conditions had a causal impact on information seeking and collective action intentions. However, the only way practitioners could be confident of replicating these results would be if they used the exact same messages as I used. Evidence for which parts of the messages were responsible for the significant effects can only be gleaned from analyses of mediation effects, or from tests of multiple messages (Hayes et al., 2011; Jackson, O’Keefe, & Jacobs, 1988; O’Keefe, 2015; Wells & Windschitl, 1999). Mediation analyses can provide hints towards what kind of message content makes messages effective, as they provide confirmation of what kind of psychological variable was responsible for the effects. Knowing why the messages works thus helps guide the search for content that will make new messages work, just as knowing that vitamin C mediates the effects of lime juice on scurvy helped guide the search for more efficient methods of delivering vitamin C (Gerber & Green, 2012). However, because none of the indirect effects on

information seeking or collective action intentions were significant, these results offer no guidance for which parts of the messages might have been responsible for their effects.

Without any strong evidence of mediation, it is more difficult to say which parts of the message might generalize to other messages practitioners might write. For instance, despite the CXPE message having the largest effect on all three outcome variables, the indirect effect results show that this was not mediated by CXPE. It may have been that the CXPE message's mention of Koch Industries' influence on Kansas politics boosted perceptions of injustice, a variable that has been shown to influence collective action in other research, and one that was regrettably not controlled for in this study (van Zomeren et al., 2008). Alternatively, it may have been due to the fact that the CXPE message mentioned benefits of clean energy for local individuals. However, these guesses are entirely speculative, and provide no firm foundation for practitioners to base messages on. It would not be accurate to imply that messages based on these speculations would be any more likely to work than messages based on any kind of hunch whatsoever.

As well as mediation analyses, multiple-message designs can provide generalizable evidence of what categories of message content have significant effects on outcomes (O'Keefe, 2015; Wells & Windschitl, 1999). These are studies in which multiple messages within specific categories – such as fear appeals, or gain- or loss-framed messages – are tested, and measures of the average effect of all messages within each category are recorded. Just as studying many individuals from a particular group – say, US citizens or TV weathercasters – allows one to make generalizable conclusions about those categories of people, studying multiple instances of one category of messages

allows one to make generalizable conclusions about that category of message (Wells & Windschitl, 1999). Unfortunately, because the experimental portion of this dissertation only tested one PE message, one CXPE message, and one PRE message, no such generalizable conclusions about message content can be made.

The weak relationship of threat to action implies practitioners hoping to encourage action should not focus on threat alone. If any practitioners believe that a strong enough sense of threat can on its own lead to action, the evidence presented here suggests they are wrong. There was substantial variation across participants in the amount of threat they perceived from global warming; if threat really was effective, we would expect to see this variation associated with more variation in political action. However, this does not imply that threat has negative effects, or that it should never be mentioned. Likely threat is a necessary but not sufficient condition for action, and in addition to threat, individuals need to be shown that political action is feasible and attractive.

While no guarantees of effectiveness can be made, practitioners should at least consider trying communication attempting to boost collective identification with those taking action. To repeat, this dissertation provides no strong evidence of a causal effect of collective identification on action. It also provides no evidence regarding how easy it is to increase collective identification with messages, as no messages focusing on collective identification were used. However, the correlation between collective identification and action was large enough to suggest that any messages that did increase collective identification *might* have a substantial effect on action as well.

11.5 Limitations

Perhaps the biggest limitation of these analyses was that no interaction effects were examined. The possibility remains that more of the efficacy beliefs may have had a significant relationship to action at higher, as opposed to lower, levels of threat. This is what the EPPM would predict. If there were such interaction effects for each efficacy belief, this would imply that the extended EPPM suggested by Hart & Feldman (2014) is correct: each type of efficacy would have an influence on action, at least at certain specific levels of perceived threat. This would also have important implications for communication practitioners: the effectiveness of boosting certain kinds of efficacy might depend on how easy it was to simultaneously boost the perceived threat of global warming.

The failure of the messages to have statistically significant or substantively large effects on most of the beliefs that they were intended to boost – PE, CXPE, PRE and perceived threat – limited the conclusions that could be drawn from the experiment. As noted in Section 7, the message experiment was intended to build upon the results of the CCAM survey by enabling stronger evidence for the causal direction of effects. However, this stronger evidence would only have been obtained if the messages had had larger effects on their targeted efficacy and threat variables. Because the messages generally did not have large or significant effects on efficacy or threat variables, none of the indirect effects were significant at the 95% confidence level. Therefore, strong evidence of the causal effects of efficacy and threat variables on action was not obtained.

Of course, the failure to find significant indirect effects is not evidence *against* the effects of efficacy and threat variables on action. It simply means that the opportunity for

finding strong evidence, provided in principle by the experimental design, was not realized in practice. As discussed above in Section 11, this meant that for the most part, the message experiment could tell us no more about the causal direction of effects than the cross-sectional CCAM survey. Any further studies should rectify this by pre-testing a larger number of messages and ideally finding several that have large effects on efficacy and threat beliefs.

While the results do suggest that efficacy beliefs are distinct, these results are also limited in that they cannot tell us how well-thought-out the beliefs are. The observed data are consistent with the idea that many individuals had never thought about efficacy for climate change action before, and responded to the items based to a large extent on the wording of the questions and spur-of-the-moment considerations they brought to mind. Additional work would need to be conducted in order to test the extent to which individuals' efficacy beliefs are reliable and stable in the way we would expect of well-formed attitudes.

Another potential problem with the message experiment is that the items used as indicators for several latent variables were very similar in wording. While this produced high factor loadings and a good fit of the model to the data, it also means reduced content validity, as the items covered a narrow range of content. For example, a latent variable for PRE might be better measured with items measuring perceived effectiveness of different specific policies, rather than the effectiveness of "government policy" generally at different levels of government.

Another measurement problem may have occurred for the message experiment item asking participants to leave their email address. Although it is against the Mturk Terms of Service, some people who run surveys on Mturk require that participants leave their email address in order for them to receive payment (Dynamo, 2015). Participants in the message experiment may have left their email address merely due to a wish to receive payment, rather than due to interest in collective action on climate. If so, this may have distorted the results. Alternatively, due to perceiving a request for email as against the norms of Mturk, some participants may have withheld their email address, even though they really were interested in collective action.

A further limitation of the message experiment data was the fact that the Mturk sample had a higher proportion of liberal respondents than the overall US population of believers in global warming. This would have meant that the results from this sample might not generalize to that broader population. However, if anything, this would have made for a more conservative test of the relationships between efficacy, threat and action. All else being equal, liberals could be expected to have higher levels of perceived threat and efficacy than moderates or conservatives (Leiserowitz et al., 2013). If more moderates and conservatives were added to the sample, this might have resulted in more variation in levels of perceived threat and efficacy, and potentially stronger relationships between threat, efficacy and action.

11.6 Future research

The most obvious future research to be conducted would address the shortcomings listed above in the limitations section. Checking for interactions between

threat and efficacy would enable a better test of the theoretical predictions of the extended EPPM. Based on these predictions, we could expect each of the efficacy variables to have a stronger effect for individuals who are high in perceived threat than those who are low in perceived threat. The efficacy variables that had no significant relationship to action in the present studies might be found to have a positive relationship for individuals who were high enough in perceived threat.

Measuring latent variables with a wider variety of item wordings would also provide a better test of the research questions, as several of the items in this dissertation's message experiment were, in hindsight, more similar to each other than might be desired. We could be more confident in the generalizability of conclusions based on variables measured with a wider variety of items.

Testing knowledge of climate science, US politics, and climate and energy policy as moderators of the effects of efficacy and threat would also be an important next step. However, it is difficult to say what the results of these interactions might be. On the one hand, we could expect efficacy and threat perceptions to be more strongly related to action for people who are more sophisticated on these topics. On the other hand, it is conceivable that floor effects might lead to the efficacy variables having *weaker* effects for more sophisticated individuals. It is possible that many individuals who pay close attention to climate science and climate policy might conclude that there is little hope for significant action in the near term; indeed, several prominent commentators have already made similar conclusions (e.g. Skocpol, 2013; Smil, 2010). If most sophisticated

individuals had uniformly low levels of efficacy, this lack of variation would make it unlikely that any significant relationships between efficacy and action would be found.

In a similar vein, testing more long-term interventions where people are exposed to more detailed information about threat and efficacy for climate action would be helpful. The present study only addresses the effectiveness of efficacy and threat for a broad sample of individuals, after exposing them to a very brief communication. Future research can test how different the results are when interventions are more in-depth.

As noted above, the present research did not test for the effects of messages designed to boost collective identification with climate activists. However, a large relationship between identification and action was observed. Future tests should directly pit efficacy and identification messages against one another. Ideally, these would be randomized field experiments, comparing multiple efficacy-related messages with multiple identification-related messages (Gerber & Green, 2012; O’Keefe, 2015). The results of such a test would provide strong evidence of which message effects were likely to generalize to real-world use.

One way to achieve more certainty about which efficacy beliefs are relevant for most people, and about the level of detail with which these beliefs are held, would be to conduct elicitation interviews, such as mental model interviews (Maibach & Murphy, 1995). Mental model interviews are semi-structured interviews in which laypeople are asked relatively open-ended questions about specific complex phenomena, such as climate science or cancer treatment (e.g. Downs, Bruine de Bruin, Fischhoff, Hesse & Maibach, 2010; Morgan, 2002). Participants are asked to, for example, describe the way

in which they imagine cancer having causal effects on the human body, or describe what they see as an appropriate analogy for the Earth's climate system. Similar interviews could be conducted to ascertain people's mental models of how political action might reduce the threat of climate change. Conducting this kind of research would be a useful test of whether the threat and efficacy perceptions assumed to be important in the extended EPPM models are spontaneously mentioned in individuals' open-ended discussion. This would provide additional evidence, beyond factor analyses of closed-ended questionnaire items, of whether or not individuals possess well-thought-out attitudes relating to the efficacy of climate action. These interviews could also be used to develop improved closed-ended questionnaire items for measuring threat and efficacy. Maibach and Murphy (1995) describe how elicitation interviews can be used to find out the circumstances and motivations that facilitate or inhibit self-efficacy for condom use, and how this interview output can then be used for improved questionnaire design. If similar interviews were conducted on the topic of political action on climate change, the results could help items measuring self-efficacy be more closely mapped to how people really think about these issues.

11.7 Conclusion

This dissertation contributes to our understanding by showing that people do distinguish between different types of efficacy for climate action. Unfortunately, largely due to the experimental messages having small effects, the results tell us less than we might hope for about which of these efficacy beliefs have an impact on collective action.

However, the results do show that PRE may have a substantial impact on behavior, and several of the other efficacy beliefs may also have an impact.

The results demonstrate the importance of distinguishing and controlling for multiple forms of efficacy belief, and other beliefs that might be relevant to collective action. Models such as the SIMCA (van Zomeren et al., 2008), Norm Alignment Model (Thomas et al., 2009) and Klandermans' model (1984) provide useful guides to the variables likely to be important in explaining collective action. Any research – past or present – that does not control for multiple such influences should be viewed with caution.

Not all the variables suggested by Hart & Feldman (2014) were significantly related to action in the present results. However, the strong relationship for PRE underlines the importance of their contribution, as this variable is arguably the most different from the original EPPM variables, and least likely to be discovered without their help. Further research can provide more conclusive evidence of which parts of the EPPM apply to collective climate action, and how the model needs to be refined.

12 APPENDICES

Appendix 1 – Differences between those excluded from CCAM analysis, due to disbelief in global warming, and those included in the analysis

Unsurprisingly, the biggest difference between included and excluded participants was their political ideology. 30% of those included identify as liberal, compared to 7% excluded; 24% of included identify as conservative, compared to 60% excluded. Demographically there were few differences, with almost no difference in age, gender or income. The group of respondents included in the analysis had slightly fewer whites, slightly more Hispanic participants, and slightly more people with a college degree, compared to the group of respondents excluded from the analysis.

Table 12.1. Comparison of ages of participants included and excluded from CCAM analysis.

		Included	Excluded	Total
18-24	Count	71	41	112
	Percentage	9%	7%	8%
25-34	Count	107	75	182
	Percentage	13%	13%	13%
35-44	Count	115	74	189
	Percentage	14%	13%	14%
45-54	Count	145	96	241
	Percentage	18%	17%	18%
55-64	Count	179	136	315
	Percentage	22%	24%	23%
65-74	Count	143	97	240
	Percentage	18%	17%	17%
75+	Count	59	42	101
	Percentage	7%	8%	7%
Total	Count	819	561	1380
	Percentage	100%	100%	100%

Table 12.2. Comparison of gender of those included and excluded from CCAM analysis.

		Included	Excluded	Total
Male	Count	394	289	683
	Percentage	48%	52%	50%
Female	Count	425	272	697
	Percentage	52%	49%	51%
Total	Count	819	561	1380
	Percentage	100%	100%	100%

Table 12.3. Comparison of race/ethnicity of those included and excluded from CCAM analysis.

		Included	Excluded	Total
White, Non-Hispanic	Count	618	454	1072
	Percentage	76%	81%	78%
Black, Non-Hispanic	Count	73	34	107
	Percentage	9%	6%	8%
Other, Non-Hispanic	Count	31	19	50
	Percentage	4%	3%	4%
Hispanic	Count	79	29	108
	Percentage	10%	5%	8%
2+ Races, Non-Hispanic	Count	18	25	43
	Percentage	2%	5%	3%
Total	Count	819	561	1380
	Percentage	100%	100%	100%

Table 12.4. Comparison of education level of those included and excluded from CCAM analysis.

		Included	Excluded	Total
Less than high school	Count	59	42	101
	Percentage	7%	8%	7%
High school	Count	194	155	349
	Percentage	24%	28%	25%
Some college	Count	254	189	443
	Percentage	31%	34%	32%
Bachelor's degree or higher	Count	312	175	487
	Percentage	38%	31%	35%
Total	Count	819	561	1380
	Percentage	100%	100%	100%

Table 12.5. Comparison of incomes of those included and excluded from CCAM analysis.

		Included	Excluded	Total
Less than \$5,000	Count	20	11	31
	Percentage	2%	2%	2%
\$5,000 to \$7,499	Count	10	3	13
	Percentage	1%	1%	1%
\$7,500 to \$9,999	Count	11	10	21
	Percentage	1%	2%	2%
\$10,000 to \$12,499	Count	26	13	39
	Percentage	3%	2%	3%
\$12,500 to \$14,999	Count	20	10	30
	Percentage	2%	2%	2%
\$15,000 to \$19,999	Count	33	13	46
	Percentage	4%	2%	3%
\$20,000 to \$24,999	Count	32	24	56
	Percentage	4%	4%	4%
\$25,000 to \$29,999	Count	41	23	64
	Percentage	5%	4%	5%
\$30,000 to \$34,999	Count	33	24	57
	Percentage	4%	4%	4%
\$35,000 to \$39,999	Count	51	32	83
	Percentage	6%	6%	6%
\$40,000 to \$49,999	Count	53	50	103
	Percentage	7%	9%	8%
\$50,000 to \$59,999	Count	73	57	130
	Percentage	9%	10%	9%
\$60,000 to \$74,999	Count	80	60	140
	Percentage	10%	11%	10%
\$75,000 to \$84,999	Count	52	50	102
	Percentage	6%	9%	7%
\$85,000 to \$99,999	Count	63	39	102
	Percentage	8%	7%	7%
\$100,000 to \$124,999	Count	105	58	163
	Percentage	13%	10%	12%
\$125,000 to \$149,999	Count	42	37	79
	Percentage	5%	7%	6%
\$150,000 to \$174,999	Count	30	15	45
	Percentage	4%	3%	3%
\$175,000 or more	Count	44	32	76
	Percentage	5%	6%	6%
Total	Count	819	561	1380
	Percentage	100%	100%	100%

Table 12.6. Comparison of political ideology of those included and excluded from CCAM analysis.

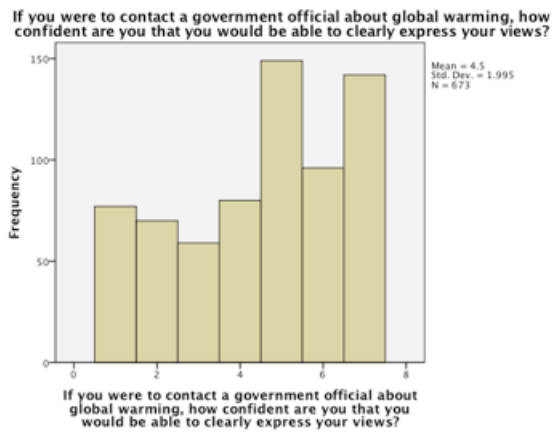
		Included	Excluded	Total
Refused to answer	Count	13	15	28
	Percentage	2%	3%	2%
Very liberal	Count	59	11	70
	Percentage	7%	2%	5%
Somewhat liberal	Count	189	33	222
	Percentage	23%	6%	16%
Moderate, middle of the road	Count	358	164	522
	Percentage	44%	29%	38%
Somewhat conservative	Count	167	217	384
	Percentage	20%	39%	28%
Very conservative	Count	33	121	154
	Percentage	4%	22%	11%
Total	Count	819	561	1380
	Percentage	100%	100%	100%

Table 12.7. Comparison of voting record in last 12 months of those included and excluded from CCAM analysis.

		Included	Excluded	Total
Did not vote	Count	408	256	664
	Percentage	50%	46%	48%
Voted	Count	411	305	716
	Percentage	50%	54%	52%
Total	Count	819	561	1380
	Percentage	100%	100%	100%

Appendix 2 – Frequency distributions of CCAM items

Self-efficacy



Response scale:

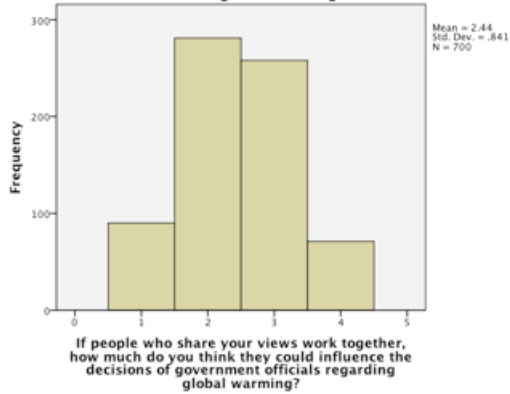
1-Not at all confident

7-Completely confident

(for scale points 2-6, no verbal label was given)

Collective External Political Efficacy

If people who share your views work together, how much do you think they could influence the decisions of government officials regarding global warming?



Response scale:

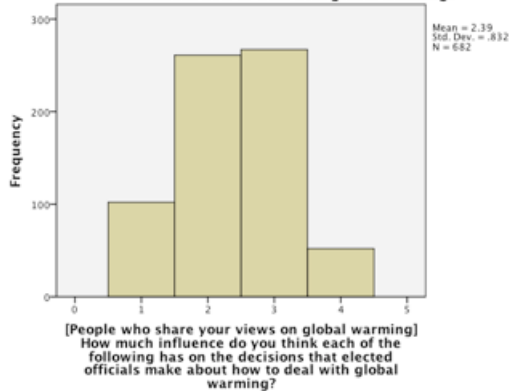
1-Not at all

2-Only a little

3-A moderate amount

4-A lot

[People who share your views on global warming] How much influence do you think each of the following has on the decisions that elected officials make about how to deal with global warming?



Response scale:

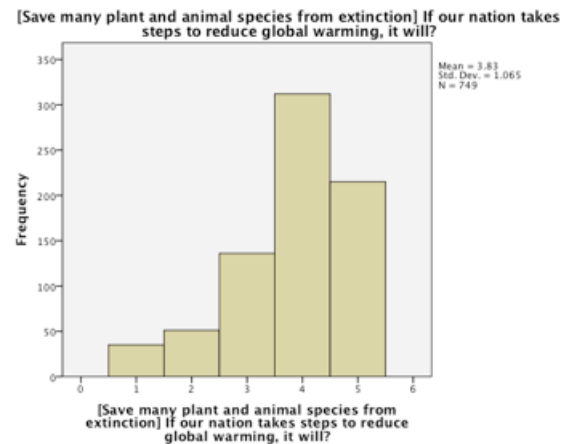
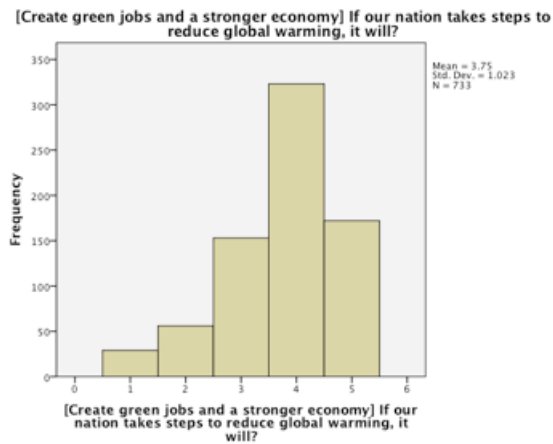
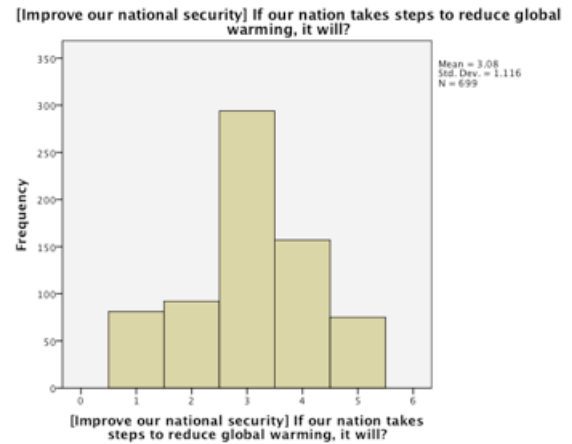
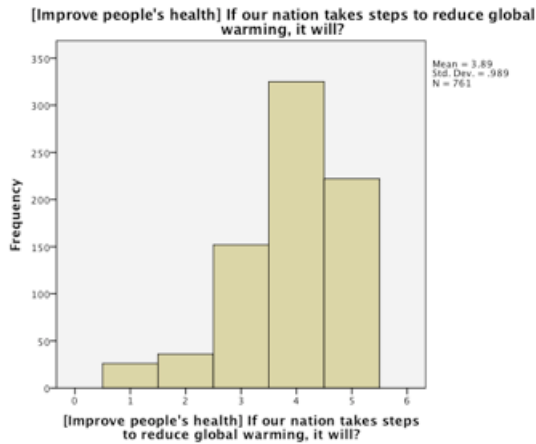
1-No influence

2-A little influence

3-Some influence

4-A lot of influence

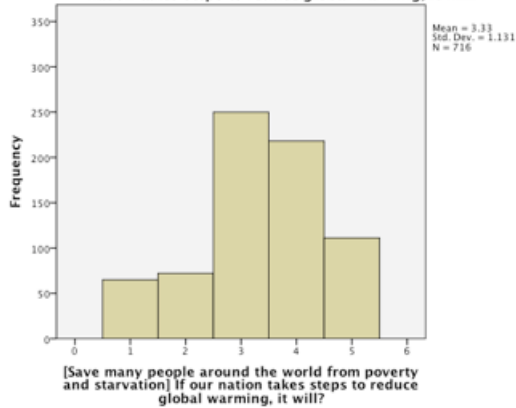
Policy Response Efficacy



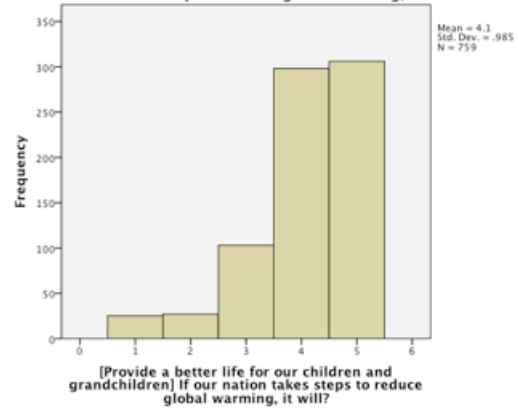
Response scale:

- 1-Strongly disagree
- 2-Moderately disagree
- 3-Neither agree nor disagree
- 4-Moderately agree
- 5-Strongly agree

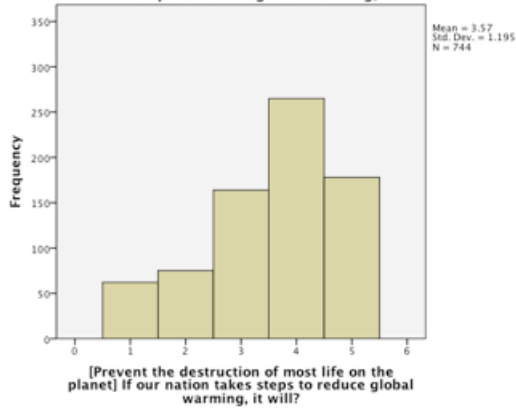
[Save many people around the world from poverty and starvation] If our nation takes steps to reduce global warming, it will?



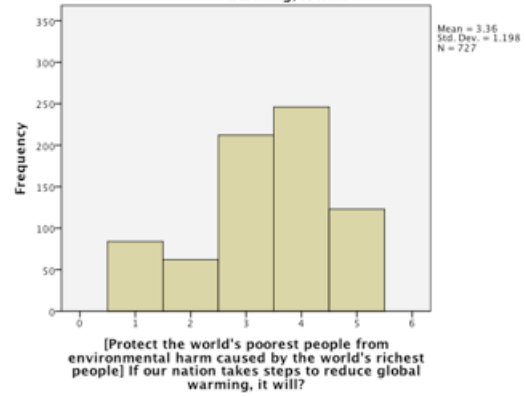
[Provide a better life for our children and grandchildren] If our nation takes steps to reduce global warming, it will?



[Prevent the destruction of most life on the planet] If our nation takes steps to reduce global warming, it will?



[Protect the world's poorest people from environmental harm caused by the world's richest people] If our nation takes steps to reduce global warming, it will?

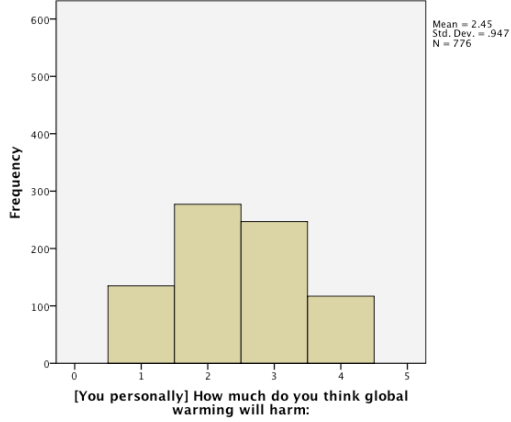


Response scale:

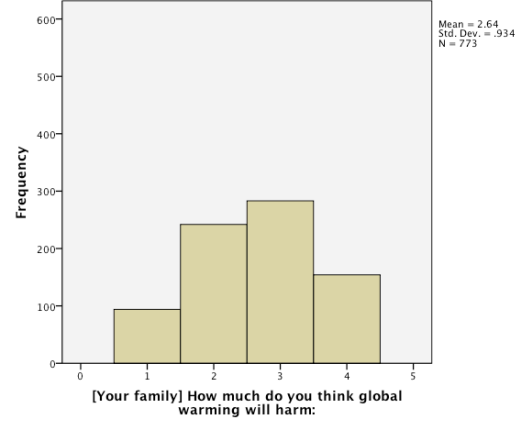
- 1-Strongly disagree
- 2-Moderately disagree
- 3-Neither agree nor disagree
- 4-Moderately agree
- 5-Strongly agree

Perceived Threat

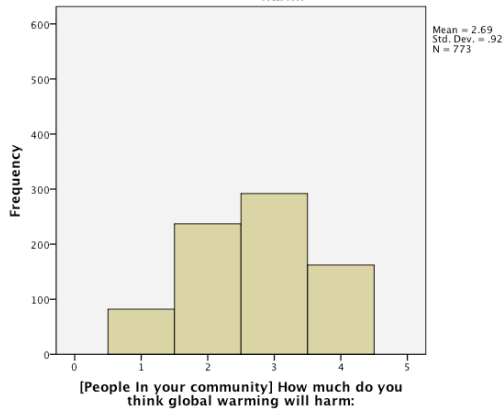
[You personally] How much do you think global warming will harm:



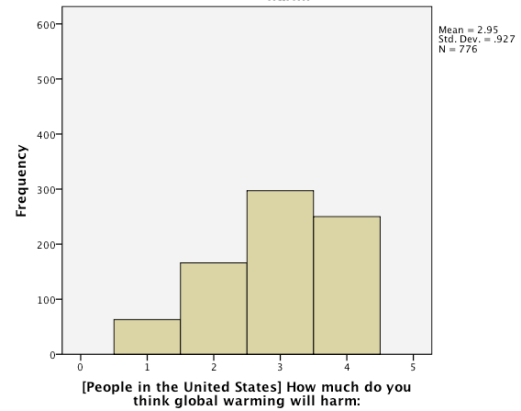
[Your family] How much do you think global warming will harm:



[People In your community] How much do you think global warming will harm:



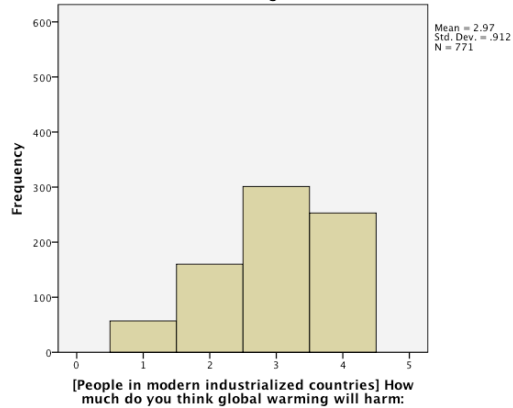
[People in the United States] How much do you think global warming will harm:



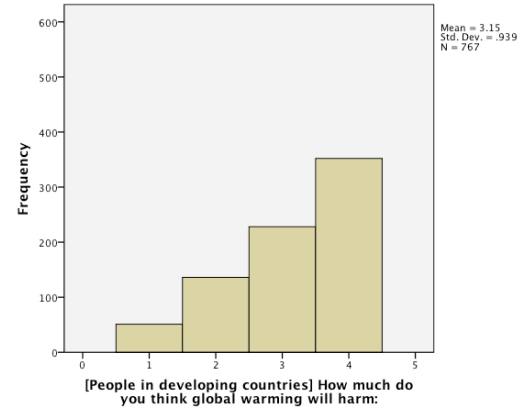
Response scale:

- 1-Not at all
- 2-Only a little
- 3-A moderate amount
- 4-A great deal

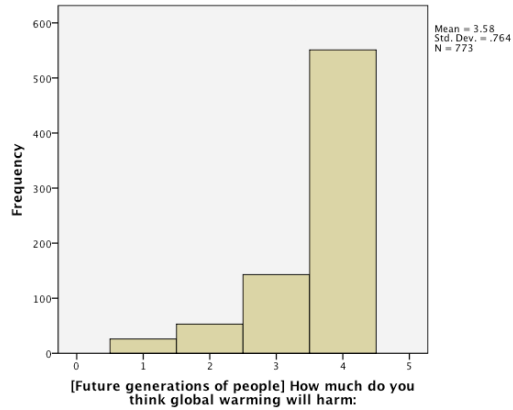
[People in modern industrialized countries] How much do you think global warming will harm:



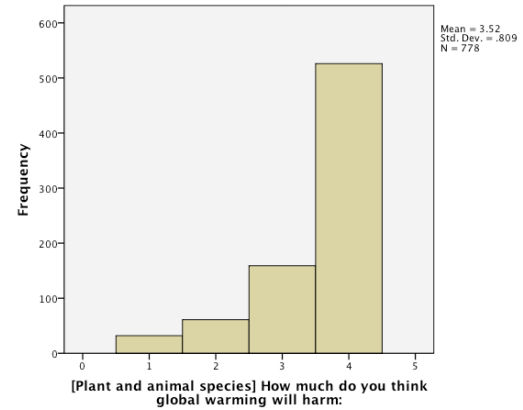
[People in developing countries] How much do you think global warming will harm:



[Future generations of people] How much do you think global warming will harm:



[Plant and animal species] How much do you think global warming will harm:



Response scale:

1-Not at all

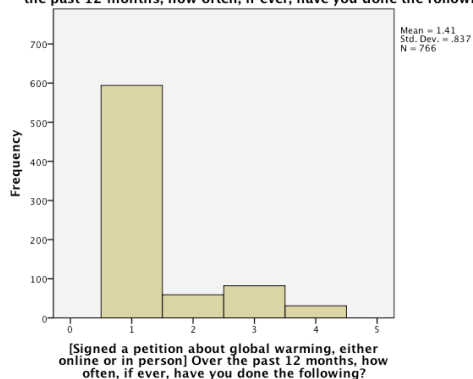
2-Only a little

3-A moderate amount

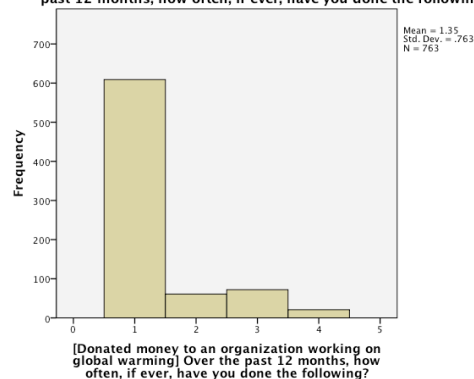
4-A great deal

Past political action

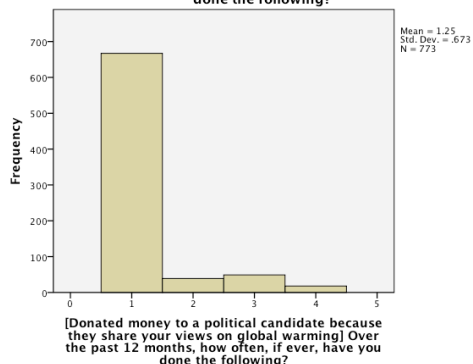
[Signed a petition about global warming, either online or in person] Over the past 12 months, how often, if ever, have you done the following?



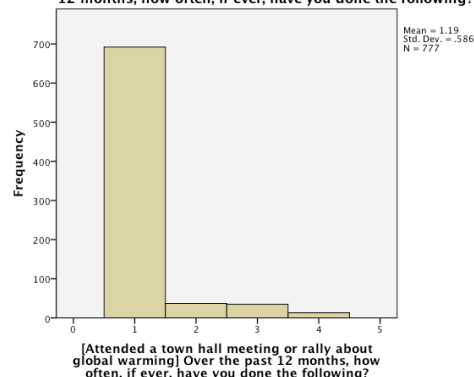
[Donated money to an organization working on global warming] Over the past 12 months, how often, if ever, have you done the following?



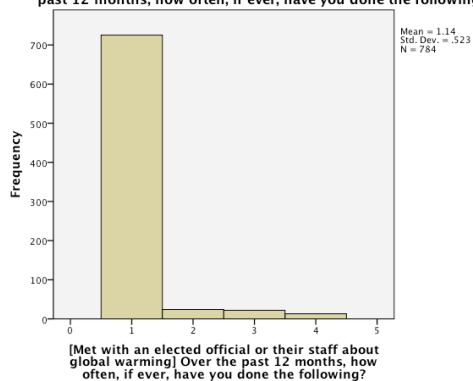
[Donated money to a political candidate because they share your views on global warming] Over the past 12 months, how often, if ever, have you done the following?



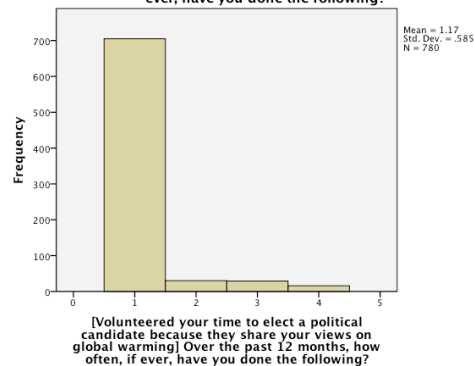
[Attended a town hall meeting or rally about global warming] Over the past 12 months, how often, if ever, have you done the following?



[Met with an elected official or their staff about global warming] Over the past 12 months, how often, if ever, have you done the following?



[Volunteered your time to elect a political candidate because they share your views on global warming] Over the past 12 months, how often, if ever, have you done the following?

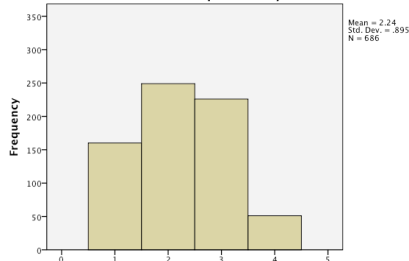


Response scale:

- 1-Never
- 2-Rarely
- 3-Occasionally
- 4-Often

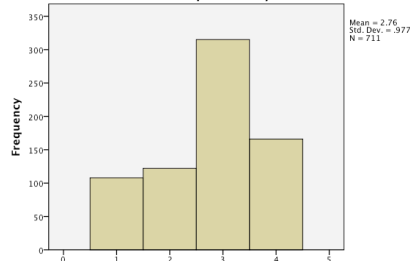
Political action intentions

[Write letters, email, or phone government officials about global warming] How likely would you be to do each of the following things if a person you like and respect asked you to?



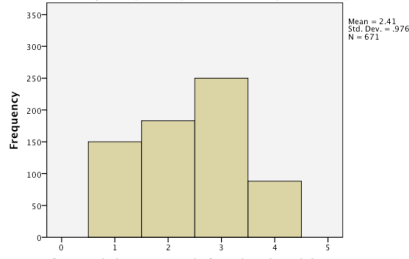
[Write letters, email, or phone government officials about global warming] How likely would you be to do each of the following things if a person you like and respect asked you to?

[Sign a petition about global warming, either online or in person] How likely would you be to do each of the following things if a person you like and respect asked you to?



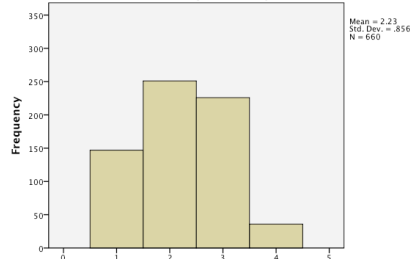
[Sign a petition about global warming, either online or in person] How likely would you be to do each of the following things if a person you like and respect asked you to?

[Sign a pledge to vote only for political candidates who share your views on global warming] How likely would you be to do each of the following things if a person you like and respect asked you to?



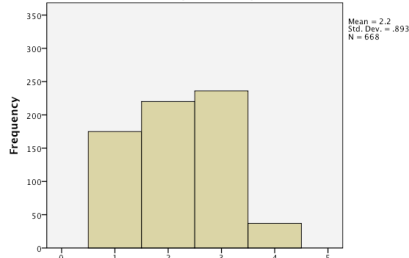
[Sign a pledge to vote only for political candidates who share your views on global warming] How likely would you be to do each of the following things if a person you like and respect asked you to?

[Volunteer your time to an organization working on global warming] How likely would you be to do each of the following things if a person you like and respect asked you to?



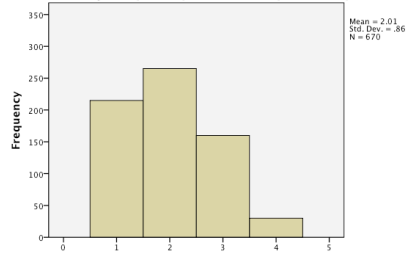
[Volunteer your time to an organization working on global warming] How likely would you be to do each of the following things if a person you like and respect asked you to?

[Donate money to an organization working on global warming] How likely would you be to do each of the following things if a person you like and respect asked you to?



[Donate money to an organization working on global warming] How likely would you be to do each of the following things if a person you like and respect asked you to?

[Donate money to a political candidate because they share your views on global warming] How likely would you be to do each of the following things if a person you like and respect asked you to?

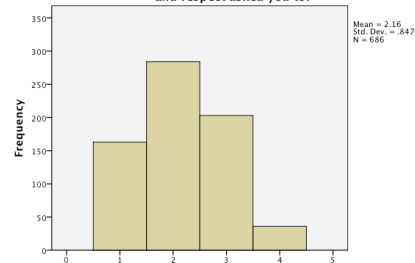


[Donate money to a political candidate because they share your views on global warming] How likely would you be to do each of the following things if a person you like and respect asked you to?

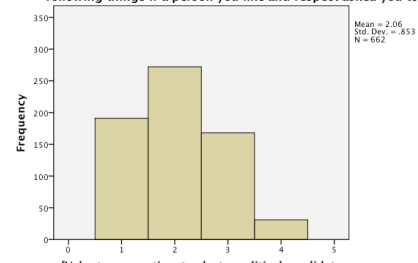
Response scale:

- 1-Definitely would not
- 2-Probably would not
- 3-Probably would
- 4-Definitely would

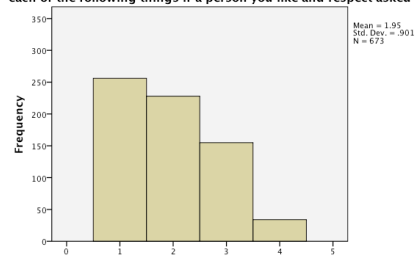
[Meet with an elected official or their staff about global warming] How likely would you be to do each of the following things if a person you like and respect asked you to?



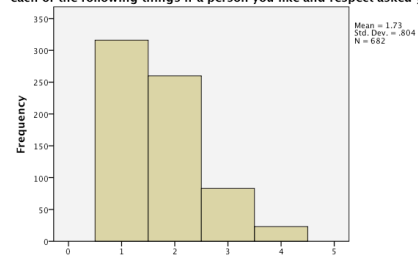
[Volunteer your time to elect a political candidate because they share your views on global warming] How likely would you be to do each of the following things if a person you like and respect asked you to?



[Support an org engaging in civil disobedience against corporate or govt activities that make global warming worse] How likely would you be to do each of the following things if a person you like and respect asked you to?



[Personally engage in civil disobedience against corporate or government activities that make global warming worse] How likely would you be to do each of the following things if a person you like and respect asked you to?



Response scale:

- 1-Definitely would not
- 2-Probably would not
- 3-Probably would
- 4-Definitely would

Appendix 3 – Overview of latent variables, and interpretation of latent variables in CCAM analysis

Latent variables, as seen below in figure 12.1, are used to represent unobservable entities that have causal relationships with other observable or unobservable phenomena. In social science research latent variables are often used to represent psychological phenomena such as beliefs or attitudes, but they can also be used to represent non-psychological forces, such as individuals' permanent income levels, or the bureaucratic capacity of nations (Bollen, Glanville, & Stecklov, 2007; Hendrix, 2010). Statistical analyses of latent variables involve using mathematical and statistical techniques to infer qualities of the latent variables, based on their effects on observable phenomena.

In the present study, the observable phenomena influenced by latent variables are survey responses. It is assumed that if a person has a latent perception, perceived threat from global warming for example, then this will cause them to respond to questionnaire items in predictable ways. This is represented in the diagram below. The oval shape represents the latent variable of perceived threat, and the rectangles represent responses to survey questions relating to threat. The idea is that if people had a generalized perception of the threat of global warming, this would cause them to respond to survey items about threat in predictable ways. Specifically, those who had high levels of overall threat (the latent variable) would report high levels of threat on questions about threat to themselves, threat to their community, threat to the United States, and so on (observable responses – selections made on questionnaire items). There would be some variation from question to question, but generally speaking, those who perceive high levels of

overall threat would give high responses to specific threat items, and those who perceived low levels of overall threat would give low responses to specific threat items.

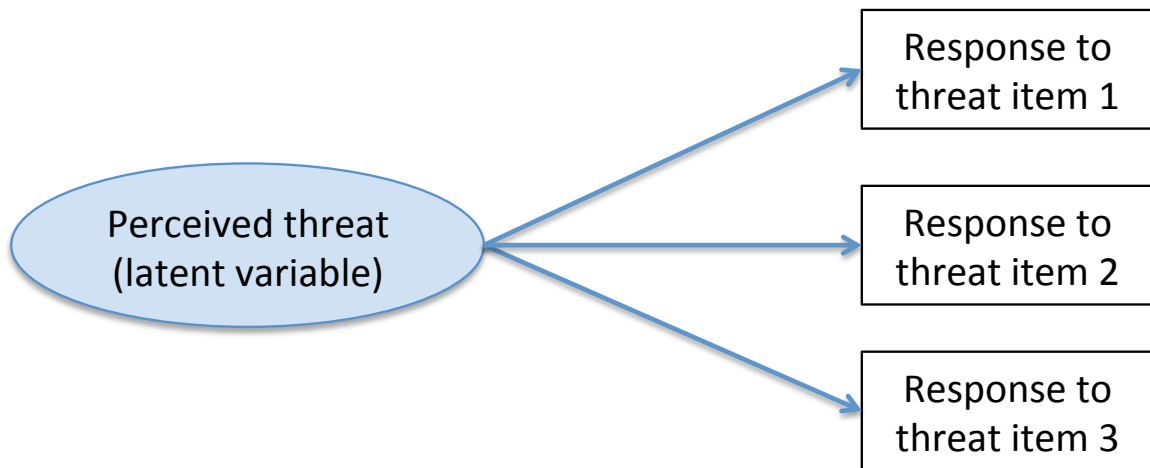


Figure 12.1. Conceptual illustration of a latent variable and its relationship to its indicator items.

Because latent variables, were they to exist, would cause predictable responses in this manner, their existence can be inferred and tested via survey items that one could expect the latent variable to influence. By choosing questionnaire items substantively related to the latent variable of interest, response patterns can be checked to see how closely they match what would be expected from an underlying latent variable.

Confirmatory factor analyses (CFAs) test the extent to which a particular set of questionnaire items can be modeled as being caused by a particular set of latent variables. Two of the major ways CFAs do this are with fit statistics and patterns of factor loadings. For CFAs, fit statistics are measures of the extent to which the observed data deviate from what would be expected if the proposed latent variables actually did cause the

responses they are modeled as causing. If the data deviate substantially from expectations, this suggests that there is something wrong with the latent variable model. Factor loadings measure the appropriateness of a model in a slightly different way. Generally, one should aim for all items to load highly on their assigned latent variable, as this is consistent with the latent variable as being a strong influence on responses to these items. If a latent variable is only a weak influence on items that it substantively should be a strong influence on, this suggests that modeling that variable as a cause for the data is invalid. Another feature of CFAs is that latent variables are modeled as having zero influence on all items other than those assigned to them. If a modeled variable in fact does have a substantial influence on an item assigned to another latent variable, this will be detected by lowered fit statistics and model modification indices. In summary, if a model has good fit statistics, and high factor loadings, it is appropriate to assume that the modeled latent variables are relatively close to the true influences on the data.

In the present CCAM analysis, latent variables are modeled for two types of efficacy belief (CXPE and PRE), perceived threat, past political action, and political action intentions. Sometimes the meaning of the latent variable is relatively straightforward to understand. For example the latent variable for perceived threat represents an individual's perception of the overall threat climate change poses. This generalized threat perception influences individuals' responses to more specific questions about perceived threat to particular groups. Similarly the latent variable for CXPE represents the overall perception of the ability for collective climate action to influence politicians, and the latent variable for PRE represents the overall perception of the ability

of government policy generally to effectively reduce the threat of global warming. The latent variable for political action intentions represents a generalized propensity to act politically on climate change; this generalized willingness to act influences one's willingness to perform the 10 specific actions described by the individual items.

Finally, the latent variable for past actions is somewhat more difficult to understand. This can also be thought of as representing a generalized propensity to act, but a propensity that existed in the past, prior to performing the actions. Just as the other latent variables are inferred from their observable consequences, a previously existing latent propensity to act can be inferred from reports of past behavior that this propensity caused. If we consider this latent variable to represent an action propensity that occurred in the past, it might seem inappropriate to model it as a dependent variable, influenced by other latent variables (e.g. threat and efficacy perceptions) taking place in the present. This is acceptable provided we make the assumption that threat and efficacy perceptions are relatively stable, and that current reports of these quantities are relatively similar to what they were previously, when they had a causal influence on past action propensities. As at least one set of authors has noted, this assumption is somewhat questionable, and I have attempted to interpret the results below with appropriate caution as a result (Maxwell & Cole, 2007). However, because the data on past political action provides the opportunity to shed some extra light on the relationship between threat, efficacy and action, I decided to analyze it rather than cast it aside due to my misgivings about the causal ordering of variables.

Appendix 4 – Details of correlated errors for CCAM measurement model

Table 12.8. Correlated errors from CCAM measurement model.

Threat 1 with Threat 2	"Global warming will harm you" with "Harm your family"	0.71
Threat 1 with Threat 3	"Harm you" with "Harm people in your community"	0.54
Threat 2 with Threat 3	"Harm your family" with "Harm people in your community"	0.65
Threat 5 with Threat 6	"Harm industrialized countries" with "Harm developing countries"	0.35
Threat 7 with Threat 8	"Harm future generations" with "Harm plants and animals"	0.75
Past 1 with Past 2	"Signed a petition" with "Donated to an organization working on global warming"	0.47
Past 2 with Past 3	"Donated to an organization" with "Donated to a political candidate"	0.38
Intentions 2 with Intentions 3	"Would sign a petition" with "Would sign a pledge to vote for candidates who share your views on global warming"	0.39
Intentions 5 with Intentions 6	"Would donate to an organization" with "Would donate to a candidate who shares your views"	0.46
Intentions 9 with Intentions 10	"Would support an organization engaging in civil disobedience" with "Would personally engage in civil disobedience"	0.63

Appendix 5 – Message experiment survey items not presented in main document text

Consent form

INFORMED CONSENT FORM

STUDY TITLE: Survey of attitudes related to science and public engagement

RESEARCH PROCEDURES

This research is being conducted to learn about how people respond to email messages written by organizations working on science-related topics. If you agree to participate, you will be assigned to read one brief email message. You will also be asked to fill out a short survey. In total, this task will take approximately 15 minutes.

RISKS

There are no foreseeable discomforts from participating in this study. As a participant, you have the right to withdraw consent at any time without consequence and you do not have to answer any question that you do not wish to answer on the survey.

BENEFITS

There are no direct benefits to you for participating in the study.

CONFIDENTIALITY

The data based on your input to the survey will be stored on the servers of the survey firm Qualtrics, which encrypt all stored data files. The full security statement by Qualtrics is available here: <http://www.qualtrics.com/security-statement/>

Data from Qualtrics surveys are password-protected and only members of the George Mason University research team will be able to access the files. Any computer onto which the files are downloaded will also have password protection to prevent access by unauthorized users. Any data that could potentially be used to identify you will be accessible only to the research team and will not be shared with any third parties.

At some point in the survey, you may be asked to enter your email address if you want to receive a follow-up email related to this study. Providing this email address is entirely voluntary and will not affect your compensation in any way. Your email address will be kept secure in a password-protected file accessible only to the GMU research team, and will not be shared with any third party.

At the conclusion of this study, the researchers may publish their findings. Information will be presented in summary format and you will not be identified in any publications or presentations.

PARTICIPATION

Your participation is voluntary, and you may withdraw from the study at any time and for any reason. If you decide not to participate, or if you withdraw from the study, you will not receive compensation. There are no costs to you or any other party for participation.

Participants who complete the survey will receive \$1.00. Researchers will be verifying that participants were paying attention while completing the study before payment will be received.

NOTE: You must be aged 18 years or over to participate.

CONTACT

This research is being conducted by Neil Stenhouse at George Mason University. He may be reached via email at nste235@gmail.com for questions or to report a research-related problem. This research is being carried out under the guidance of his faculty advisor, Dr. Edward Maibach, from the Department of Communication. Should you wish to contact Dr. Maibach, you may get in touch with him through email at: emaibach@gmu.edu.

You may contact the George Mason University Office of Research Integrity and Assurance at irb@gmu.edu if you have questions or comments regarding your rights as a participant in the research. This research has been reviewed according to George Mason University procedures governing your participation in this research.

CONSENT

- ☐ I have read this form and agree to participate in this study.
- ☐ I do not wish to participate in this study.

Issue Importance

For each of the following issues, please indicate how important the issue is to you personally.

	++++++ ++++++ Not at all important 1	++++++ ++++++ ++++++ 2	++++++ ++++++ ++++++ 3	++++++ ++++++ Moderately important 4	++++++ ++++++ 5	++++++ ++++++ 6	++++++ ++++++ Extremely important 7
Advocacy groups' actions on climate change	☐	☐	☐	☐	☐	☐	☐
Immigration	☐	☐	☐	☐	☐	☐	☐
Climate change	☐	☐	☐	☐	☐	☐	☐
Gun rights	☐	☐	☐	☐	☐	☐	☐

Climate science knowledge block 1

Please select the correct response to both of the following questions about science.

Climate scientists have concluded that globally averaged surface air temperatures were higher for the first decade of the twenty-first century (2000-2009) than for the last decade of the twentieth century (1990-1999).

- ☐ True
- ☐ False

Climate scientists believe that nuclear power generation contributes to global warming.

- ☐ True
- ☐ False

Climate science knowledge block 2

Please select the correct response to both of the following questions about science.

Climate change experts predict there will be positive as well as negative effects from human-caused global warming.

- ☐ True
 - ☐ False
-

What gas do most scientists believe causes temperatures in the atmosphere to rise? Is it...

- ☐ Radon
- ☐ Helium
- ☐ Hydrogen
- ☐ Carbon dioxide

Political knowledge block 1

Please select the correct response to both of the following questions about **politics**.

What is the position to which John Boehner was recently re-elected?

- ☐ Vice president
- ☐ US Senator
- ☐ President
- ☐ Speaker of the House of Representatives

Do you happen to know if children born to illegal immigrants in the U.S. are automatically U.S. citizens, or are they NOT automatically U.S. citizens?

- ☐ They are citizens if they remain in the US until they are 16 years old
- ☐ They are citizens if they remain in the US until they are 18 years old
- ☐ Yes, they are citizens
- ☐ No, they are not citizens

Political knowledge block 2

Please select the correct response to both of the following questions about **politics**.

President Obama recently ordered the restoration of diplomatic relations with which country?

- ☐ North Korea
- ☐ Yemen
- ☐ Iraq
- ☐ Cuba

How much of a majority is required for the US Senate and House to override a presidential veto?

- ☐ Two thirds
- ☐ Three quarters
- ☐ 80%
- ☐ 51%

Fear

How much does climate change make you feel...

	++++++ ++++++ Not at all 1	++++++ ++++++ ++++++ ++++++ 2	++++++ ++++++ ++++++ ++++++ 3	++++++ ++++++ ++++++ ++++++ 4	++++++ ++++++ ++++++ ++++++ 5	++++++ ++++++ ++++++ ++++++ 6	++++++ ++++++ ++++++ ++++++ Very much 7
Nervous	☐	☐	☐	☐	☐	☐	☐
Tense	☐	☐	☐	☐	☐	☐	☐
Frightened	☐	☐	☐	☐	☐	☐	☐

Political Ideology

Politically speaking, do you think of yourself as...

- ☐ Very liberal
- ☐ Somewhat liberal
- ☐ Moderate, middle of the road
- ☐ Somewhat conservative
- ☐ Very conservative

Party ID

Generally speaking, do you think of yourself as a...

- ☐ Republican
- ☐ Democrat
- ☐ Independent
- ☐ Other
- ☐ No party/not interested in politics

**Party ID leaning – Only asked of participants who selected “Independent”,
“Other”, or “No party/not interested in politics” for party ID item**

If you had to choose, do you think of yourself as closer to the...

- ☐ Republican party
- ☐ Democratic party
- ☐ Neither

Appendix 6 – Process of excluding invalid message experiment responses

First, for all responses that were made via the same Amazon worker ID number, the responses made later in time were excluded, as it seemed likely that these responses would have been made by the same individuals attempting to complete the survey a second time. This resulted in 10 responses being cut out of the analysis.

Similarly, some responses with the same IP address as other responses were deleted. Although there is no way to be sure whether the same individuals or different ones were responsible for responses from the same IP address, I selected the more conservative option of deleting any responses that were likely to not represent independent responses by separate individuals. If the responses from the same IP address were made on separate days, I deleted the second response only, as it seemed unlikely that the individual responsible for the second response could have influenced the way in which the first individual made their responses. Some responses from duplicate IP addresses were made on the same day, or even simultaneously. If two respondents from the same household were completing the survey at the same time, it was possible that each would influence each other's responses, distorting the results. Thus, for any two responses from the same IP address that occurred on the same day, I deleted both responses. Altogether, this process resulted in 34 responses being excluded from the dataset.

Following this, I excluded respondents who had failed the attention check item. Out of 676 individuals who actually got to the attention check question and answered it, only four failed – giving a failure rate of 0.6%. However, after excluding those with

duplicate Amazon worker IDs, or duplicate IP addresses, three of these four individuals who failed the attention check had already been excluded. This meant only one individual was excluded solely due to failing the attention check.

I also excluded several incomplete responses from analysis. Although I did not require that all participants complete the survey for their responses to be analyzed, I did require that they complete at least one item beyond the attention check item. This ensured that all analyzed cases included responses to items that came after the messages, making it possible to have at least some information on how the messages affected each participant. Also, requiring at least one response past the attention check ensured that all respondents had demonstrated that they were paying attention.

Respondents whose total survey time was less than 238 seconds (i.e. 3 minutes and 58 seconds) were also excluded from the analysis. I calculated the minimum time of 238 seconds in the following way. First, I timed myself running through the experiment, as fast as possible, five times. I did not read any instructions, item text, or any of the messages. Instead, I merely responded to each of the items as fast as possible, and clicked to proceed to the next screen as soon as I had responded to all the items. The average time across the five attempts was 112 seconds. As I was very familiar with the layout of the experiment, 112 seconds is thus a generous estimate of the minimum time needed to respond to all items, without reading any of the instructions or thinking about one's responses at all. I also measured the number of words a participant would need to read in order to properly understand and respond to the experiment. In calculating this total, I excluded the consent form and all instructions explaining the messages. I also excluded

the messages themselves from the word count, as control condition participants did not read any message. Finally, I excluded the instructions for how to respond to most items, as well as the labels of most response scales, as many respondents might have been able to figure out that many responses were on a 7-point agree-disagree scale, and could have responded meaningfully without reading all parts of the question.

Excluding all these words, 631 words remained that all participants would have needed to read to have a bare minimum understanding of the experiment. Because average reading speed is around 300 words per minute (Reichle et al., 2003), these 631 words would take the average person about 126 seconds to read. Adding this 126 seconds to the 112 seconds it took to respond to all the items gave the 238-second minimum required for a response to stay in the sample. Because this is a reasonable estimate for the minimum time required to read the minimum amount of text and respond to all the items, without even thinking about one's responses, it follows that any respondent who took less than 238 seconds was extremely unlikely to be thinking at all about their responses, and should not be included in the analysis. In total, 24 responses were excluded due to taking less than 238 seconds to complete the experiment.

Finally, 70 individuals were excluded due to reporting that they did not believe that global warming is happening. This left 525 individuals in the sample to be analyzed. Table 12.9 summarizes the reasons for excluding participants, and the number excluded for each reason.

Table 12.9. Number of participants excluded from message experiment analysis for each of the six reasons.

	Number excluded	Running total
Number of responses originally in sample	678	678
Duplicate worker IDs	10	668
Duplicate IP address	34	634
Failed attention check	1	633
Those not answering past attention check	14	619
Took less than 238 seconds	24	595
Reported disbelief in global warming	70	525

Two tables below show the differences between those individuals excluded from the sample and those remaining on important characteristics. Two tables are used, rather than one, because of the differences in available data for those individuals excluded due to disbelief in global warming, compared to those excluded for all other reasons. The majority of those excluded for disbelief in global warming completed the survey properly, and could thus be compared to other participants on any items in the survey. However, many of those excluded for all other reasons did not complete the survey, and could thus not be compared on characteristics measured by items later in the survey, such as political ideology and demographics. Therefore, Table 12.10 compares the 83 individuals excluded due to reasons other than global warming disbelief to all 595 other participants, using items early in the survey that almost all participants completed. Table 12.11 splits those 595 participants into the 70 excluded due to disbelief in global warming, and the 525 included in the analyses, and compares these two groups on measures more likely to be related to their responses to the experiment – specifically, political ideology, demographics, and time spent responding to the survey.

Table 12.10. Comparison of message experiment participants excluded for improper responses and those who gave proper responses.

	Gave proper responses (includes non-believers in global warming)	Excluded due to improper responses
Believe global warming is happening	88%	92%
Believe global warming is not happening	12%	8%
Believe gun violence is mostly due to individuals' choices	57%	53%
Believe gun violence is equally due to individuals' choices and laws around gun ownership	40%	43%
Believe gun violence is mostly due to laws around gun ownership	4%	4%
Voted in 2012 presidential election	71%	62%
Voted in 2014 midterm elections	49%	39%
Signed petition in last 12 months	30%	25%
Total number of participants	595	83

Table 12.10 shows that those excluded for reasons other than global warming disbelief had similar positions to other respondents on issues known to be politically polarizing. These two groups showed differences of only about 3 or 4 percent in answer categories on global warming and gun violence. This suggests that the two groups are unlikely to be radically different in political orientation. One substantial difference is that those excluded from the study appear to be somewhat less civically active – being about 10% less likely to have voted in elections, and about 5% less likely to have signed a petition in the last 12 months.

Table 12.11. Comparison of message experiment participants excluded for expressing disbelief in global warming with those included in further analyses.

	GW believers	GW non- believers
% Very liberal	22%	0%
% Somewhat liberal	40%	21%
% Moderate, middle of the road	25%	18%
% Somewhat conservative	11%	34%
% Very conservative	1%	28%
Mean age	35	41
% Female	42%	39%
% Non-white	21%	19%
Mean education category	3.5	3.4
Mean income category	2.5	2.7
Mean time in survey	11m1s	9m10s
Median time in survey	8m13s	9m5s
Total N	525	70

Table 12.11 shows that those excluded due to global warming disbelief tended to be less liberal and more conservative than those included in the analyses. Global warming believers were also somewhat younger, and had a slightly lower median time spent in the survey. The two groups were equivalent on gender, race, education and income.

Appendix 7 – Details of message creation, sources used

(Sources cited in this Appendix are listed at the end of this Appendix, rather than in the main References section.)

There were two passages in the messages where precise wordings were taken from other sources. The following passage was taken from Gillis (2014):

The gathering risks of climate change are so profound that they could stall or even reverse generations of progress against poverty and hunger... failure to reduce emissions could threaten society with food shortages, the flooding of major cities, and mass extinction of plants and animals.

The messages also contained this passage:

As the world's leading scientists hold up a danger sign, hundreds of thousands of Americans are pointing the way to a solution to the threat of climate change. This is not a time for cynicism and despair -- it's a time for hope, determination, and action. Join us.

The original quote, taken from Hitt (2014), is as follows:

As the world's leading scientists hold up a danger sign, hundreds of thousands of Americans who are moving their communities beyond coal are pointing the way to a solution. This is not a time for cynicism and despair -- it's a time for hope, determination, and action. Join us.

The passage from the PRE message about rates of wind growth in Kansas before and after the renewable portfolio standard (RPS) was introduced are based on the following calculations.

US Department of Energy records (2015) show that at the end of 2000, Kansas had 2 megawatts (MW) of installed wind capacity, whereas at the end of 2008 it had 921 megawatts.

921-2= 919 MW growth over 8 years

919/8 = 114.875 MW growth per year

At the end of 2009, the state had 1021 MW of wind capacity, whereas at the end of 2013, it had 2967 MW.

2967-1021 = 1946 MW growth over 4 years

1946/4=486.5 MW growth per year

486.5/114.875=4.2

Thus, the rate of growth 2009-2013 was 4.2 times as large as for 2000-2008.

The PRE message passage about 1 million cars being taken off the road was based on the following calculations. All figures are from an American Wind Energy Association report (AWEA, 2014).

Kansas 2013 emissions reductions due to wind energy = 4,356,000 tons CO₂

Total US emissions reductions due to wind energy 2013: 126.8 million tons

Kansas reductions as proportion of total = 4,356,500/126,800,000 = 0.034

Total US wind energy production in 2013 was equivalent to taking about 20 million cars off the road.

*20 million cars*0.034=0.69 million cars*

Thus, according to the AWEA's calculations, the wind energy generated in Kansas in 2013 reduced carbon dioxide emissions by about the same amount as taking

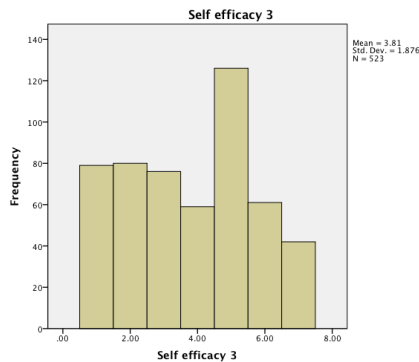
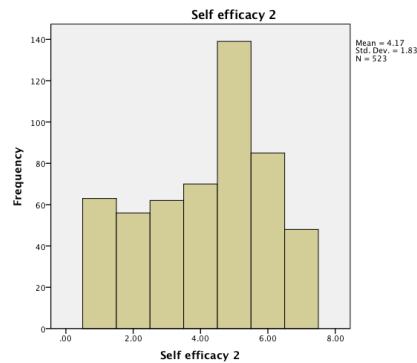
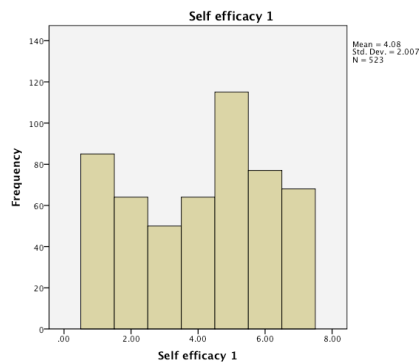
700,000 cars off the road. This makes the “about 1 million” quote somewhat of an exaggeration, but one close enough to the truth that many advocacy groups might be willing to make the claim.

References used in creating the messages:

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- Romm, J. (2014). Landmark report warns time is running out to save US from climate catastrophe. *Think Progress*. Retrieved from <http://thinkprogress.org/climate/2014/05/06/3434108/report-climate-catastrophe/>
- Sekar, S., & Sohngen, B. (2014). The Effects of Renewable Portfolio Standards on Carbon Intensity in the United States. *Resources for the Future Discussion Paper*, (14-10).
- Shrimali, G., & Kniefel, J. (2011). Are government policies effective in promoting deployment of renewable electricity resources? *Energy Policy*, 39(9), 4726-4741.
- Worster, D. (2004). *Dust bowl: The southern plains in the 1930s*. New York: Oxford University Press.

Appendix 8 – Frequency distributions of message experiment items

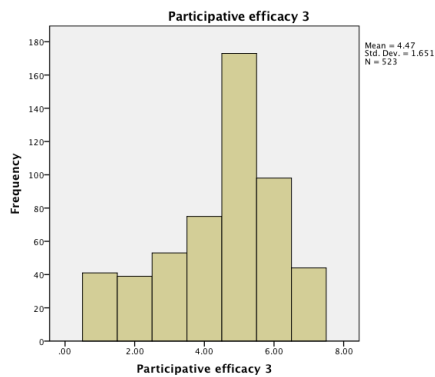
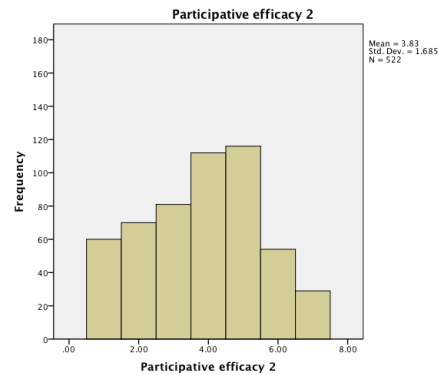
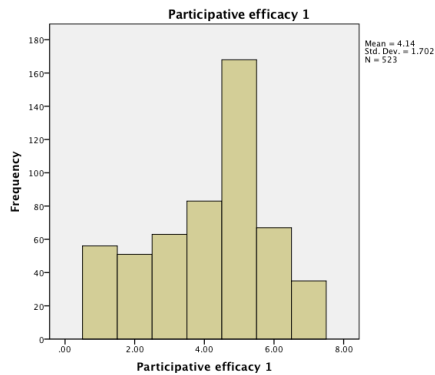


Self-efficacy (SE)

1. If I wanted to contribute time to a group taking political action on climate change, I would not find it difficult to do so.
2. If I wanted to, I have great confidence that I could contribute money to a group acting politically on climate change.
3. I would find it easy to contribute some time each week to an organization taking political action on climate change, if I really wanted to.

Response options:

- 1-Strongly disagree
- 2
- 3
- 4-Neither agree nor disagree
- 5
- 6
- 7-Strongly agree



Participative efficacy (PE)

1. I believe that I, as an individual, can provide an important contribution to groups working to influence politicians' action on climate change.
2. If I worked with groups trying to influence politicians on climate change, I think my contribution would make a very large difference to the overall group effort.
3. If I worked with an organization to influence the decisions of government officials regarding global warming, my actions as an individual would be helpful to the overall effort.

Response options:

- 1-Strongly disagree
- 2
- 3
- 4-Neither agree nor disagree
- 5
- 6
- 7-Strongly agree



Expectation of others' participation (EOP)

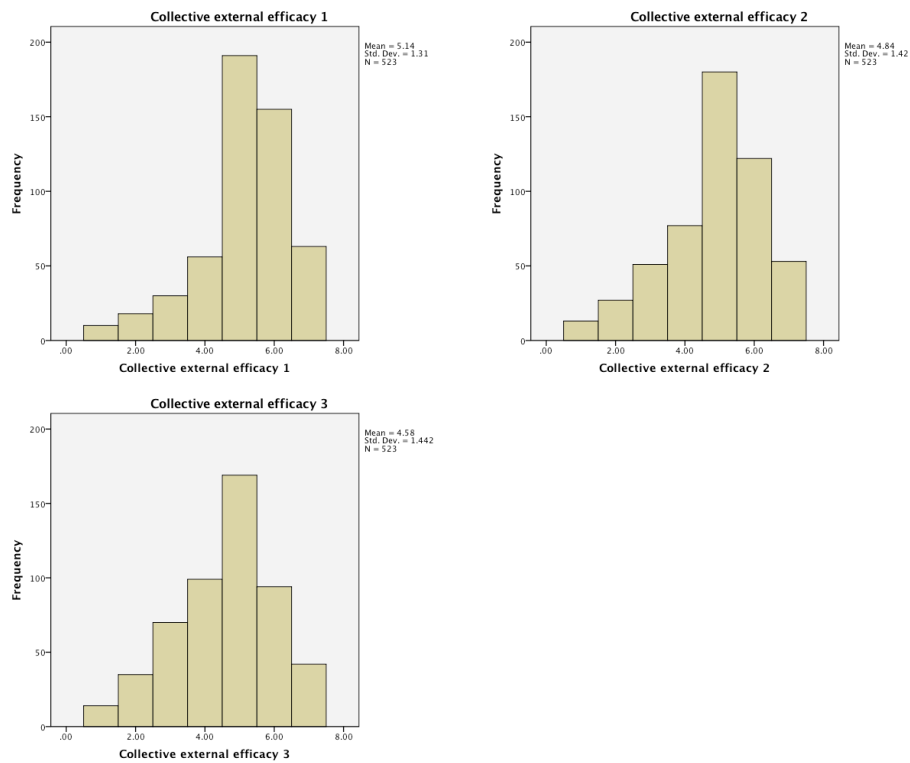
How confident are you that, over the next 12 months, a number of Americans will contribute time or money to organizations taking political action on climate change?

Specifically, how confident are you that...

1. At least 1% will contribute to organized political efforts?
2. At least 10% will contribute to organized political efforts?
3. At least 50% will contribute to organized political efforts?
4. At least 80% will contribute to organized political efforts?

Response options:

- 1-Not at all confident
- 2
- 3
- 4-Moderately confident
- 5
- 6
- 7-Extremely confident

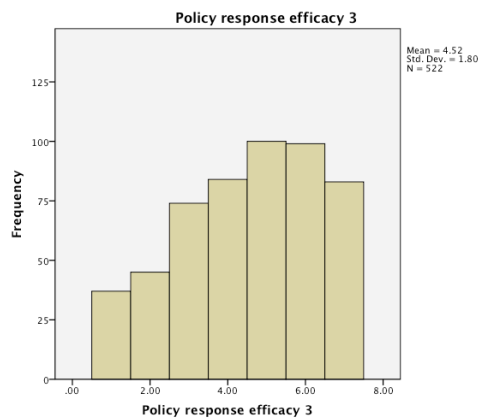
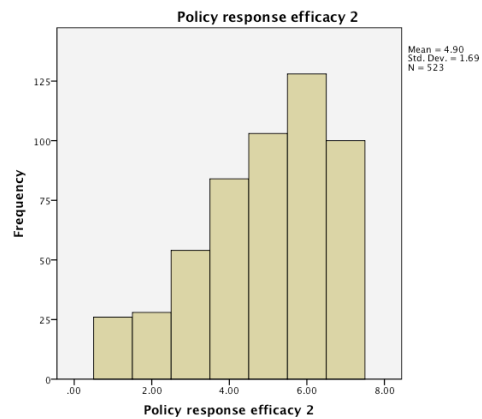
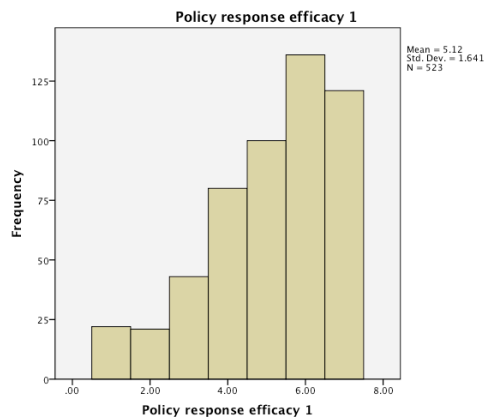


Collective External Political Efficacy (CXPE)

1. If members of climate advocacy groups work together, they can influence the decisions of government officials regarding global warming.
2. Organizations taking political action on climate change can have a very large influence on government officials.
3. Government officials are likely to be strongly influenced by the actions of climate change advocacy organizations.

Response options:

- 1-Strongly disagree
- 2
- 3
- 4-Neither agree nor disagree
- 5
- 6
- 7-Strongly agree



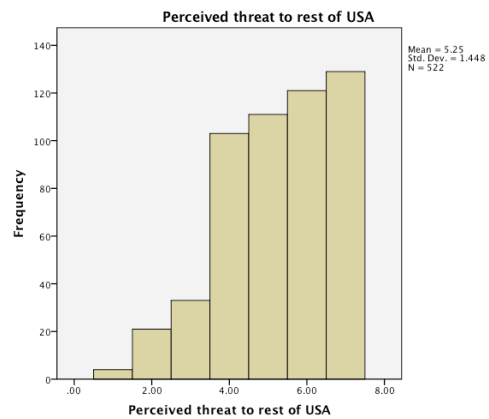
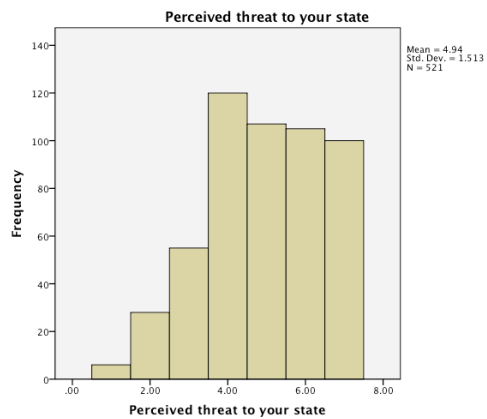
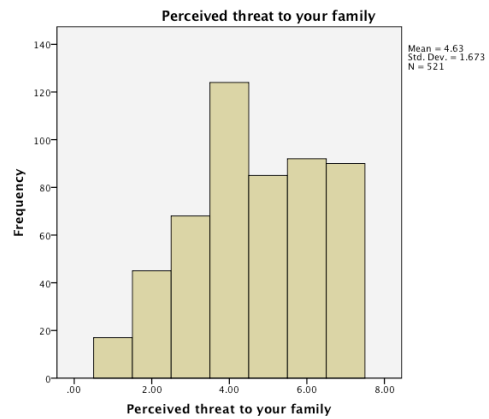
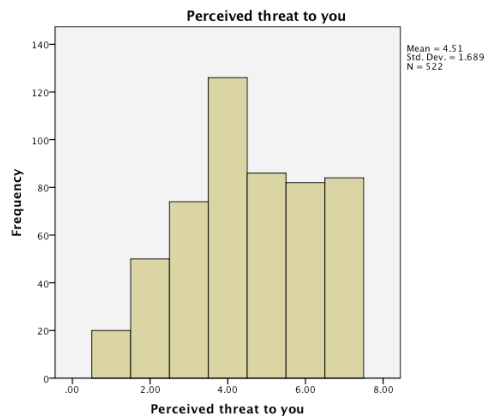
Policy response efficacy (PRE)

How confident are you that...

1. Federal government policies can help reduce climate change?
2. State government policies can help reduce climate change?
3. Local government policies can help reduce climate change?

Response options:

- 1-Not at all confident
- 2
- 3
- 4-Moderately confident
- 5
- 6
- 7-Extremely confident



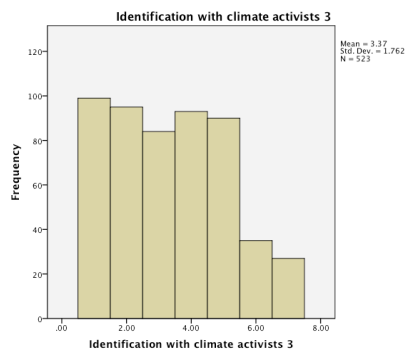
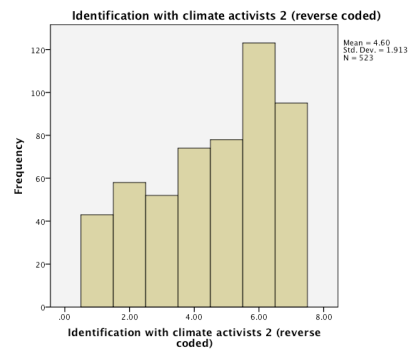
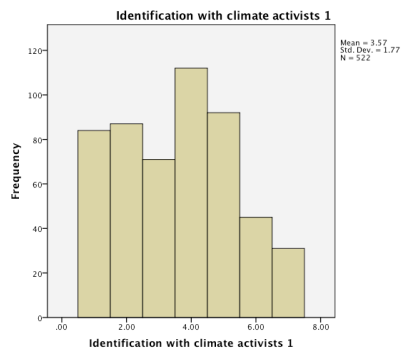
Perceived threat

How harmful do you think climate change is likely to be for...

1. You personally
2. Your family
3. People in your state
4. People elsewhere in the United States

Response options:

- 1-Not harmful at all
- 2
- 3
- 4-Moderately harmful
- 5
- 6
- 7-Extremely harmful



Collective identification with climate activists

1. I strongly identify with members of climate advocacy groups.
2. I do not see myself as a member of a group working for political action on climate change.
3. I feel strong ties with groups working to influence politicians' decisions on climate change.

Response options:

1-Strongly disagree

2

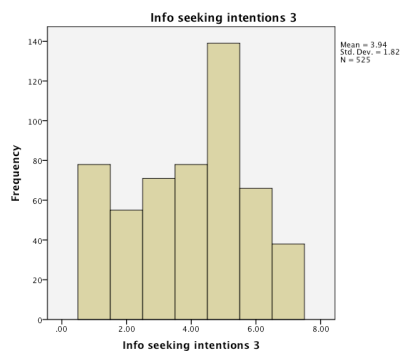
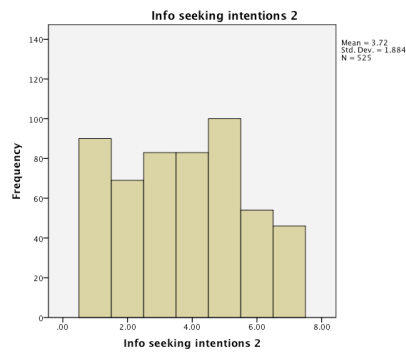
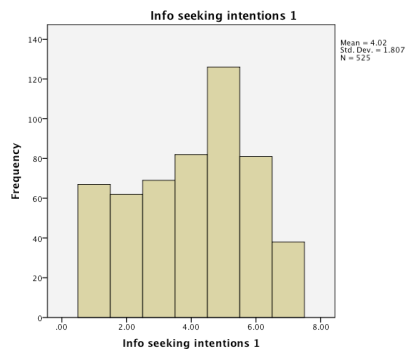
3

4-Neither agree nor disagree

5

6

7-Strongly agree



Information seeking intentions

1. I will try to seek information about climate change advocacy groups in the near future.
2. Within the next 30 days, I will seek information about which groups taking political action on climate change are most effective
3. Soon, I intend to find out more about groups acting to influence politicians' decisions on climate change.

Response options:

1-Strongly disagree

2

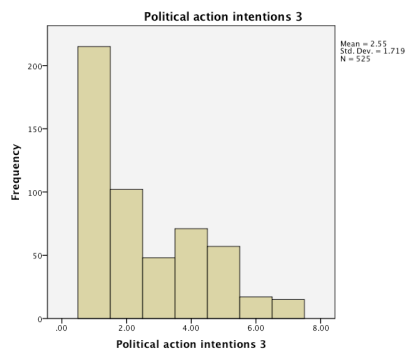
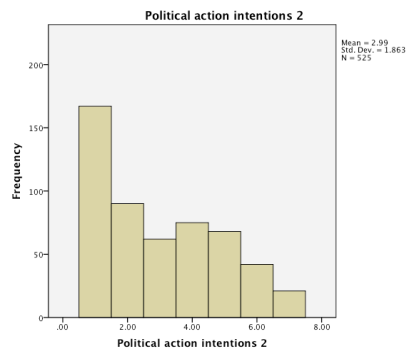
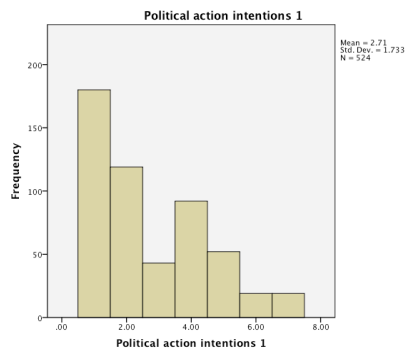
3

4-Neither agree nor disagree

5

6

7-Strongly agree



Political action intentions

1. Within the next 6 months, I intend to volunteer for an organization taking political action on climate change.
2. It is extremely likely that I will contribute to political action on climate change in the next 6 months.
3. At some point over the next 30 days, I will contribute money to an organization working to influence politicians' decisions on climate change.

Response options:

1-Strongly disagree

2

3

4-Neither agree nor disagree

5

6

7-Strongly agree

Appendix 9 – Initial CFAs from message experiment, plus diagrams of one-factor, two-factor and three-factor CFA models

CFA attempt 1

I first ran a CFA with the model shown in Figure 12.2. No numbers are shown due to problems with the model making the results invalid, as I explain below.

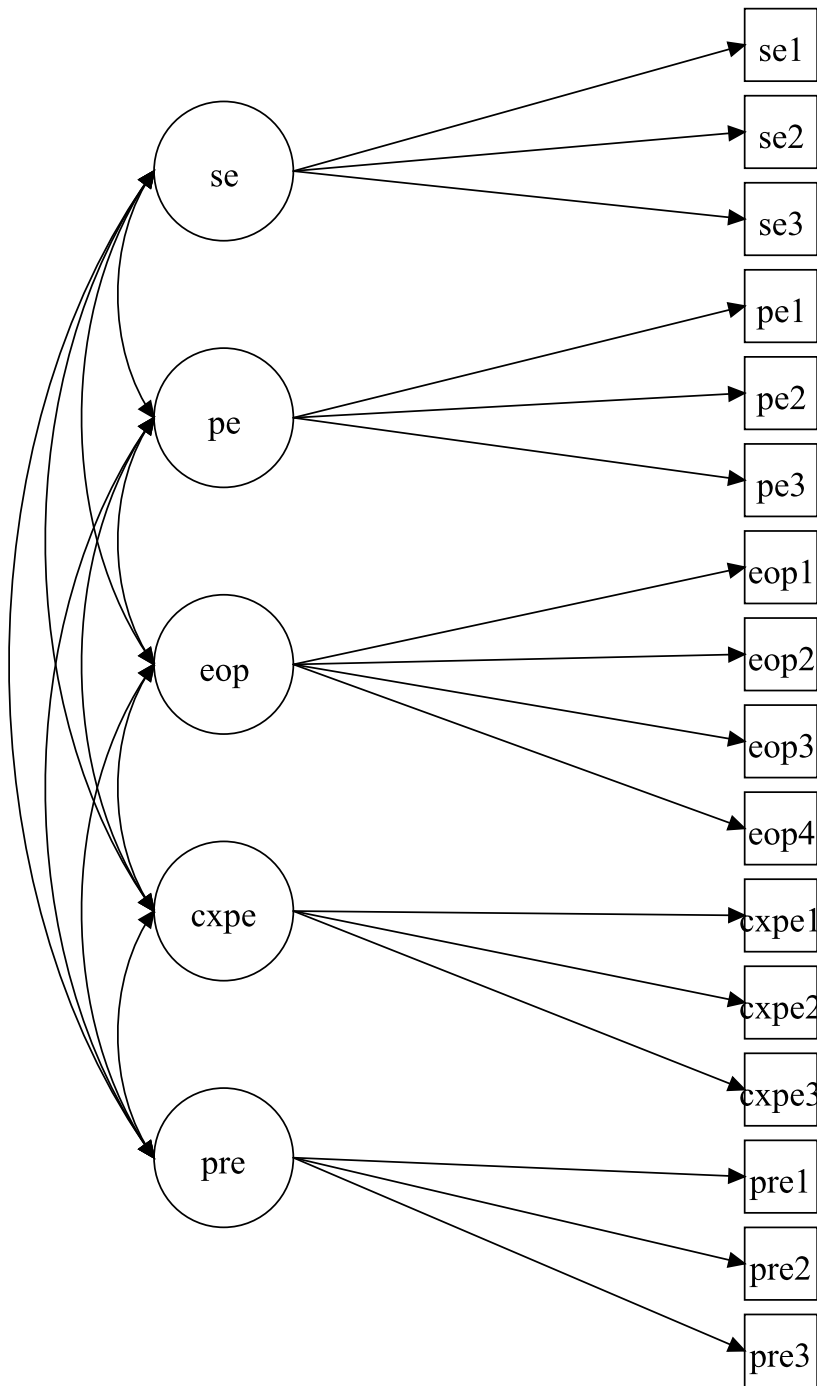


Figure 12.2. First attempted 5-factor confirmatory factor analysis of message experiment data.

Key to abbreviations: se=Self-efficacy. pe=Participative efficacy. eop=Expectation of others' participation. cxpe=Collective external political efficacy. pre=Policy response efficacy.

Results for this model showed that two items – EOP2 and PRE2 – had negative residual variances. These are displayed in Table 12.12.

Table 12.12. Residual variances from first message experiment CFA attempt.

	Residual variance	Std Error	p value
SE1	2.89	0.204	0
SE2	0.435	0.13	0.001
SE3	0.716	0.105	0
PE1	0.449	0.062	0
PE2	0.733	0.094	0
PE3	0.433	0.051	0
EOP1	1.381	0.112	0
EOP2	-0.259	0.225	0.249
EOP3	1.065	0.103	0
EOP4	0.945	0.141	0
CXPE1	0.417	0.048	0
CXPE2	0.406	0.102	0
CXPE3	0.467	0.059	0
PRE1	0.654	0.06	0
PRE2	-0.097	0.036	0.007
PRE3	0.785	0.081	0

EOP – Causes of negative residual variance

Residual variance in a latent variable indicator is the variance in responses to that particular item that is left unexplained when the influence of the latent variable is accounted for. It is calculated by subtracting the total observed variance in the indicator from the variance predicted to be explained by the estimated latent variable (Raykov & Marcoulides, 2012, p54). Normally, this variance is positive. However, latent variable estimation processes are often not restricted from estimating parameters in such a way as

to give impossible results. The model parameters that both fit the structural specification (one single latent variable causing variation in the indicators), and maximize likelihood of finding the observed data, will sometimes be impossible values (Fan, Thompson, & Wang, 1999).

It seems that the model that maximizes the likelihood of finding the observed data for EOP items could only do so by predicting a greater explanation of variance in one indicator (EOP2) than the variance that actually exists in EOP2. Normally, the variance explained is less than the variance observed, and when this lesser variance is subtracted from the total variance, a positive value remains. In this case, because the modeled explanation of variance is larger, when subtracted from the actual variance, the resulting residual value is negative.

In the present case, it appears that this occurs due to the implausibility of a single factor causing individuals' responses to EOP1, EOP2, EOP3 and EOP4. Rather than a generalized perceived likelihood of Americans taking political action on climate change, it appears more likely that people have different perceived likelihoods of different levels of participation – for example, perceived likelihood of small, moderate and large levels of participation. Modeling all these items as caused by a single latent variable thus seems inappropriate. For the purposes of the present study, it is theoretically justified to restrict the items used to the perceived likelihood of small levels of participation. These levels are more realistic, and much closer to levels of participation currently observed in the American public. Assuming there is any relationship between EOP and action,

expectations of smaller participation are likely to be a stronger influence, since there is more variation in these predictors.

I thus attempted to re-run the CFA with various combinations of the three items toward the lower end of the scale of expected participation – expectations that 1%, 10% and 50% of Americans would act politically on climate change. Unfortunately, attempting any combination of two or more EOP items tended to produce similar problems with negative residual variances. For this reason, I decided to use a single item rather than a latent variable to measure EOP, despite the increase in measurement error this would lead to. I decided to use EOP2, perceived likelihood that 10% of Americans would act politically. This item was most normally distributed, had the highest variance, and seemed potentially most substantively relevant to individuals' decisions to participate in collective action.

CFA attempt 2

For the next CFA, I replaced the EOP latent variable with the EOP2, and modeled this item as correlated with all the latent variables for the other efficacy beliefs. Unfortunately, this model also included negative residual variances, as shown in Table 12.13.

Table 12.13. Residual variances from second message experiment CFA attempt.

	Estimate	Std Error	p value
SE1	2.889	0.204	0
SE2	0.436	0.13	0.001
SE3	0.715	0.105	0
PE1	0.449	0.062	0
PE2	0.732	0.094	0
PE3	0.433	0.051	0
CXPE1	0.417	0.048	0
CXPE2	0.406	0.102	0
CXPE3	0.468	0.059	0
PRE1	0.654	0.06	0
PRE2	-0.097	0.036	0.007
PRE3	0.784	0.081	0

PRE – Causes of negative residual variance

The residual variance for the second PRE item, PRE2, is again negative, although this variance is relatively small (-0.097). Sometimes, when the true value of a residual variance is close to zero, sampling fluctuation can cause the estimated value to be slightly negative (Cortina, 2002). In these cases, an acceptable solution to the problem is to change the model to restrict the residual variance to zero (Cortina, 2002). However, this is not an appealing solution in the present case. Substantively, the true residual variance being zero would imply that the latent PRE variable was synonymous with perceived effectiveness of state-level policy. If the latent variable perfectly predicts responses to PRE2, the item for state-level policy, this means that the latent variable essentially *is* the perception of state-level policy effectiveness. For the purposes of the present analysis, the goal is to measure perceived effectiveness of government policy more generally. This is because a more general efficacy perception should provide estimates of the efficacy-

action relationship that generalize to a wide variety of types of political action, rather than just state-level action (Bandura, 1997).

For this reason, I did not solve the problem of negative residual variance by fixing it to zero. Instead, I eliminated the PRE2 item from the model, and used a latent variable based on the federal-level (PRE1) and local-level (PRE3) policy items. Choosing these two items had the desirable effect of making the latent variable measure perceived effectiveness of a wider range of categories of government policy effectiveness. As shown below, it also eliminated the problem of negative residual variances.

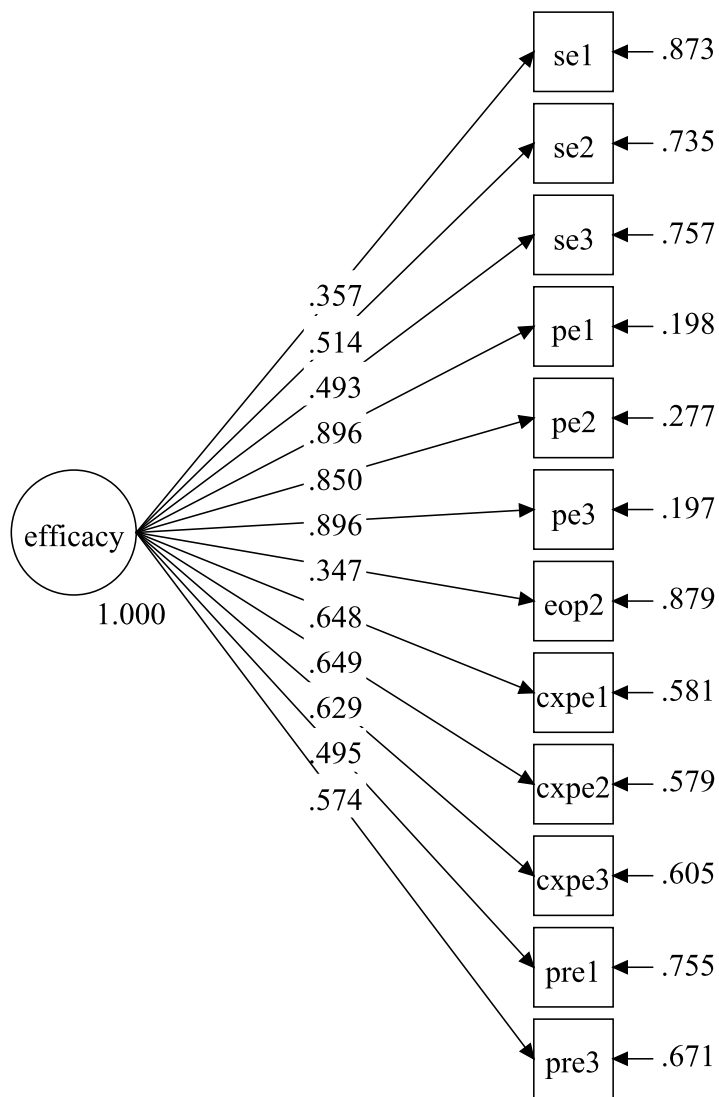


Figure 12.3. One-factor confirmatory factor analysis of message experiment data.

Key to abbreviations: se=Self-efficacy. pe=Participative efficacy.

eop=Expectations of others' participation. cxpe=Collective external political efficacy.

pre=Policy response efficacy.

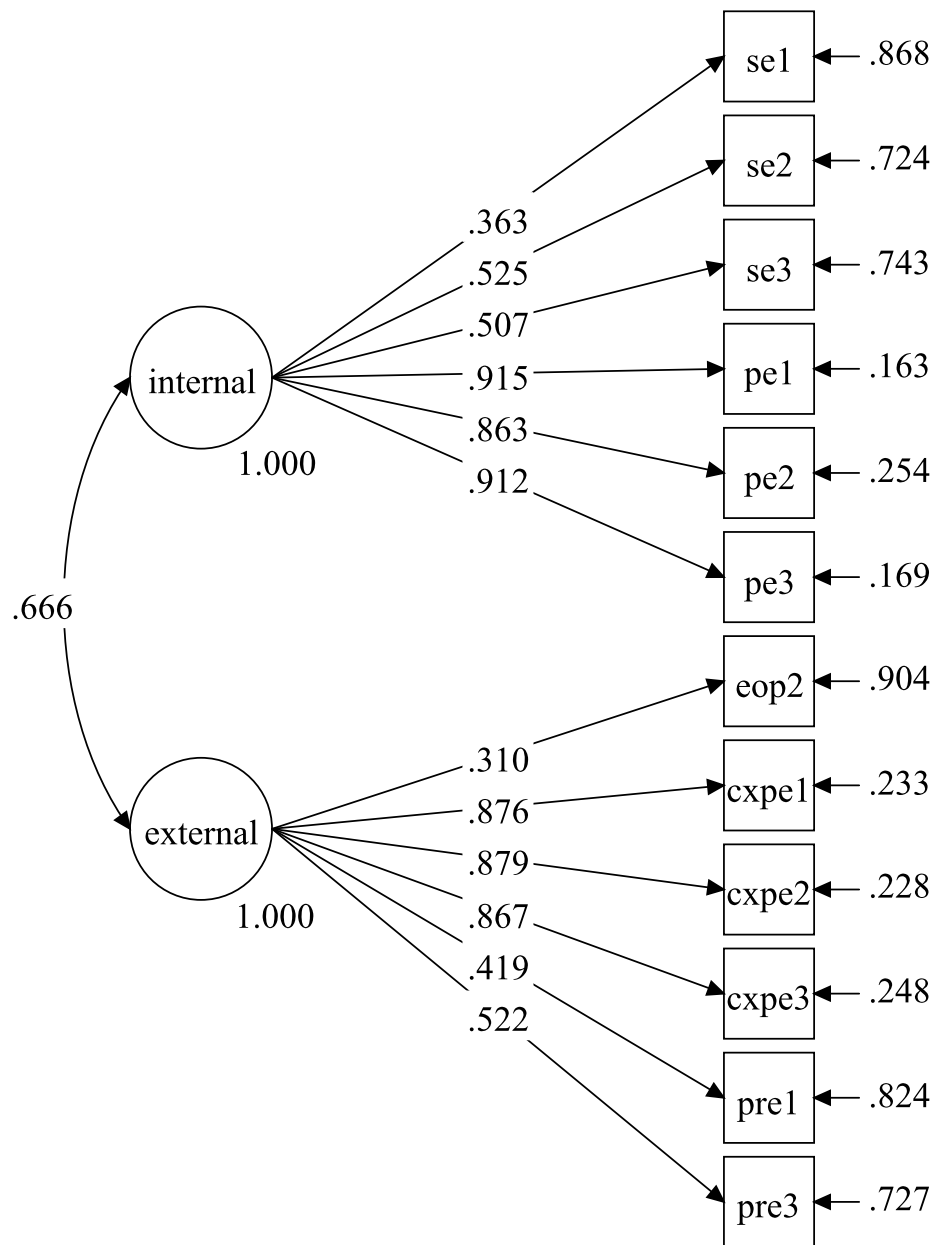


Figure 12.4. Two-factor confirmatory factor analysis of message experiment data.

Key to abbreviations: se=Self-efficacy. pe=Participative efficacy.
eop=Expectations of others' participation. cxpe=Collective external political efficacy.
pre=Policy response efficacy.

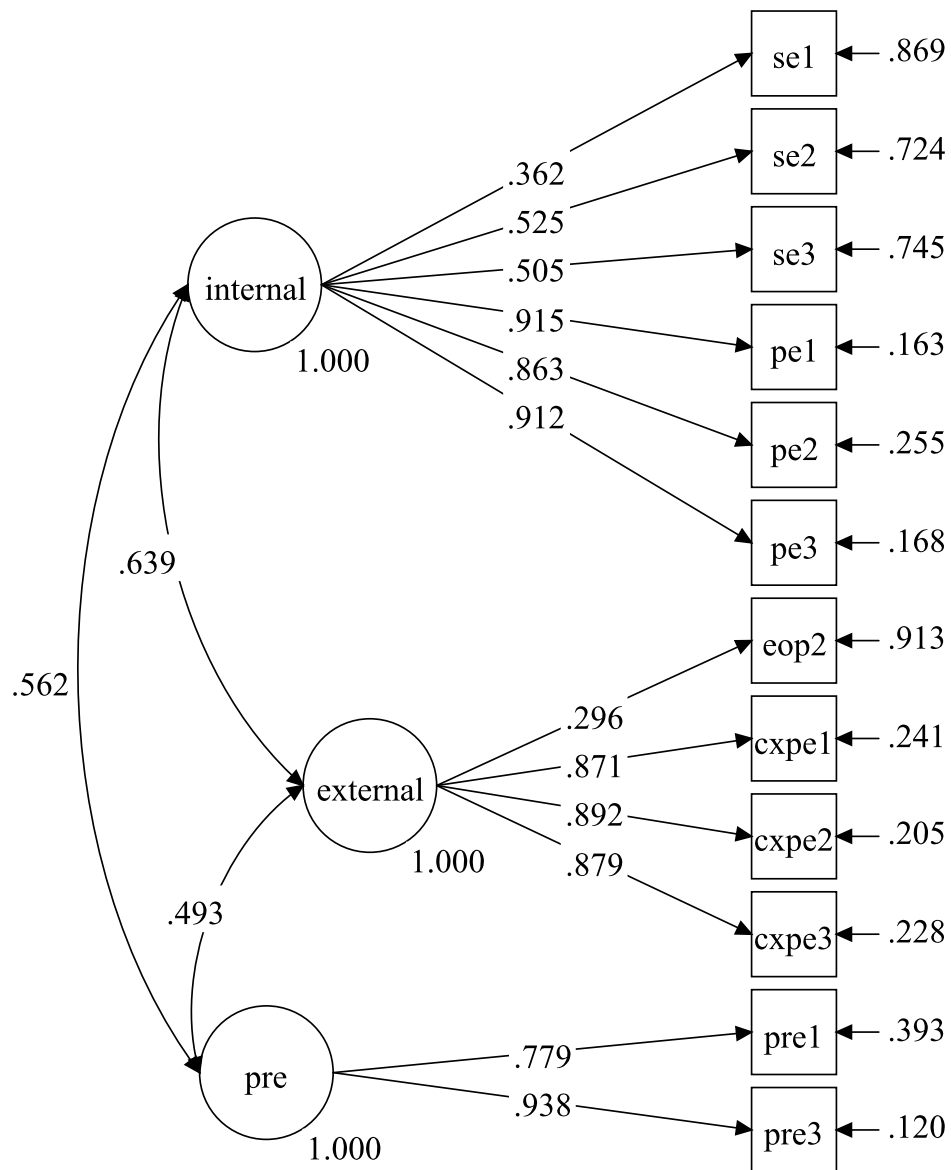


Figure 12.5. Three-factor confirmatory factor analysis of message experiment data.

Key to abbreviations: se=Self-efficacy. pe=Participative efficacy.

eop=Expectations of others' participation. cxpe=Collective external political efficacy.

pre=Policy response efficacy.

Appendix 10 – Full list of indirect effects and total effects of messages

Table 12.14. Bootstrap confidence intervals for effects of PE message on information seeking intentions.

		95% CI	90% CI	Estimate	90% CI	95% CI
		lower limit	lower limit		upper limit	upper limit
Total effect		-.01	.03	.24	.48	.51
Total indirect effect		-.15	-.12	.04	.22	.25
Specific indirect effects	SE	-.01	-.01	.000	.02	.02
	PE	-.01	-.01	.02	.08	.09
	EOP2	-.02	-.01	.000	.01	.01
	CXPE	-.01	-.01	.01	.05	.06
	PRE	-.04	-.03	-.004	.01	.01
	threat	-.01	-.01	.01	.03	.03
	Coll. ID	-.13	-.10	.02	.15	.17
Direct effect		.04	.07	.20	.35	.37

Table 12.15. Bootstrap confidence intervals for effects of CXPE message on information seeking intentions.

		95% CI	90% CI	Estimate	90% CI	95% CI
		lower limit	lower limit		upper limit	upper limit
Total effect		.19	.23	.44	.67	.72
Total indirect effect		-.07	-.03	.15	.33	.37
Specific indirect effects	SE	-.01	-.003	.003	.03	.04
	PE	-.02	-.01	.01	.07	.08
	EOP2	-.02	-.01	.000	.02	.02
	CXPE	-.01	-.001	.02	.07	.08
	PRE	-.01	-.003	.01	.04	.05
	threat	-.01	-.004	.01	.03	.04
	Coll. ID	-.06	-.03	.10	.23	.27
Direct effect		.12	.15	.29	.44	.46

Table 12.16. Bootstrap confidence intervals for effects of PRE message on information seeking intentions.

		95% CI	90% CI	Estimate	90% CI	95% CI
		lower limit	lower limit		upper limit	upper limit
Total effect		.04	.07	.28	.51	.55
Total indirect effect		-.08	-.04	.11	.28	.31
Specific indirect effects	SE	-.04	-.03	-.002	.003	.01
	PE	-.04	-.03	.002	.04	.05
	EOP2	-.01	-.01	.000	.01	.01
	CXPE	-.01	-.004	.01	.05	.06
	PRE	-.01	-.004	.01	.05	.05
	threat	-.004	-.001	.01	.04	.04
	Coll. ID	-.05	-.03	.09	.21	.25
Direct effect		.002	.03	.17	.31	.35

Table 12.17. Bootstrap confidence intervals for effects of PE message on political action intentions.

		95% CI	90% CI	Estimate	90% CI	95% CI
		lower limit	lower limit		upper limit	upper limit
Total effect		-.03	.000	.22	.44	.48
Total indirect effect		-.13	-.10	.06	.24	.27
Specific indirect effects	SE	-.03	-.02	.001	.03	.04
	PE	-.03	-.02	.03	.10	.12
	EOP2	-.01	-.01	.000	.01	.01
	CXPE	-.04	-.03	-.002	.004	.01
	PRE	-.01	-.01	.01	.04	.05
	threat	-.01	-.003	.002	.02	.02
	Coll. ID	-.13	-.10	.02	.14	.17
Direct effect		-.02	.02	.17	.32	.35

Table 12.18. Bootstrap confidence intervals for effects of CXPE message on political action intentions.

		95% CI	90% CI	Estimate	90% CI	95% CI
		lower limit	lower limit		upper limit	upper limit
Total effect		.09	.12	.35	.58	.61
Total indirect effect		-.10	-.06	.12	.29	.33
Specific indirect effects	SE	-.02	-.01	.01	.04	.05
	PE	-.04	-.03	.02	.09	.10
	EOP2	-.01	-.01	.002	.02	.02
	CXPE	-.05	-.04	-.01	.01	.02
	PRE	-.06	-.05	-.01	.002	.01
	threat	-.01	-.003	.003	.02	.03
	Coll. ID	-.05	-.03	.10	.23	.26
Direct effect		.06	.09	.23	.39	.42

Table 12.19. Bootstrap confidence intervals for effects of PRE message on political action intentions.

		95% CI	90% CI	Estimate	90% CI	95% CI
		lower limit	lower limit		upper limit	upper limit
Total effect		-.01	.03	.25	.48	.52
Total indirect effect		-.13	-.09	.06	.24	.26
Specific indirect effects	SE	-.05	-.04	-.01	.02	.02
	PE	-.07	-.05	.003	.06	.07
	EOP2	-.01	-.01	.000	.01	.01
	CXPE	-.04	-.03	-.003	.003	.01
	PRE	-.07	-.06	-.02	.000	.003
	threat	-.004	-.002	.004	.03	.03
	Coll. ID	-.05	-.03	.08	.21	.23
Direct effect		.03	.05	.18	.32	.35

Table 12.20. Bootstrap confidence intervals for effects of PE message on email-address-leaving.

		95% CI	90% CI	Estimate	90% CI	95% CI
		lower limit	lower limit		upper limit	upper limit
Total effect		-.47	-.43	-.13	.19	.26
Total indirect effect		-.13	-.12	-.01	.12	.14
Specific indirect effects	SE	-.02	-.02	.001	.03	.05
	PE	-.02	-.01	.01	.08	.09
	EOP2	-.02	-.01	.000	.02	.02
	CXPE	-.10	-.08	-.01	.004	.01
	PRE	-.10	-.08	-.02	.02	.03
	threat	-.01	-.01	.004	.04	.05
	Coll. ID	-.06	-.05	.01	.08	.10
Direct effect		-.45	-.39	-.12	.19	.25

Table 12.21. Bootstrap confidence intervals for effects of CXPE message on email-address-leaving.

		95% CI	90% CI	Estimate	90% CI	95% CI
		lower limit	lower limit		upper limit	upper limit
Total effect		-.08	-.03	.25	.55	.61
Total indirect effect		-.08	-.05	.07	.18	.21
Specific indirect effects	SE	-.01	-.01	.01	.06	.07
	PE	-.02	-.01	.01	.07	.08
	EOP2	-.04	-.03	-.001	.02	.02
	CXPE	-.13	-.11	-.02	.01	.02
	PRE	-.01	-.01	.03	.11	.13
	threat	-.01	-.01	.01	.05	.06
	Coll. ID	-.02	-.01	.05	.13	.15
Direct effect		-.15	-.10	.18	.45	.50

Table 12.22. Bootstrap confidence intervals for effects of PRE message on email-address-leaving.

		95% CI	90% CI		90% CI	95% CI
		lower limit	lower limit	Estimate	upper limit	upper limit
Total effect		-.49	-.40	-.10	.22	.30
Total indirect effect		-.06	-.04	.08	.20	.21
Specific indirect effects	SE	-.06	-.05	-.01	.01	.02
	PE	-.03	-.02	.001	.04	.05
	EOP2	-.02	-.02	.000	.01	.02
	CXPE	-.11	-.07	-.01	.01	.01
	PRE	-.01	.001	.04	.12	.15
	threat	-.01	-.004	.01	.06	.06
	Coll. ID	-.02	-.01	.04	.14	.15
Direct effect		-.54	-.48	-.18	.10	.16

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