REDUCING RESISTANCE TO COMMUNICATION ABOUT CLIMATE CHANGE
USING AN APPLIED SELF-AFFIRMATION INTERVENTION

by

John Kotcher
A Dissertation
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DEDICATION

This is dedicated to the two greatest sources of joy in my life: my loving wife Karin, and my wonderful daughter Akiko.

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I owe a great debt of gratitude to a number of amazing people who were instrumental in making this happen. First of all, I want to thank my dissertation advisor, Ed Maibach. Ed, you have been an incredible mentor, role model, and champion for me from the moment I began contemplating a return to graduate school. I look forward to continuing our relationship for years to come. I'd also like to thank my committee members, Xiaoquan Zhao, Emily Vraga, and Chris Clarke. Aside from your excellent feedback, each of you has played a special role in shaping me into the scholar I am today.

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ABSTRACT

REDUCING RESISTANCE TO COMMUNICATION ABOUT CLIMATE CHANGE
USING AN APPLIED SELF-AFFIRMATION INTERVENTION

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Self-affirmation is a psychological process in which individuals draw upon important aspects of their self-concept to maintain a positive evaluation of themselves. Previous work has found that self-affirmation can reduce biased processing of information that conflicts with individuals' prior beliefs or political ideology. However, little research has examined the effect of self-affirmation in the domain of climate change communication.

Furthermore, much of the existing literature has relied upon methods of inducing self-affirmation that are highly contrived and not easily transferrable to applied public engagement efforts (e.g., having participants write an essay for several minutes before reading a message). Previous work suggests that self-affirmation works in part by activating a number of cognitions and emotions associated with close interpersonal relationships. Specifically, prior evidence suggests that self-affirmation increases feelings

of 1) love, 2) connectedness, and 3) social belongingness; and 4) increases the importance attached to aspects of an individual's identity tied to their role in close interpersonal relationships (e.g., as a friend or family member) relative to the threatened aspects of their identity (e.g., their political identity). Therefore, one goal of this dissertation was to test a novel method of inducing self-affirmation embedded directly into the content of a message by prompting individuals to think about the importance of these interpersonal relationships and what they would do to protect their friends and family members from a threat like climate change. I conducted a randomized, controlled experiment to compare this applied form of self-affirmation to traditional methods of inducing self-affirmation in terms of its ability to reduce ideologically motivated resistance to information about climate change. Additionally, I investigated whether this new method of self-affirmation operates through a similar psychological mechanism compared to traditional methods of self-affirmation by examining the aforementioned variables that may mediate the effect of self-affirmation on attitudes about climate change.

Contrary to expectations, I found that the traditional method of self-affirmation, the applied method of self-affirmation, as well as the combination of the two have an undesirable direct effect on multiple climate change beliefs and attitudes. However, consistent with expectations, mediation analysis reveals that the traditional and applied forms of self-affirmation (as well as the combination of the two) have a relatively smaller, but desirable indirect effect on a number of climate change beliefs and attitudes. These indirect effects operate through changes in the importance people attach to aspects

of their identity tied to their role in interpersonal relationships relative to their political identity, as well as increased feelings of love and connectedness, but not through social belongingness. This pattern of effects was consistent across ideological groups, including political liberals, moderates, and conservatives. Implications for theory and practice are discussed.

CHAPTER ONE - INTRODUCTION

Based upon the best available scientific evidence, human-caused climate change
is already having wide-ranging disruptive effects on people and ecosystems and, if left
unchecked, continued emissions of greenhouse gases are expected to have, "severe,
pervasive, and irreversible impacts," in the future (IPCC, 2014, p. 56; U.S. Global
Change Research Program, 2014). In recent years, social scientists from various
disciplines have made an effort to articulate how their expertise can facilitate societal
action to address the threat of climate change (Dunlap & Brulle, 2015; Swim et al.,
2011). Early contributions in this area focused on the role of shifting individual
household behavior to reduce greenhouse gas emissions (e.g., Dietz, Gardner, Gilligan,
Stern, & Vandenbergh, 2009). However, others have argued that changes in voluntary,
individual behavior are insufficient, and that in order to decarbonize society fast enough
to avoid the greatest impacts of climate change, social scientists should focus on building
political will for large-scale governmental action (Ockwell, Whitmarsh, & O'Neill,
2009).

A significant barrier to government action in the United States is the current state
of polarization in American politics (Persily, 2015). The term "polarization" can mean
many different things, however. Persily (2015, p. 4) argues that three separate but
interacting phenomena are useful in defining political polarization, "The first is

ideological convergence within parties and divergence between parties – what we might call "hyperpartisanship." The second, often characterized as "gridlock," refers to the inability of the system to perform basic policy-making functions due to obstructionist tactics. Third, when we speak of polarization we often mean something beyond government dysfunction: a larger cultural phenomenon of "incivility," namely the erosion of norms that historically constrained the discourse and actions of political actors or the mass public." These three types of political polarization apply to politics generally; however, the present study focuses on testing a communication intervention designed to help address political polarization on a single issue: climate change (McCright & Dunlap, 2011b). Consistent with prior research on attitude polarization (e.g., Lord, Ross, & Lepper, 1979; Taber & Lodge, 2006), this political polarization can be defined as the divergence of attitudes and beliefs about a specific policy issue between ideological and partisan orientations.

In the United States, political conservatives and Republicans tend to be more skeptical about the scientific evidence behind climate change, and less supportive of steps to reduce the threat of climate change (Dunlap & McCright, 2008; Hamilton, 2011; McCright & Dunlap, 2011a, 2011b). A large number of factors are believed to have contributed to ideological polarization on climate change over the years, including falsely balanced reporting of the scientific evidence (Boykoff & Boykoff, 2004, 2007; Nisbet, 2011), more dismissive coverage of the issue at conservative-leaning media outlets (Feldman, Maibach, Roser-Renouf, & Leiserowitz, 2012; Hmielowski, Feldman, Myers, Leiserowitz, & Maibach, 2013), selective attention to attitudinally reinforcing coverage

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of climate change (Feldman, Myers, Hmielowski, & Leiserowitz, 2014; Zhao, 2009), polarizing elite cues from elected officials (Brulle, Carmichael, & Jenkins, 2012), active attempts by the fossil fuel industry to sow doubt about the validity of climate science (Dunlap & McCright, 2011; Oreskes & Conway, 2010), ineffective communication by the scientific community (Maibach, Myers, & Leiserowitz, 2014; Nisbet, 2009), and constraints in human psychology in the form of biased processing of information about climate change when it conflicts with one's prior beliefs, worldview, ideology, and/or political party identification (Hart & Nisbet, 2012; Hart, Nisbet, & Myers, 2015; Kahan et al., 2012; Nisbet, Cooper, & Garrett, 2015).

The study presented here primarily concentrates on this last contributor to polarization by testing an intervention to reduce ideologically biased processing of information about climate change. Interest in methods of correcting misinformation and debiasing appears to have increased in recent years, with special issues at prominent journals (Southwell & Thorson, 2015; Suhay & Druckman, 2015) and reviews of the existing literature on debiasing techniques (Lewandowsky, Ecker, Seifert, Schwarz, & Cook, 2012). In the area of climate change communication, research in this vein has primarily included an emphasis on scientific consensus messaging (e.g., van der Linden, Leiserowitz, Feinberg, & Maibach, 2014, 2015) and reframing climate change as a public health issue (e.g., Myers, Nisbet, Maibach, & Leiserowitz, 2012; Petrovic, Madrigano, & Zaval, 2014). However, a rich literature has shown that the psychological process of affirming one's self-integrity—called self-affirmation—can have debiasing effects that lead to greater acceptance of persuasive messages and changes in behavior (Epton,

Harris, Kane, van Koningsbruggen, & Sheeran, 2015; Sweeney & Moyer, 2015). The potential of this approach has only begun to be explored for the purpose of climate change communication (Sparks, Jessop, Chapman, & Holmes, 2010; van Prooijen & Sparks, 2013; van Prooijen, Sparks, & Jessop, 2013).

In general, little attention has been devoted to translating the findings from laboratory research on self-affirmation into practically-relevant methods that can be incorporated into applied public engagement efforts (Armitage, Harris, & Arden, 2011; Jessop, Simmonds, & Sparks, 2009). Therefore, one goal of this dissertation is to test a novel form of self-affirmation that, if shown to be effective, can be used in climate change communication. An additional goal is to build upon past research by exploring possible mediating variables that explain the effects of self-affirmation on persuasion (Critcher & Dunning, 2015; Crocker, Niiya, & Mischkowski, 2008; Shnabel, Purdie-Vaughns, Cook, Garcia, & Cohen, 2013). In the sections below, I review past research and explicate the concept of self-affirmation, and advance an argument for a new method of self-affirmation designed to be embedded directly into messages about climate change.

CHAPTER TWO - LITERATURE REVIEW

Conceptual Analysis of Self-Affirmation

Self-affirmation theory grew out of a critique of traditional theories of cognitive consistency, most notably the theory of cognitive dissonance (Festinger, 1957; Steele, 1988). In the classic version of cognitive dissonance theory, when individuals hold two or more cognitions that are in opposition (i.e. dissonant), it induces a form of psychological discomfort that individuals will be motivated to reduce. Festinger (1957) proposed that this dissonance could be reduced by 1) adding more consonant cognitive elements, 2) reducing the number of dissonant elements, or 3) by reducing the importance attached to the dissonant elements. For example, the heavy smoker who is confronted with information about the link between smoking and lung cancer may reduce the dissonant cognition that their behavior is a threat to their own health by adding cognitions that are consonant with their behavior (e.g. "smoking is cool", "smoking relaxes me"), attempting to remove the dissonant cognition by counter-arguing against it (e.g., "the science behind the smoking-lung cancer link is faulty"), reducing the importance attached to the dissonant cognition (e.g., "that may be true, but I'll probably die of something else before lung cancer gets me"), or finally, they may change their behavior to be more consistent with the threatening information (e.g., quitting smoking).

While the above routes to reducing cognitive dissonance all pertain to resolving the inconsistency between the domain-specific cognitive elements related to smoking,

self-affirmation theory proposes an alternative method by which individuals reduce the psychological discomfort associated with cognitive inconsistency. Steele (1988) argued that rather than being motivated by a drive to reduce the inconsistency, individuals are driven by a deeper motivation to maintain their self-integrity, a view of themselves as "adaptively and morally adequate, that is, as competent, good, coherent, unitary, stable, capable of free choice, capable of controlling important outcomes, and so on" (Steele, 1988, p. 262). In other words, the reason that individuals attempt to reduce the psychological discomfort associated with the information about smoking and lung cancer is not because of the inconsistency itself, but because the statement poses a threat to their global perception of self-integrity and implies that they are incapable of controlling this important behavior. From this perspective, any act that reestablishes one's sense of self-integrity should reduce the discomfort associated with cognitive dissonance without necessarily resolving the inconsistency posed by the threatening information. That is, an individual may engage in some other action that is not specific to the domain of smoking to restore their perception that they are a morally and adaptively adequate person. They may instead spend some time volunteering at the local homeless shelter, which might help reduce the psychological discomfort, but in no way resolve the inconsistency between heavy smoking and knowledge of its harmful effects to one's health. As Steele (1988) argues, the reason that early studies of cognitive dissonance viewed a motive to reduce the inconsistency as the primary force driving dissonance reduction is simply because this was the only means by which experimental participants were given an opportunity to reduce the psychological discomfort. This same critique applies to other

theories that attempt to explain individual responses to self-threats such as the theory of reactance (Brehm, 1966). Steele (1988) argues that the reason early studies of reactance observed boomerang effects was because study participants were unable to restore their global sense of self-integrity via other domains and hence reduced the self-threat by reasserting their perceived freedom of control over their own thoughts and actions.

Due to the nature of the literature on self-affirmation, precise conceptual definitions of exactly what self-affirmation is have been somewhat elusive. Much of the research on the topic has focused on examining the effects of experimental manipulations that activate self-affirmation with relatively little attention to mediating variables that explain the mechanism behind self-affirmation (Critcher & Dunning, 2015; McQueen & Klein, 2006). Cohen and Sherman (2014, p. 337) define self-affirmation as "an act that demonstrates one's adequacy" implicitly making reference to Steele's concept of self-integrity described above as "adaptively and morally adequate, that is, as competent, good, coherent, unitary, stable, capable of free choice, capable of controlling important outcomes, and so on" (Steele, 1988, p. 262). Another prominent review of the literature explicitly acknowledged that the concept of self-affirmation as a process has yet to be clearly defined due to a lack of empirical evidence about mediating variables, but provisionally offered the definition that self-affirmation is "the active affirmation of some important aspect of one's self-concept that is unrelated to a self-threat," (McQueen & Klein, 2006, p. 300). McQueen and Klein's (2006) definition implies that self-affirmation is initiated in response to a threat to one's self-concept, however this is not always the case and it is also conceivable that individuals spontaneously engage in cognitions or

behaviors that can be self-affirming even in the absence of threat, without any deliberate intention to bolster or maintain one's self-integrity (Pietersma & Dijkstra, 2012). For example, experimental work has induced self-affirmation in participants in the absence of a threat (van Prooijen et al., 2013), and other studies have showed that routine behaviors such as browsing one's Facebook profile or purchasing high-status goods can have self-affirming effects (Sivanathan & Pettit, 2010; Toma & Hancock, 2013), presumably even if they are conducted in the absence of a preceding threatening stimulus.

Despite this current limitation in the literature, it is clear that even scholars who fail to explicitly define self-affirmation as a process implicitly believe that it results in a cascade of psychological consequences which ultimately serve to maintain one's sense of self-integrity (Cohen & Sherman, 2014; McQueen & Klein, 2006; Steele, 1988). From this perspective, self-affirmation can be defined as a psychological process that is typically initiated by a discrete thought or act that ultimately restores or maintains an individual's perception of global self-integrity. Here, self-integrity refers to Steele's original concept (Steele, 1988), and the modifier "global" is simply meant to convey that it is a general evaluation of the self rather than one specific to a single domain. Therefore, it is a property of a person, experienced at an individual-level of analysis that varies across time and across individuals. As mentioned above, self-affirmation tends to be an experimentally manipulated variable rather than one that is observed and measured (McQueen & Klein, 2006). Therefore, the experimental task that activates self-affirmation is typically treated as a binary categorical variable (i.e. affirmed or not affirmed), however this does not imply that all self-affirming acts are equally effective at

restoring one's sense of self-integrity. Although it is difficult to observe and measure self-affirmation acts in situ because they can manifest themselves spontaneously and in myriad ways (Steele, 1988), scholars have developed a survey scale that taps into the dispositional propensity to self-affirm that varies across individuals (Pietersma & Dijkstra, 2012).

Given that self-affirmation largely focuses on self-evaluation, it has been suggested that self-affirmation is simply one more psychological strategy that individuals employ in order to maintain their self-esteem (Tesser, 2000). Self-esteem has a long history of study in the social sciences, but at its most basic level it has been defined as "the positivity of the person's evaluation of the self" (Baumeister, 1998, p. 694). Initially, Steele (1988) did not explicitly address the similarities and differences between his concept of self-integrity and self-esteem in his original articulation of self-affirmation theory. However, in a later article, Steele et al. (1993) argued that self-esteem is not an outcome of self-affirmation, but rather he conceptualized self-esteem as a stable trait that moderates self-affirmation because individuals high in self-esteem have a greater number of positive self-images stored in their memory that they can access to restore and maintain their global self-integrity, compared to individuals low in self-esteem. Furthermore, a review of the self-affirmation literature (McQueen & Klein, 2006) found that of the five studies that had examined self-esteem as an outcome of self-affirmation, only one found a positive effect of self-affirmation on self-esteem (Koole, Smeets, van Knippenberg, & Dijksterhuis, 1999). McQueen and Klein (2006, p. 300) speculate that these findings may result because "according to Steele (1988), self-affirmation strategies

are used to reduce the self-threat by maintaining or restoring an overall positive sense of self, so perhaps no substantive change in global self-esteem should be evident."

Some have similarly argued that the motive to maintain self-integrity via self-affirmation should more appropriately be thought of as part of the concept of self-enhancement, defined as a "an observed effect, an ongoing process, a personality trait, and an underlying motive," that involves "taking a tendentiously favorable view of oneself," (Sedikides & Gregg, 2008, pp. 102–103). Sedikides and Gregg (2008) further explain that individuals can "self-enhance either by self-advancing or self-protecting—that is, either by augmenting the positivity or diminishing the negativity of the self-concept or self-regard". Despite some conceptual similarities in terms self-enhancement's focus on boosting the positivity of self-evaluations, Cohen and Sherman (2014, p. 336) argue that three key points are important to understanding and differentiating the motive to maintain self-integrity. First, they argue self-integrity is, "a global narrative of oneself as a moral and adaptive actor ("I am a good person"), not a specific self-concept (e.g., "I am a good student")." Second, "the motive for self-integrity is not to be superior or excellent, but to be "good enough," as the term "adequate" implies—to be competent enough in a constellation of domains to feel that one is a good person, moral and adaptive." Third, "the motive for self-integrity is not to esteem or praise oneself but rather to act in ways worthy of esteem or praise." McQueen and Klein (2006, p. 300) take a similar perspective that self-affirmation is different from unbridled self-enhancement arguing that, "Self-affirmation [theory] posits that individuals draw on unthreatened, but

important aspects of their self-concept to maintain rather than maximize positive self-worth."

Despite decades of research, scholars have only recently begun to elucidate the process by which self-affirming acts exert their effects. Sherman and Hartson (2011) proposed that self-affirmation works by first expanding the scope of the working self-concept—the salient cognitive representation of the self (Markus & Wurf, 1987)—to include other important, valued aspects of one's overall self-concept stored in memory, that are unrelated to the threatened domain. This expansion of the working self-concept provides an individual with a greater perspective on their overall self-integrity relative to the threatened domain, such that the motivation to directly defend the threatened domain is attenuated. In a series of three experiments, an initial empirical test found support for this mechanistic account of self-affirmation, and ruled out an alternative explanation that self-affirmation works by causing individuals to trivialize the threatened domain—that is, by merely seeing it as less important (Critcher & Dunning, 2015). Using survey measures of the two aforementioned mediators, Critcher & Dunning (2015) found evidence that increased perspective on one's self-concept—but not trivialization of the threatened domain—statistically mediated the effect of self-affirmation on (reducing) defensiveness toward negative feedback on a personality assessment. Next, Critcher & Dunning (2015) conducted a follow up experiment that had individuals engage in an exercise designed to directly manipulate one's perspective on their working self-concept by prompting them to reflect upon the relative importance of their academic identity (the threatened domain) compared to the most important and least important aspects of their identity (e.g. athletic

achievement). The perspective exercise resulted in reduced defensiveness to negative feedback about their academic performance equivalent to both a standard self-affirmation manipulation in which participants write an essay about a value that is important to them, as well as a condition in which participants engaged in both the perspective exercise and the standard self-affirmation manipulation (Critcher & Dunning, 2015).

Another possibility is that self-affirmation may work by activating cognitions about important relationships with others, specifically by prompting positive other-directed feelings (Crocker et al., 2008), and a sense of social belonging (Shnabel et al., 2013). Crocker et al. (2008) hypothesized that self-affirmation prompts individuals to "transcend concerns about self-image or self-worth" by reminding "people what they care about beyond themselves" particularly when they write about valued relationships in their essay, a topic that was found to be the most prevalent topic written about in self-affirmation essays in one study (Creswell et al., 2007). They found that other-directed positive feelings of love and feeling connected were rated higher in response to self-affirmation than self-directed positive feelings such as feeling proud, strong, or admirable. Additionally, only feelings of love and feeling connected mediated the effect of self-affirmation on increased acceptance of a persuasive message among smokers (Crocker et al., 2008).

In a related finding, Shnabel et al. (2013) conducted content analyses of students' self-affirmation essays to examine whether writing about themes of social belonging are responsible for self-affirmation's effects in the domain of academic performance among minority students. Specifically, the authors believe self-affirmation has beneficial effects

on academic performance because it reduces the deleterious effects of stereotype threat experienced by some minority students (i.e., the perceived expectation that they will do worse academically because they come from a minority background). They operationalized social belonging as "explicitly mentioning in an essay that (a) one values an activity because it is done with others (e.g., "Athletics is important to me because I like to work out with my brother"), or (b) one feels part of a group of people because of a certain value or while engaging in a certain activity (e.g., "I feel part of a team when I play music with my band"), or (c) any related thoughts on the subject of one's social belonging, such as being affiliated with or liked by others (e.g., "Friends and family are important to me because they are always there for me")," (Shnabel et al., 2013, p. 667). The authors found that writing about social belonging in essays significantly mediated the effect of the self-affirmation on grade point average among minority students, and that when specifically prompted to write about social belonging in a follow up study, the effect of the social belonging self-affirmation on GPA was even greater compared to a standard self-affirmation. Shnabel et al. (2013), argue that the reason self-affirmation may be particularly effective when individuals write about social belongingness is because fitting into social groups is a fundamental human motive central to feelings of adequacy (Baumeister & Leary, 1995). Figure 1 below depicts the different mediating constructs currently known to explain some of the effects of self-affirmation.
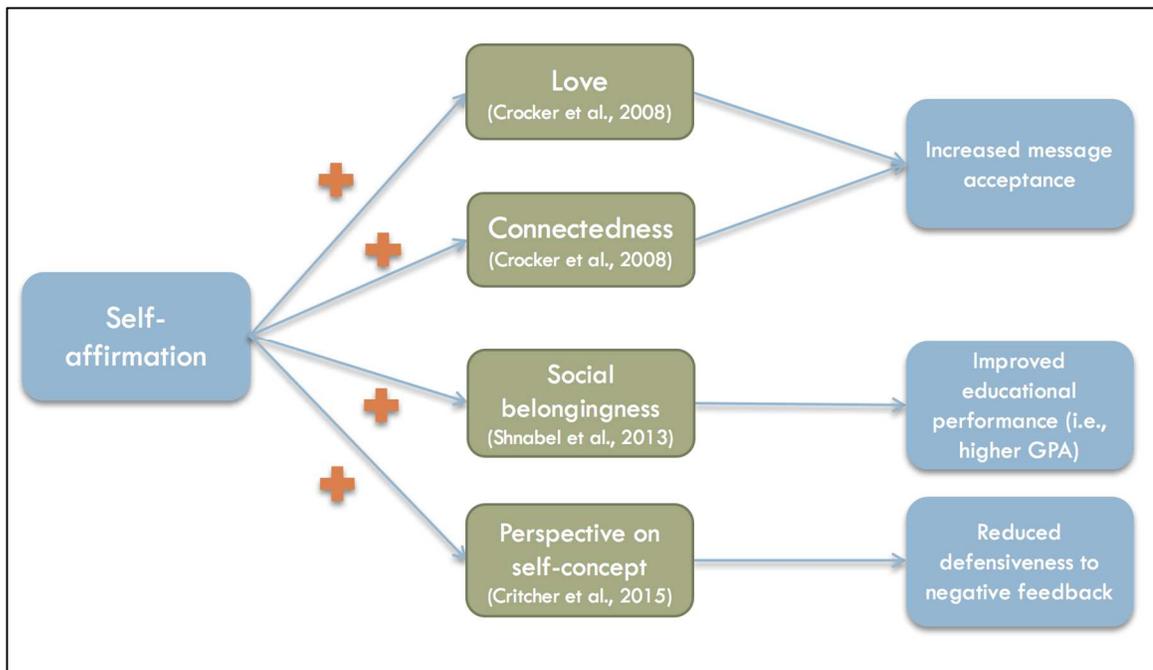
Figure 1. Conceptual Model of Mediating Processes Behind Self-affirmation's Effects

Operational Analysis of Self-affirmation

As previously stated, self-affirmation is typically not measured, but rather manipulated. According to a systematic review of the literature (McQueen & Klein, 2006), the most common form of self-affirmation manipulation that has been used in the literature is a values scale, typically a scale developed by Allport, Vernon and Lindzey (1960). In this manipulation, individuals are usually assessed during a pre-test to identify the sub-category of values that are most important to them (e.g. economic, political, aesthetic, social, religious, etc.) and then they are asked to fill out the subscale regarding this particular value from the Allport-Vernon-Lindzey scale as the self-affirmation manipulation. The idea is that responding to the survey items causes individuals to reflect on their important values and express them in a manner that activates self-affirmation and

maintains self-integrity. As an example, one of the Allport-Vernon-Lindzey questions asks individuals to indicate whether they would prefer to teach a) poetry, or b) chemistry and physics, if they were a university professor (Kopelman, Rovenpor, & Guan, 2003).

Another survey scale-based manipulation of self-affirmation developed in one study consists of 32-items that focus individuals' thoughts on a list of important strengths and values, and for each one they are asked to rate on a 5-point scale the extent to which each statement applies to them (e.g. very much like me to very much unlike me; Napper, Harris, & Epton, 2009).

Another common self-affirmation manipulation is to have participants engage in some sort of short writing task (McQueen & Klein, 2006). This may take the form of a values essay in which the participant is either asked to pick one value from a list provided or to rank the list of values, then they are asked to write anywhere from one sentence to a paragraph about the value they selected or the one they ranked as most important (McQueen & Klein, 2006). The list of values are often times directly from or similar to those developed by Allport et al. (1960) or, interestingly, from an unpublished list of values developed by Harber (1995; e.g. see Cohen, Aronson, & Steele, 2000). Participants may be asked to write about why the value was important to them and a time when it had been particularly important, how it had made them feel good about themselves, a time in their lives when it had proved meaningful (McQueen & Klein, 2006), or when the value made them feel closer and more connected with people (Shnabel et al., 2013).

Other writing tasks do not focus on specific values but use variations on the theme by asking participants to write about times when they demonstrated their most important characteristic, writing about a time in their life when they did something that made them proud, or to write about three positive aspects about themselves and think about one for a few minutes (McQueen & Klein, 2006). In another highly cited, but somewhat different manipulation from the value essays described above, Reed and Aspinwall (1998) developed a kindness questionnaire that provides participants with a list of 10 acts of kindness (e.g.,"Have you ever been considerate of another person's feelings?" and "Have you ever attended to the needs of another person?") and asks them to answer "yes" or "no" whether they have ever performed each one of these acts. For each act they answer "yes" to, they are then asked to provide a brief written example of a time when they had done so in order to affirm their sense that they are a kind and compassionate person.

Although the majority of self-affirmation studies have used values scales or essays like the ones described above, a variety of alternative methods have been used. Some studies asked participants to simply think of another individual that values and accepts them unconditionally, to write down their initials, and then to visualize the person with instructions such as, "'see a picture of this person's face,' 'notice the color of their hair,' and 'imagine the person is here with you,'" (Arndt, Schimel, Greenberg, & Pyszczynski, 2002, p. 674; see also, Schimel, Arndt, Pyszczynski, & Greenberg, 2001). Examining one's own Facebook profile for several minutes has also been shown to increase the acceptance of negative feedback in a manner equivalent to effects observed in response to a value essay self-affirmation task (Toma & Hancock, 2013). Lastly,

Sivanathan and Pettit (2010) found that consumption of high-status goods can also have self-affirming effects. The authors argue that high-status goods have self-affirming effects because these possessions symbolize an identity desirable to the owner that helps to bolster or maintain their self-integrity.

Although a wide variety of self-affirmation manipulations have been proven effective in laboratory settings, the identification of manipulations that are less contrived and could plausibly be used as interventions in a field setting is one of the current shortcomings in the literature (Epton et al., 2015; Harris & Epton, 2009; McQueen & Klein, 2006; Sweeney & Moyer, 2015). However, several attempts have been made to develop brief self-affirmation interventions for field studies in the health domain, with varying degrees of success (Armitage & Rowe, 2011; Charlson et al., 2007; Dillard, McCaul, & Magnan, 2005; Jessop et al., 2009).

Armitage et al. (2011, p. 636) developed what they refer to as a self-affirmation implementation intention exercise in which participants are presented with the stem of a statement (i.e., "If I feel threatened or anxious, then I will . . .") and then they are asked to select one of four options to complete the sentence (i.e. ". . . think about the things I value about myself," ". . . remember things that I have succeeded in," ". . . think about what I stand for," or ". . . think about things that are important to me"). After participants select their preferred fragment to complete the sentence, they are instructed to write out the full statement on a separate line. Results from a field experiment to reduce alcohol consumption found that participants undergoing this manipulation exhibited greater message acceptance and reduced alcohol intake at follow up compared to those in a

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control condition, and equivalent to others who had completed Reed and Aspinwall's (1998) kindness questionnaire manipulation (Armitage et al., 2011). Dillard et al. (2005) attempted to activate self-affirmation by embedding self-affirming statements on cigarette warning labels (e.g., "You are an honest person") prior to the provision of risk information about smoking, but these failed to increase message acceptance among smokers. The authors speculate that their brief, self-affirming statements on the warning labels may not have been as strong as more traditional methods of self-affirmation, such as writing a value essay (Dillard et al., 2005).

In a field experiment designed to communicate the risk of skin cancer, another intervention was developed, referred to as a positive traits self-affirmation (Jessop et al., 2009). Individuals were asked to indicate "yes" or "no" whether they were, "'enthusiastic', 'keen', 'conscientious', 'hardworking', 'intelligent', 'open-minded', 'responsible', and 'determined,'" then they were told "'If you have responded yes to any of the above then you would be an ideal candidate to take part in our 'Safety in the Sun 2006 Challenge' to use sunscreen (SPF 15 or above) when sunbathing for the rest of this year. What you decide to do today can alter the quality of the life that you will enjoy in the future. It's up to you. You are a unique and special person. Don't you deserve looking after?'" (Jessop et al., 2009, p. 534). Following the affirmation exercise, participants were given a leaflet with information about the risks of skin cancer. The positive traits self-affirmation exercise reduced message derogation relative to a control and equivalent to value essay and kindness questionnaire self-affirmation conditions. Interestingly, the

positive traits self-affirmation was the only condition to increase behavior change in the form of taking a free bottle of sunscreen (Jessop et al., 2009).

Lastly, in a series randomized controlled clinical trials designed to promote behavior change among three populations of patients with chronic cardiopulmonary disease (i.e. increasing physical activity for asthma and angioplasty patients, and increasing medication adherence for patients who had undergone angioplasty) a combined positive affect and self-affirmation induction exercise was given to the experimental group (Charlson et al., 2007, 2013; Mancuso et al., 2012). Separate prompts to induce positive affect and self-affirmation were used in combination for the experimental group, so it is impossible to disentangle which exercise—positive affect or self-affirmation—resulted in the changes witnessed among patients. The self-affirmation component of this manipulation instructed patients to think of things they have done that they are proud of at times when they feel it is difficult to take their medication or be physically active (for example text from the script, see Charlson et al., 2007, p. 753). The self-affirmation prompt was given to patients both at the beginning of the trial and at each follow up (occurring every two months) for the duration of one year. Relative to a control, the positive affect/self-affirmation condition had both direct and indirect effects on behavior change among the hypertension and angioplasty patients, but not the asthma patients (Charlson et al., 2013; Mancuso et al., 2012). Several steps mediated the effect of the intervention on increases in behavior change. First, the intervention reduced stress in patients, which itself led to increased self-efficacy to change one's behavior, which in turn increased adoption of the prescribed behaviors (Charlson et al., 2013). It is unclear

why the intervention was ineffective among the asthma patients. One explanation offered

by the authors is that the severity of the condition mattered. Compared to the

hypertension and angioplasty patients, the asthma patients had less severe conditions and

were enrolled in a practice where they received more ongoing care (Charlson et al.,

2013).

Antecedents of Self-Affirmation

Because self-affirmation has almost always been experimentally manipulated

within studies, little is known about the antecedents to self-affirmation (McQueen &

Klein, 2006). It is assumed that the motive to self-affirm is aroused in response to any

sufficiently threatening cognition in order to restore one's self-integrity (Cohen &

Sherman, 2014; McQueen & Klein, 2006; Steele, 1988). According to Steele (1988, pp.

290–291), these threatening cognitions can come from "information in the environment,

from the behavior of others toward us, from the judgments of others, from our own

behavior, and from cognitions that we invoke in response to particular situations or

events."

As mentioned earlier however, self-affirmation can also occur in the absence of

self-threatening stimuli. Some studies have compelled participants to self-affirm in the

absence of any experimentally introduced threat (e.g., van Prooijen et al., 2013), and

seemingly routine behaviors that may not be consciously motivated by a desire to

maintain one's self-integrity can also have self-affirming effects, such as looking at one's

Facebook profile (Toma & Hancock, 2013), or through consumption of high-status goods

(Shu & Townsend, 2014; Sivanathan & Pettit, 2010). In these instances, it may be that

self-affirmation is induced incidentally as a by-product of a behavior that was otherwise

conducted for other reasons, (e.g., one checks their Facebook profile because they are

bored rather than because their self-integrity is threatened.)

Consequences of Self-affirmation

A wide variety of effects of self-affirmation have been identified in a number of

domains (Cohen & Sherman, 2014; Steele, 1988). In terms of physiological outcomes,

self-affirmation has been shown to reduce self-reported physical symptoms in breast-

cancer patients (Creswell et al., 2007), attenuate stress responses in the form of lower

levels of cortisol (Creswell et al., 2005), and increase levels of neural activity in the

ventromedial pre-frontal cortex during exposure to persuasive health messages, an area of

the brain associated with self-related processing (Falk et al., 2015). It has also been

hypothesized that self-affirmation causes an up-regulation in oxytocin activity that may

be responsible for the feelings of love and connectedness reported by participants who

have undergone self-affirmation (Crocker et al., 2008). Aside from physiological

responses, in the education domain self-affirmation interventions have been shown to

lead to improved educational performance by students subject to stereotype threats

(Cohen, Garcia, Purdie-Vaughns, Apfel, & Brzustoski, 2009; Shnabel et al., 2013).

Of most interest to the present investigation, however, are the various effects of

self-affirmation on message processing, acceptance, behavioral intentions and actual

behavior (for example, in the area of political communication, see Binning, Brick, Cohen,

& Sherman, 2015; Binning, Sherman, Cohen, & Heitland, 2010; Cohen et al., 2007,

2000; Ehrlich & Gramzow, 2015; in health communication, see Epton et al., 2015; Harris

& Epton, 2009, Sweeney & Moyer, 2015; and in climate change communication, see Sparks et al., 2010; van Prooijen & Sparks, 2013).

The effect of self-affirmation on persuasion has been most studied in the health communication domain. Two recent meta-analyses integrated results from studies of self-affirmation's influence on message acceptance, behavioral intention, and actual behavior change (Epton et al., 2015; Sweeney & Moyer, 2015). Examining the effects of self-affirmation interventions (paired with exposure to health messages) on intentions and behavior, Sweeney & Moyer (2015) showed that data from 16 studies found a significant, but small effect of self-affirmation on intention (d_+= .26, 95% CI = .04 –.48) and behavior (d_+= .27, 95% CI = .11–.43). Interestingly, these results were not moderated by the type of self-affirmation intervention provided (values scale vs. kindness questionnaire). Using a larger number of studies, Epton et al. (2015) similarly found that self-affirmation had a small, but consistent effect on message acceptance (34 tests, d_+= .17, 95% CI = .03-.31), intentions (64 tests, d_+= .14, 95% CI = .05 to .23), and behavior (46 tests, d_+= .32, 95% CI = .19 to .44). The findings of both meta-analyses were consistent across different types of health problems and behaviors (Epton et al., 2015; Sweeney & Moyer, 2015).

The effects of self-affirmation on message processing have also been most heavily studied in the health domain. In anti-smoking research, self-affirmation has been found to reduce message derogation, anger, and the number of negative thoughts generated in response to a message, however these effects seem to depend on whether the message is gain-framed or loss-framed (Zhao & Nan, 2010), and whether the smoker is

low or high in trait-reactance (Nan & Zhao, 2012). Specifically, self-affirmation led to more desirable outcomes when a message was loss-framed rather than gain-framed (Zhao & Nan, 2010), and when a smoker was low in trait-reactance but not when a smoker was high in trait-reactance (Nan & Zhao, 2012). Another study also found conditional effects on message processing such that self-affirmation reduced the perceived effectiveness of a message, fear in response to a message, and increased message elaboration only among occasional smokers versus daily smokers (Zhao, Peterson, Kim, & Rolfe-Redding, 2014). One study also found undesirable effects of self-affirmation on message processing, increasing message derogation and decreasing perceived argument strength of indoor tanning prevention messages, resulting in greater indoor tanning intentions (Mays & Zhao, 2015).

In the area of political communication, a number of effects of self-affirmation have been documented. For example, self-affirmed individuals exhibit greater openness and attitude change in response to arguments that run counter to their prior beliefs or political orientation on the issues of capital punishment, abortion, and U.S. foreign policy (Cohen et al., 2007, 2000). Cohen et al. (2007) also found that self-affirmed individuals made more concessions during a mock political negotiation about abortion policy with a confederate posing as an ideological adversary, and evaluated the confederate more positively. Additionally, self-affirmation reduces the influence of partisan identity on evaluation of opposition political candidates and their debate performances, and makes individuals generally more open to opposing points of view (Binning et al., 2010). Self-affirmation has also been found to reduce the influence of normative information (i.e.,

polling data) and increase the influence of evidentiary information (i.e., economic data) on the evaluation of presidential approval ratings, regardless of political party identification (Binning et al., 2015). Lastly, among those who highly identify with their preferred political party, affirming one's political in-group has been shown to increase negative attributions of the opposing political party (Ehrlich & Gramzow, 2015). However, when one affirms a different group identity (i.e., university affiliation), negative outgroup attributions of the opposing political party are not accentuated (Ehrlich & Gramzow, 2015).

Scholars have only recently begun to apply self-affirmation theory to the study of environmental and climate change communication (Sparks et al., 2010; van Prooijen & Sparks, 2013; van Prooijen et al., 2013). These studies have found that self-affirmation increases perception of self-involvement in climate change and increases intentions to recycle among those whose past recycling behavior was low (Sparks et al., 2010). Van Prooijen and Sparks (2013) found that a self-affirmation manipulation increased risk perceptions of climate change and self-efficacy to reduce climate change among those with skeptical ecological worldviews (i.e. those who were skeptical about the influence of human action on ecological stability). However, an important moderator of this result was identified in another study (van Prooijen et al., 2013). When individuals were not exposed to a persuasive message, but instead underwent a self-affirmation manipulation and then immediately filled out a questionnaire, the influence of ecological worldviews on subsequent beliefs about climate change was accentuated for both those with negative and positive worldviews (relative to a control). In other words, these two groups were

more polarized on subsequent measures relative to individuals who had not received a self-affirmation manipulation.

Developing an Applied Self-Affirmation Intervention

As reviewed earlier, very little of the self-affirmation literature has focused on developing methods of inducing self-affirmation that can be utilized in an applied communication context by practitioners (Armitage et al., 2011; Charlson et al., 2007; Dillard et al., 2005; Jessop et al., 2009). Most of the existing methods of inducing self-affirmation rely on idiographic approaches to activating important values or aspects of one's identity that often require an element of interactivity and relatively high participant burden (i.e. writing an essay or filling out a questionnaire). While there may be some applied contexts in which these methods can be adopted, such as educational interventions for students (e.g., Cohen et al., 2009), or through the use of workbooks for patients with chronic illnesses (e.g., Charlson et al., 2007), I argue that the most widely usable self-affirmation intervention will be one that can be embedded directly into the content of a persuasive message itself.

One challenge to embedding self-affirming content within a message is the assumption that in order for self-affirmation to be effective, one must self-affirm in a domain that is unrelated to the topic of the threatening persuasive message. Structurally, this implies the construction of a message that has two seemingly tangential and unrelated components that would likely be confusing or noticeably contrived to most audiences (e.g., "Take a moment to think about how great you are at something you love---hey wait, we also wanted mention that climate change is a big problem!"). One clue to

developing an applied means of self-affirmation lies within a series of studies examining the influence of message-compatible self-affirmations (Jacks & O'Brien, 2004). Contrary to prior research suggesting that self-affirmation is only effective when in a domain irrelevant to the threatening message (Blanton, Cooper, Skurnik, & Aronson, 1997), Jacks and O'Brien (2004) found that individuals who affirm a domain-relevant value that is compatible with a persuasive message exhibit similar increases in message acceptance to those who self-affirm in a domain irrelevant to the message. For example, individuals who affirm the value of being non-prejudiced exhibited less resistance to a message promoting affirmative action, and to a similar degree as individuals who had been affirmed in the irrelevant value of honesty. Similarly, they found that when individuals self-affirm in a message-incompatible value (non-prejudiced) they exhibit increased resistance to a counter-attitudinal message (arguing against gays in the military). This finding is important because if individuals can be self-affirmed by simply increasing the accessibility of personally important aspects of one's self-concept (certain values, or identities associated with certain values) that are compatible with—rather than unrelated to—the topic of a persuasive message, then it means that one can avoid the drawbacks associated with trying to juxtapose two unrelated topics together into a single, coherent message.

While the findings of Jacks and O'Brien are suggestive that the distinction between affirmation of relevant and irrelevant domains may not always be the determining factor in shaping the success of self-affirmation, it is important to note little research has explicitly tested this hypothesis and the current body of evidence is

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inconclusive. A handful of studies do support the notion that self-affirmation must occur in a domain irrelevant to the threat in order to be successful (Blanton et al., 1997; Ehrlich & Gramzow, 2015; Stone & Cooper, 2003), while others suggest that that the relevance of the domain affirmed is not consequential.

Affirming a Desire to Protect Close Personal Contacts from Climate Change

Contrary to past research, using a message-based approach to activating self-affirmation implies a nomothetic approach to inducing self-affirmation; the researcher/communicator can select which values to activate in a message rather than the participant/receiver defining and selecting which value or set of values are most important to them. Therefore, if one's goal is to maximize the impact of such a self-affirmation intervention with a general audience, one must identify a value or set of values that are likely to be personally important to a wide array of potential audiences. Multiple lines of evidence point toward the likelihood that the affirmation of what I will refer to as a protection value—a desire to protect one's close interpersonal contacts (i.e. family and friends) from threats—will be influential in shaping attitudes toward climate change.

From an evolutionary standpoint, theories of kin selection and inclusive fitness argue that organisms are motivated to propagate their genes throughout a population both through direct reproduction (producing offspring) as well as through indirect reproduction by helping other genetically similar members of a population (i.e. those who may share identical copies of certain genes) to reproduce (Hamilton, 1964). This motivational drive is also consistent with psychological studies of universal human

values, which have identified benevolence and security as two conceptually similar values that guide the selection and evaluation of human behavior (Schwartz, 1992; Schwartz et al., 2012). The motivational goal of benevolence is defined as, "preservation and enhancement of the welfare of people with whom one is in frequent personal contact," (Schwartz, 1992, p. 11), and the motivational goal of security is defined as, "safety, harmony, and stability of society, of relationships, and of self," (Schwartz, 1992, p. 9).

Targeting the activation of close interpersonal relationships as a component for inducing self-affirmation is also supported by recent research in this area. First, there is evidence that family and other close relationships appear to be particularly accessible and important to most individuals' self-concept, two features that suggest this identity is strong and impactful on self-related thoughts and evaluations (DeMarree, Petty, & Briñol, 2007). As described earlier, content analyses of self-affirmation value essays have found that individuals spontaneously discuss valued personal relationships more frequently than any other topic (Creswell et al., 2007). Furthermore, a large majority of Americans (79%) rank their family or marital status as their most important identity when provided a list of 10 different social identities (Smith, 2007). Second, simply asking individuals to visualize other people who value them uncontigently has self-affirming effects (Arndt et al., 2002; Schimel et al., 2001). Third, in terms of the mechanism of self-affirmation, feelings of love and connectedness (Crocker et al., 2008) and social belongingness (Shnabel et al., 2013) are among the handful of known mediators of self-affirmation.

There is also some evidence directly from the field of environmental and climate change communication that suggests priming certain identities and a desire to protect others (particularly children and future generations) are consequential for engagement with climate change. For example, Zaval et al. (2015) found that priming individuals' legacy motivations (i.e., asking individuals to think about the ways in which they would like to have a positive impact on future generations) increased individuals' belief that they had a responsibility to reduce their personal contribution to climate change, increased their intention to take action to reduce climate change, and increased the amount of money they chose to donate to an environmental organization (taken from their compensation for participating in the study). This is consistent with other research which found that parental status strengthened the relationship between support for action on climate change and voting intentions, presumably because parents are more strongly motivated by a desire to leave behind a positive legacy to future generations (Milfont, Harré, Sibley, & Duckitt, 2012). Increasing the salience of one's political identity has been shown to have a detrimental effect on belief in human-caused climate change and support for policy action among conservatives, suggesting that priming alternative identities (in an effort to reduce the salience of one's political identity) may help to reduce polarization (Unsworth & Fielding, 2014). Lastly, Simon et al. (2014) directly tested the utility of invoking a generalized protection value (not specifically targeted toward close interpersonal contacts) in an appeal to address climate change. They found that it increased the perceived pervasiveness and significance of climate change impacts, the salience of climate change as an issue, efficacy to address climate change, and

support for climate change policies, particularly among those respondents who identified

as Republican. These effects were amplified when the protection value was combined

with a description of the health impacts of climate change (Simon et al., 2014), a message

strategy that has been shown to be particularly effective with political conservatives in

prior research (Maibach, Nisbet, Baldwin, Akerlof, & Diao, 2010; Myers et al., 2012;

Petrovic et al., 2014).

Hypotheses and Research Questions

Although self-affirmation has only been tested in the domain of climate change

communication in a handful of studies, prior research suggests that self-affirmation will

increase message acceptance among audiences otherwise motivated to resist messages

designed to increase engagement with climate change (Sparks et al., 2010; van Prooijen

& Sparks, 2013; van Prooijen et al., 2013). However, these studies have only examined

the ability of self-affirmation to reduce the influence of skeptical ecological worldviews

on climate change beliefs, in small convenience samples of British university students.

The present study builds on this previous work by examining the ability of self-

affirmation to reduce the influence of political ideology on message acceptance in a large,

demographically diverse sample of U.S. citizens. Consistent with past research and

theory (Cohen & Sherman, 2014; Steele, 1988), I expect self-affirmation to be most

effective among audiences with whom societal action on climate change is threatening to

their self-integrity. In the United States, political conservatives (and to a lesser degree

political moderates) are more likely to feel threatened by calls for government action on

climate change compared to liberals, who tend to be supportive of action on climate

change (Dunlap & McCright, 2008; Hart & Nisbet, 2012). Therefore, my first hypothesis states:

> **H1**: *Self-affirmation will lead to more favorable changes among political conservatives, and to a lesser degree in moderates, in terms of key beliefs about, perceived importance of, and policy support to address climate change, whereas its effect on liberals will be indistinct.*

Because traditional forms of self-affirmation are difficult to incorporate into an applied communication context (Armitage et al., 2011; Charlson et al., 2007; Dillard et al., 2005; Jessop et al., 2009), an additional goal of the present study is to test the effectiveness of an applied means of inducing self-affirmation within a message, rather that asking participants to perform a self-affirming exercise such as writing a value essay prior to message exposure. Specifically, the applied form of self-affirmation uses a message component intended to activate a desire to protect the message recipient's close interpersonal contacts. Practically speaking, it is important to know if a message-based affirmation is more or less effective than traditional forms of self-affirmation that entail writing an essay. Therefore, I ask the following research question:

> **RQ1**: *Will embedding a protection value self-affirmation in a message be different from a traditional value essay self-affirmation intervention in terms of its effects on climate beliefs and attitudes?*

In order to better understand the mechanism underlying self-affirmation, the

present study also examines a number of mediating variables to test whether the self-

affirmation interventions tested here operate via some of the mechanisms identified in

previous research (Critcher & Dunning, 2015; Crocker et al., 2008; Shnabel et al., 2013).

As reviewed earlier, prior studies have identified feelings of love and connectedness

(Crocker et al., 2008), social belonging (Shnabel et al., 2013), and changes to the

perceived relative importance of different identities in one's working self-concept

(Critcher & Dunning, 2015) as potential mediators that explain the effects of self-

affirmation on attitude change. Therefore, my second hypothesis states:

> **H2**: *Both traditional and protection value forms of self-affirmation will have*
>
> *favorable indirect effects on climate beliefs and attitudes through increased*
>
> *feelings of a) love, b) connectedness, c) social belonging, and/or d) greater*
>
> *perceived importance of one's identity as a friend or family member relative to*
>
> *the perceived importance of one's political identity.*

CHAPTER THREE - METHODS

Experimental Design

To test my hypotheses and research question, I conducted a randomized, controlled survey experiment with a 2 (traditional self-affirmation essay vs. control task) x 2 (applied protection value affirmation present or absent in message) x 3 (political ideology) factorial design. The first two factors represent experimentally manipulated variables, and the final factor represents an observed variable of political ideology (i.e., liberal, moderate, conservative). Together, the two experimentally manipulated factors result in four different cells: a control condition (with a no affirmation control task and without a protection value affirmation added to the message), a traditional self-affirmation (without a protection value affirmation added to the message), a protection value affirmation added to the message (with a no affirmation control task before exposure to the message), and a final condition in which participants both engaged in a traditional self-affirmation exercise and were also exposed to the message with a protection value affirmation (in subsequent sections this condition is referred to the "combined" self-affirmation condition). Participants were randomly assigned to one of these four conditions. Procedures for each of the experimental manipulations are described in more detail below.

Participants

Participants were recruited by an external vendor (Toluna) that maintains an online panel of participants who have agreed to participate in online surveys. Participants were quota-matched to recruit a demographically diverse sample that approximately reflects national proportions of age, gender, education, and Hispanic ethnicity found in the U.S. Census. Specifically, the sample was 48.2% male and 51.8% female; 83% non-Hispanic or non-Latino and 17% Hispanic or Latino; the median age was between 45-54; and the median level of education was "some college".

A total sample of n=1337 individuals completed the survey which provided sufficient power to detect the average observed effect size of self-affirmation on message acceptance found in a recent meta-analysis of the health communication literature (see Epton, Harris, Kane, van Koningsbruggen, & Sheeran, 2015; f=0.085, d=0.17). This effect size is considered to be "small" based upon a review of 112 meta-analyses in the communication research literature (Weber & Popova, 2012).

At the beginning of data collection, individuals were initially screened out if they failed any one of three attention checks in the survey (see description of attention check measures below). However, because of a low incidence rate of qualified completions, this requirement was later relaxed after approximately 26% percent of the sample had been collected so that subsequent participants were screened out only if they failed all three attention checks.

Procedure

Traditional Self-Affirmation. This study utilized a value essay self-affirmation manipulation widely used in previous research (for a review, see McQueen & Klein,

2006). Participants were asked to rank a list of 11 values developed by Harber (1995;

e.g., Artistic skills/aesthetic appreciation, Sense of humor, Relations with friends/family)

in terms of their personal importance. Next, participants were asked to think about the

value they ranked as the most important to them, and then to take a few minutes to write

about three or four personal experiences in which this value was important to them and

made them feel good about themselves. This procedure, along with this list of values, has

been used in a number of prior studies (e.g., Binning, Brick, Cohen, & Sherman, 2015;

Cohen, Aronson, & Steele, 2000; Zhao, Peterson, Kim, & Rolfe-Redding, 2014).

No affirmation control task. Individuals in these conditions were asked write

down everything they ate or drank in the last 48 hours. Furthermore, individuals were

instructed to "not worry about those things you find yourself unable to remember." This

task has been used as a control in a number of previous studies because it is believed that

almost any self-reflective writing task can potentially be self-affirming (e.g., Cohen et al.,

2000; van Prooijen & Sparks, 2013).

Messages. Following completion of either the self-affirmation or no-affirmation

control task, participants were randomly assigned to read one of two versions of a

message that argues for action to address the health impacts of climate change—one with

a protection value affirmation and one without a protection value affirmation. In the

opening passage of the protection value self-affirmation version of the message,

participants read a prompt that asked them to visualize somebody else that values them

and accepts them for who they are, and asks readers to think about what they would do to

protect that person from harm. This component was adapted from previous research

which found that this visualization exercise led to reduced defensiveness (Arndt et al., 2002; Schimel et al., 2001). Message wording is in Appendix A.

Measures

Mediator Variable Measures

Relative identity importance. Participants rated, on a 7-point scale, how important a number of different groups are to them "in describing who you are," (1-Not at all important, 7-Extremely important). The list of groups is taken from the 2004 General Social Survey and reported in Smith (2007). In order to assess the relative importance of one's role in a close relationship (e.g., son/daughter, parent, grandparent, friend) versus one's political identity, I calculated the difference score between the ratings for these two measures, ranging from -6 (high political identity importance) to +6 (high relationship identity importance). For example, if an individual rates their relationship identity as a 7 and their political ideology as a 1, then the resulting score would be a +6, if they rate these two identities as equally important then the score is zero, and if they rate their political identity a 7 and their relationship identity as a 1, then their score would be -6 (M=1.88, SD=2.29).

Feelings of love and connectedness. Using the measures from Crocker et al. (2008), I asked participants to rate how much they felt 17 different emotions while writing their essay, including love and connectedness, on a 5-point scale (1-Not at all, 5-Extremely; M_{love}=3.26, SD_{love}=1.40; $M_{connected}$=3.20, $SD_{connected}$=1.31).

Social belongingness. I measured feelings of social belongingness using the General Belongingness Scale previously developed by Malone et al. (2012). The scale

consists of 12 items rated on 7-point likert scales. Half of the items are designed to assess

feelings of social inclusion and acceptance, and the other half are designed to assess

feelings of social exclusion and rejection which were reverse coded (M=5.10, SD=1.30,

Cronbach's α=0.935).

Dependent Variable Measures

Belief certainty that climate change is happening. Two items were used to

compute a nine-point scale measuring certainty that climate change is happening. The

first item asked respondents whether they think climate change is happening with

response options being yes, no, or don't know. Individuals who answered yes or no were

then asked a follow up question which asked how sure they were that climate change is/is

not happening (1=not at all sure, 4=extremely sure). The new variable combined

responses to these two items such that 1=extremely sure climate change is not happening,

3 = somewhat sure climate change is not happening, 5=Don't know, 7 = somewhat sure

climate change is happening, 9=extremely sure climate change is happening (M=7.03,

SD=2.08).

Belief in human causation. A single, six-point item was used to measure the

extent to which individuals think climate change is caused by human activities versus

natural changes in the environment (1=None of the above because climate change isn't

happening, 2=Caused entirely by natural changes in the environment, 3=Caused mostly

by natural changes in the environment 4=Caused about equally by human activities and

natural changes in the environment, 5=Caused mostly by human activities 6=Caused

entirely by human activities; M=4.23, SD=1.16).

Worry about climate change. A single, 7-point item asked individuals, "How worried are you about climate change?" (1-Not at all worried, 7-Extremely worried; M=2.90, SD=1.24).

Climate change issue importance. A single, 7-point item asked individuals, "How important is the issue of climate change to you personally?" (1-Not at all important, 7-Extremely important; M=3.03, SD=1.25).

Perceived harm of climate change. Participants were asked to rate on a 7-point scale (1-Not at all, 7-A great deal), "How much do you think climate change will harm…" with four different targets: 1) you and your family, 2) people in the United States, 3) people in other countries, 4) future generations. Responses to these four items were averaged and combined into a single scale (M=4.94, SD=1.62, Cronbach's α=0.938).

Injunctive beliefs about climate change. Participants were asked on a 7-point scale whether they think the following entities should be doing "more or less to address climate change…" (1-should be doing much less, 4-currently doing about the right amount, 7-should be doing much more). The actors are: 1) your local government officials, 2) your state government, 3) The U.S. Congress, 4) The President. Responses to these four items were averaged and combined into a single scale (M=5.31, SD=1.73, Cronbach's α=0.967).

Climate change policy support. This variable was an averaged composite of responses to five different policies designed to address climate change. The question asked participants, "How much do you support or oppose the following policies?" (1-

Strongly oppose, 4-Neither support nor oppose, 7-Strongly support; M=4.82, SD=1.12, Cronbach's α=0.734).

Political participation intentions. This variable was an averaged index of responses to the question, "Over the next 12 months, how likely are you to do each of the following?" (1-Very unlikely, 4-Neutral, 7-Very likely). The behaviors are: 1) Write letters, email, or phone government officials about climate change, 2) Attend a community meeting or rally about climate change, 3) Sign a petition about climate change, either online or in person, 4) Donate money to an organization working to reduce climate change, 5) Vote for a political candidate because they support action to reduce climate change (M=3.70, SD=1.84, Cronbach's α=0.921).

Moderator Variable Measure

Political ideology. A single, 5-point scale asked individuals, "In general, do you think of yourself as…" (1-Very liberal, 3-Moderate, middle of the road, 5-Very conservative; M=2.94, SD=1.14).

Control Variable

Attention. Participant attention was assessed with three separate measures spread across the instrument. Two of the attention check items were embedded in matrix-style questions (one in the battery that assessed belongingness, and one in the battery that assessed policy support) and asked respondents to click on a particular response to indicate that they were paying attention. An additional attention check was a sham question adapted from Berinksy et al. (2014) about interest in government and politics that instructed participants to select two specific responses to indicate that they were

paying attention. These three attention check items were combined to create a 3-point

measure of attention (11% passed one attention check, 28% passed two attention checks,

and 61% passed all three attention checks; M=2.50, SD=0.69).

Missing Data

As is typical in survey research, some individuals did not respond to one or more

questions. As a result, several variables had small amounts of missing data (less than 1%)

that were assumed to be missing at random (MAR). In order to reduce potential bias in

statistical estimates, a hotdeck imputation procedure was used to address these missing

data patterns (Myers, 2011). Specifically, gender, age, and education were used as deck

variables to impute values on variables with missing data.

Analysis Plan

In order to initially test H1 and answer RQ1, I ran a MANCOVA to examine the

main effects of experimental condition and political ideology as well as a two-way

interaction between experimental condition and political ideology, with attention as a

covariate. The MANCOVA was then followed with a series of univariate ANCOVAs for

each dependent variable to provide estimates of effect size. I then probed any significant

omnibus effects with post-hoc pairwise comparisons, using a Bonferroni adjustment to

correct for familywise error.

In order to test H2, I used the PROCESS macro for SPSS (Hayes, 2013).

PROCESS uses a regression based approach to examine the direct and indirect effects of

the independent variable X on the dependent variable(s) Y, mediated by variables M_i.

Here, the independent variable X was a dummy variable examining the effect of each

experimental condition (entered one at a time) with the control condition used as a reference category. The mediators M_i were the four proposed mediators, M_1=relative identity importance, M_2=feelings of love, M_3=feelings of connectedness, and M_4=social belongingness, tested in parallel (as opposed to serial mediators). Y represents the different dependent variables listed above. Multiple model runs were conducted because PROCESS only allows examination of one dependent variable at a time. More details on the specific path model used is provided in the results section given that this analysis was conducted subsequent to and specified in light of the initial MANCOVA/ANCOVA tests.

CHAPTER FOUR - RESULTS

MANCOVA/ANCOVA Analysis

Beginning with tests of H1, which predicted that self-affirmation (both traditional and protection-value versions) would have desirable effects on political conservatives in terms of beliefs and attitudes about climate (and to a lesser degree among moderates and liberals), I will present results from a two-way MANCOVA examining the influence of experimental condition, political ideology, and the interaction of these two factors (along with attention as covariate[1]) on my dependent variables. Multivariate tests found significant main effects from experimental condition, political ideology, and attention[2], but the hypothesized interaction between experimental condition and political ideology was non-significant (See Table 1).

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[1] I also ran an additional model to test for an interaction between attention and experimental condition. The interaction was non-significant and therefore dropped from the model *Pillai's Trace*= 0.067, *F*(78, 7860)= 1.135, *p*=0.196, *partial η^2*=0.011.

[2] Additional analysis of the main effect of attention can be found in Appendix B.

Table 1. MANCOVA Summary Table for Multivariate Tests of Between Subjects Effects

Source	Pillai's Trace	Hypothesis df	Error df	F	Partial η^2
Attention	0.146	13	1312	17.23***	0.146
Condition	0.072	39	3942	2.49***	0.024
Political ideology	0.257	26	2626	14.88***	0.128
Condition*Political ideology	0.05	78	7902	0.859	0.008

*** $p<.001$, ** $p<.01$, * $p<.05$, † $p<.10$

Follow-up univariate ANCOVAs for each dependent variable found that experimental condition had a significant main effect on only five out of thirteen dependent measures examined (see Table 2). These included significant main effects on the three hypothesized mediator variables (relative identity importance, feelings of love, and feelings of connectedness), and two of the climate-related attitudes (issue importance and political participation intentions).

Specifically, ANCOVA suggested that there was a main effect of condition on relative identity importance, $F(3, 1324)=3.60$, $p<.05$, *partial* $\eta^2=.008$. Post-hoc tests revealed a significantly higher level of relative identity importance in the combined self-affirmation condition (i.e., where individuals were exposed to both traditional and protection value self-affirmation stimuli) relative to control, however there was insufficient evidence to suggest that the traditional self-affirmation or the protection value affirmation were significantly different from the control (see Table 2).

A significant main effect of condition on feelings of love was also observed via ANCOVA, $F(3, 1324)=12.56$, $p<.001$, *partial* $\eta^2=.028$. Post-hoc tests found that the traditional self-affirmation, the protection value affirmation, and the combined self-affirmation conditions also resulted in higher feelings of love compared to the control, however there were no significant differences among the three self-affirmation conditions (see Table 2).

ANCOVA also suggested there was also a main effect of condition on feelings of connectedness, $F(3, 1324)=4.73$, $p<.01$, *partial* $\eta^2=.011$. Post-hoc analysis revealed that the traditional self-affirmation and combined self-affirmation conditions resulted in feelings of connectedness significantly higher than the control group, however the protection value affirmation was not significantly different than the control (see Table 2).

Table 2. ANCOVA Summary Table for Main Effects of Experimental Condition

Dependent Variable	F-Value	Partial η^2	Scale Range	Mean estimates by condition			
				Control	Traditional SA	Protection Value SA	Combined SA
Relative identity importance	3.60*	0.008	-6 to +6	1.531[a]	1.913[ab]	1.809[ab]	2.09[b]
Loving	12.56***	0.028	1 to 5	2.89[a]	3.353[b]	3.346[b]	3.506[b]
Connected	4.73**	0.011	1 to 5	2.998[a]	3.343[b]	3.188[ab]	3.294[b]
Belongingness	0.83	0.002	1 to 7	5.057[a]	5.196[a]	5.132[a]	5.072[a]
Belief certainty	1.85	0.004	1 to 9	7.182[a]	6.889[a]	6.896[a]	6.907[a]
Human causation	2.57†	0.006	1 to 6	4.332[a]	4.144[a]	4.198[a]	4.116[a]
Efficacy	1.10	0.002	1 to 5	3.52[a]	3.419[a]	3.424[a]	3.396[a]
Worry	1.96	0.004	1 to 5	2.988[a]	2.826[a]	2.909[a]	2.782[a]
Issue importance	3.12*	0.007	1 to 5	3.165[a]	2.947[ab]	3.005[ab]	2.902[b]
Perceived harm	2.21†	0.005	1 to 7	5.022[a]	4.754[a]	4.975[a]	4.825[a]
Injunctive beliefs	2.41†	0.005	1 to 7	5.387[a]	5.103[a]	5.356[a]	5.176[a]
Policy Support	2.02	0.005	1 to 7	4.883[a]	4.69[a]	4.812[a]	4.773[a]
Participation	4.03**	0.009	1 to 7	3.884[a]	3.507[b]	3.748[ab]	3.505[b]

Note: Means with dissimilar superscripts (a, b, c) are significantly different.
*** $p<.001$, ** $p<.01$, * $p<.05$, † $p<.10$

In terms of climate-related attitudes, ANCOVA suggested there was a significant main effect of condition on issue importance, $F(3, 1324)=3.12$, $p<.05$, *partial $\eta^2=.007$*. Contrary to expectations, post-hoc comparisons found that the combined self-affirmation condition had significantly lower perceived importance of climate change relative to the control group (see Table 2). The traditional self-affirmation and protection value self-affirmation conditions were not significantly different from the control group (see Table 2).

ANCOVA suggested there was also a significant main effect of condition on climate change-related political participation intentions $F(3, 1324)=4.03$, $p<.01$, *partial* $\eta^2=.009$. Again contrary to expectations, post-hoc tests revealed that individuals in the traditional self-affirmation and combined self-affirmation conditions had significantly lower levels of political participation intentions relative to the control group (see Table 2). There was no significant difference between the protection value affirmation condition and the control group (see Table 2).

Overall, the results from the MANCOVA and ANCOVA analyses do not support H1. The effects of the three different self-affirmation conditions were not conditional on political ideology (Table 1). With the exception of two outcomes (i.e., issue importance and political participation intentions), the majority of climate-related attitudes were unmoved by the three self-affirmation conditions relative to the control group (Table 2). In the case of issue importance, the combined self-affirmation condition caused a boomerang effect (Byrne & Hart, 2009) resulting in lower levels of issue importance relative to the control group (see Table 2). Similarly, with regard to political participation intentions, the traditional self-affirmation and combined self-affirmation conditions (but not the protection value self-affirmation) caused a boomerang effect resulting in reduced intentions to engage in climate-related political participation relative to the control group (see Table 2).

Regarding RQ1, which asked whether there would be differences in terms of how the protection value self-affirmation versus the traditional self-affirmation impacted climate-related attitudes, I found that only in the aforementioned case of political

participation intentions was there a difference between the effects of the two different

forms of self-affirmation relative to the control group (see Table 2). Specifically, the

traditional self-affirmation significantly reduced political participation intentions relative

to the control group, but the protection value self-affirmation did not cause a significant

change in political participation intentions relative to the control group. However, it is

worth noting that when directly comparing the traditional self-affirmation versus the

protection value self-affirmation, there were no significant differences between the two

conditions for all of the dependent variables tested.

PROCESS Analysis

Turning now to examination of the indirect effects of the self-affirmation

conditions on climate attitudes, I used the PROCESS macro for SPSS (Hayes, 2013) to

test whether relative identity importance, feelings of love, connectedness, and social

belongingness mediate the effects of the self-affirmation conditions on climate-related

attitudes (H2). Because the interaction between experimental condition and political

ideology was non-significant for direct effects on all of the hypothesized mediators and

climate-related dependent variables in the MANCOVA and ANCOVA analyses reported

above, here I report only a simple mediation model—as opposed to a moderated

mediation analysis—for the sake of parsimony. Specifically, I used Model 4 in

PROCESS with political ideology and attention included as covariates (Hayes, 2013).

Table 3. Bivariate Pearson Correlations of Continuous Predictor Variables in Analysis

	Attention	Ideology	Identity	Loving	Connected	Belongingness
Attention	1	.066*	.174**	-.168**	-.147**	.171**
Ideology	---	1	.124**	-0.018	-.067*	.142**
Identity	---	---	1	0.054	-0.005	.221**
Loving	---	---	---	1	.662**	.162**
Connected	---	---	---	---	1	.200**
Belongingness	---	---	---	---	---	1

** p<.01, * p<.05

A bivariate correlation matrix of the predictor variables utilized in the models is available in Table 3. Of these, the correlation between feelings of love and feelings of connectedness was relatively high ($r=.662$, $p<.01$). Because PROCESS does not produce collinearity diagnostics, I ran a traditional direct effects multiple regression model—which does produce collinearity diagnostics—predicting belief certainty climate change is happening with all of the same predictor variables used in the PROCESS analysis. Both feelings of love (*Tolerance*=0.538, *VIF*=1.86) and feelings of connectedness (*Tolerance*=0.540, *VIF*=1.85) had acceptable levels of tolerance and VIF, indicating that there were no problems with multicollinearity.

Table 4. Total, Direct, and Indirect Effects of Traditional Self-affirmation condition vs. Control

Dependent Variable	Total effect	Direct effect	Specific Indirect Effect through:			
			Identity	Loving	Connected	Belonging
Belief certainty	-0.2551†	-0.3477*	0.0329*	-0.0181	0.0851*	-0.0072
Human causation	-0.1776*	-0.2337**	0.0175*	0.0027	0.0438*	-0.0079
Efficacy	-0.0883	-0.1264†	0.0003	0.0030	0.0362*	-0.0013
Worry	-0.1451	-0.2401**	0.0000	0.0250	0.0721*	-0.0021
Issue importance	-0.1884*	-0.3033***	0.0067	0.0246	0.0875*	-0.0039
Perceived harm	-0.2333*	-0.3670**	0.0289*	0.0129	0.0971*	-0.0052
Injunctive beliefs	-0.2538*	-0.3720**	0.0405*	0.0138	0.0707*	-0.0068
Policy Support	-0.1880*	-0.2748***	0.0161*	0.0153	0.0575*	-0.0021
Participation	-0.3666**	-0.5424***	-0.0181*	0.0792*	0.1174*	-0.0025

Note: Values represent the unstandardized regression coefficient.
*** $p<.001$, ** $p<.01$, * $p<.05$, † $p<.10$

Beginning with the effects of the traditional self-affirmation condition vs. control, I found a significant and negative total effect on belief in human causation, issue importance, perceived harm, injunctive beliefs, policy support, and political participation (see Table 4). However, when these total effects are broken down into direct and indirect effects, a more complex picture emerges. Relative to the control group, the traditional self-affirmation had a series of negative direct effects on belief in human causation, issue importance, perceived harm, injunctive beliefs, policy support, and political participation that were greater in magnitude than the total effects on these variables. Traditional self-affirmation also resulted in significant negative direct effects on belief certainty climate change is happening and worry about climate change, even though the total effects on

belief certainty and worry were non-significant at the conventional cutoff for statistical significance ($p<.05$).

Turning to indirect effects, I found that traditional self-affirmation had significant and positive indirect effects through relative identity importance (i.e. increased importance attached to relationship identity relative to political identity) on belief certainty, belief in human causation, perceived harm, injunctive beliefs, and policy support; and a significant and negative indirect effect on political participation through relative identity importance (see Table 4). Traditional self-affirmation also had significant and positive indirect effects through increased feelings of connectedness on all dependent variables: belief certainty climate change is happening, belief in human causation, collective efficacy, worry about climate change, issue importance, perceived harm, injunctive beliefs, policy support, and political participation (see Table 4). Furthermore, traditional self-affirmation had a significant and positive indirect effect on political participation through increase feelings of love. However, traditional self-affirmation did not have any significant indirect effects on any of the dependent variables through changes in feelings of social belongingness.

Next I focus on results examining the protection value self-affirmation relative to the control group. The total effects of the protection value self-affirmation on all outcome variables were non-significant, although the protection value self-affirmation had a negative total effect on belief certainty that climate change is happening and issue importance at a marginal level of significance ($p<.10$; see Table 5). Again, a more nuanced pattern is revealed when one examines the direct and indirect effects. The

protection value self-affirmation resulted in a significant and negative direct effect on

belief certainty climate change is happening, issue importance, and political participation;

and a marginally significant ($p<.10$) and negative direct effect on belief in human

causation, worry about climate change, and policy support (see Table 5).

Table 5. Total, Direct, and Indirect Effects of Protection Value Self-affirmation condition vs. Control

Dependent Variable	Total effect	Direct effect	Specific Indirect Effect through:			
			Identity	Loving	Connected	Belonging
Belief certainty	-0.2828†	-0.3267*	0.0238*	-0.0174	0.0434*	-0.0058
Human causation	-0.1169	-0.1481†	0.0127*	0.0026	0.0223*	-0.0064
Efficacy	-0.087	-0.1075	0.0002	0.0029	0.0185*	-0.0011
Worry	-0.0887	-0.1479†	0.0000	0.0241*	0.0368*	-0.0017
Issue importance	-0.1531†	-0.2232*	0.0049	0.0237	0.0446*	-0.0032
Perceived harm	-0.0289	-0.1075	0.0209	0.0124	0.0496*	-0.0042
Injunctive beliefs	-0.0329	-0.1060	0.0293	0.0133	0.0360*	-0.0055
Policy Support	-0.0830	-0.1370†	0.0229*	0.0148	0.0293*	-0.0017
Participation	-0.1273	-0.2483*	-0.0131	0.0763*	0.0599	-0.0021

Note: Values represent the unstandardized regression coefficient.
*** $p<.001$, ** $p<.01$, * $p<.05$, † $p<.10$

The protection value self-affirmation had a significant and positive indirect effect

through relative identity importance on belief certainty climate change is happening,

belief in human causation, and policy support (see Table 5). The protection value self-

affirmation also had a significant and positive indirect effect through increased feelings

of connectedness on all dependent variables except for political participation.

Additionally, the protection value self-affirmation had significant and positive indirect

effects on worry about climate change and political participation through increased

feelings of love. Lastly, there were no significant indirect effects of the protection value

self-affirmation through feelings of social belongingness on any of the dependent

variables.

Lastly, I conclude with results from the combined self-affirmation condition

versus the control group. The combined self-affirmation had a significant and negative

total effect on belief certainty climate change is happening, belief in human causation,

worry about climate change, issue importance, and political participation (see Table 6).

As with the other two experimental conditions, decomposing the total effects into their

constituent direct and indirect effects leads to a more complicated picture. The combined

self-affirmation had a significant and negative direct effect on all climate-related

dependent variables.

Table 6. Total, Direct, and Indirect Effects of Combined Self-affirmation condition vs. Control

Dependent Variable	Total effect	Direct effect	Specific Indirect Effect through:			
			Identity	Loving	Connected	Belonging
Belief certainty	-0.3179*	-0.4070**	0.0468*	-0.0244	0.0665*	0.0001
Human causation	-0.2141*	-0.2771**	0.0249*	0.0036	0.0342*	0.0001
Efficacy	-01290†	-0.1618*	0.0005	0.0040	0.0283*	0.0000
Worry	-02371**	-0.3272***	-0.0001	0.0336	0.0564*	0.0000
Issue importance	-0.2818**	-0.3930***	0.0096	0.0331	0.0684*	0.0001
Perceived harm	-0.2044†	-0.3389**	0.0412*	0.0173	0.0760*	0.0001
Injunctive beliefs	-0.2418†	-0.3735**	0.0577*	0.0186	0.0553*	0.0001
Policy Support	-0.1466†	-0.2351**	0.0229*	0.0206	0.0449*	0.0000
Participation	-0.4021**	-0.5747***	-0.0258*	0.1066*	0.0918*	0.0000

Note: Values represent the unstandardized regression coefficient.
*** $p<.001$, ** $p<.01$, * $p<.05$, † $p<.10$

In terms of indirect effects, the combined self-affirmation condition had a significant and positive indirect effect through relative identity importance on belief certainty climate change is happening, belief in human causation, perceived harm, injunctive beliefs, policy support, and political participation (see Table 6). The combined self-affirmation also had a significant and positive indirect effect through feelings of connectedness on all climate-related dependent variables (see Table 6). The combined self-affirmation had a significant and positive indirect effect through feelings of love only on political participation; there were no other indirect effects through feelings of love. There also were no significant indirect effects through social belongingness on any of the climate-related dependent variables.

Overall, the pattern of results from the PROCESS analysis described above indicates partial support for H2, which hypothesized that the effects of the various self-affirmation conditions would be mediated by feelings of love, connectedness, social belonging, and changes in the relative importance people attached to their relationship-based identity versus their political identity. Specifically, a feeling of connectedness was the most consistent mediator across conditions and dependent variables. In the traditional self-affirmation and combined self-affirmation conditions (and to a lesser extent in the protection value self-affirmation condition), changes in relative identity importance also partially mediated effects on 6 out of 9 climate-related attitudes (3 out of 9 for the protection value self-affirmation). Increased feelings of love mediated impacts on political participation intentions, and did so consistently across all three experimental

conditions. Increased feelings of love also mediated positive impacts on worry about climate change, but only in the protection value self-affirmation condition. Lastly, social belongingness did not mediate experimental effects on climate-related attitudes in any of the conditions.

It is worth pointing out the apparent discrepancy between the MANCOVA/ANCOVA and the PROCESS results. The ANCOVA analysis suggested there were statistically significant main effects of experimental condition only for issue importance and political participation intentions and, contrary to expectations, in the negative direction. Alternatively, the PROCESS results suggest main effects on many more outcome variables, depending on the experimental condition. These differences are due to several differences in the way the two different analyses were specified. These differences include: 1) the MANCOVA/ANCOVA analyses included an interaction term for experimental condition and political ideology, whereas the PROCESS analysis did not; 2) political ideology was recoded into a 3-point variable (i.e., 1 – Liberal, 2 – Moderate, middle of the road, 3 – Conservative) for the MANCOVA/ANCOVA analysis whereas it was coded on a 5-point scale for the PROCESS analysis; and 3) a Bonferroni adjustment was applied to the MANCOVA/ANCOVA analysis whereas no Bonferroni adjustment was applied to the PROCESS analysis. When the MANCOVA/ANCOVA analysis is re-run without the interaction between condition and ideology, ideology is coded on 5-point scale, and the Bonferroni adjustment is removed, the overall pattern of total effects for the MANCOVA/ANCOVA and PROCESS analysis is the same.

The addition of a Bonferroni adjustment in particular creates a more conservative test than the PROCESS analysis, which is effectively a series of pairwise comparisons that examine the mean difference between each experimental condition and the control group, without controlling for familywise error. While the practice of using statistical adjustments to reduce the likelihood of Type I errors associated with multiple tests is one that is still debated among methodologists in our discipline (for example, see Matsunaga, 2007), I agree with O'Keefe (2007), who argues that replication and meta-analysis is the best method of sorting out Type I errors over a series of studies rather than using statistical procedures. Nevertheless, because such differences are philosophical in nature, I used a Bonferroni adjustment in the ANCOVA analysis to allow readers to decide for themselves how to interpret the two sets of results and choose which one they feel is more trustworthy.

CHAPTER FIVE - DISCUSSION

This dissertation had two primary goals: to examine a novel form of message-based self-affirmation against a traditional method of self-affirmation in terms of its ability to reduce ideologically motivated resistance to climate change risk information, and to test four potential mechanisms by which these different forms of self-affirmation might exert their effects on climate-related attitudes. Contrary to expectations, both the traditional self-affirmation and combined self-affirmation conditions caused a boomerang effect, resulting in undesirable attitudinal outcomes across most dependent measures. The message-based protection value self-affirmation had an overall null total effect on most outcomes, however it also generated statistically significant and undesirable direct effects on belief certainty climate change is happening, issue importance, and political participation intentions. Also contrary to expectations, these effects were not conditioned by political ideology.

This study also aimed to shed light on some of the mechanisms underlying self-affirmation's effects. I found support for the idea that the effects of self-affirmation were partially mediated by relative identity importance and feelings of love and connectedness, but no support for the idea that these effects are mediated by feelings of social belongingness. Both types of self-affirmation produced desirable indirect effects through

these three mediators, but these indirect effects were not large enough to counteract the undesirable direct effects. Implications for theory and practice are discussed below.

Overview of Boomerang and Null Effects

What caused the self-affirmation interventions to result in boomerang effects? Although it is impossible to definitively identify what caused the boomerang effects to occur without additional research, several potential explanations are worthy of discussion. First, it is useful to review the theoretical framework of boomerang effects developed by Byrne and Hart (2009). They argue that upon exposure to a strategic message receivers enter a process of competitive processing where, "certain aspects of a message become more salient than others in the mind of the receiver" (Byrne & Hart, 2009, p. 22). Competitive processing—which can be conscious or automatic—then results in the activation of either intended or unintended constructs depending on whether the receiver processes the intended or unintended elements of a message, thereby making cognitions related to those elements more accessible in the mind of the receiver. Next, the specific mechanisms associated with the activated constructs (intended or unintended) determine whether the intended effect manifests, no effect occurs, or whether an unintended effect (boomerang) emerges.

The mediation analysis in the current study suggests that the traditional self-affirmation, the protection value self-affirmation, and the combination of the two activated changes in the intended constructs of relative identity importance, love, and connectedness, but not social belongingness. In most instances, the activation of feelings of connectedness—and to a lesser degree relative identity importance—resulted in the

intended effects on climate-related attitudes whereas in most instances the activation of feelings of love resulted in no effect on climate-related attitudes. Yet these intended indirect effects were smaller in magnitude compared to the unintended, negative direct effects observed across the different self-affirmation conditions. This led to a net unintended boomerang effect on many outcome variables in the traditional and combined self-affirmation conditions, and a net null effect on most of the outcome variables in the protection value self-affirmation condition. This suggests that in addition to the intended constructs activated, the self-affirmation methods examined in this study also may have unintentionally activated an indeterminate number of other unobserved and counter-productive constructs that overrode the intended impacts and resulted in an overall boomerang. Although the initial framework by Byrne and Hart (2009) argues that competitive processing results in either intended or unintended construct activation, the current study provides empirical evidence that communication interventions can result in the activation of both intended and unintended constructs. This finding suggests that, in some cases, the "competitive" aspect of competitive processing is less about whether the intended or unintended constructs are activated per se, but instead, out of the constructs activated, whether it is the intended or unintended ones that have a greater influence over the direction and magnitude of the ultimate net total effect.

Causal Analysis of Boomerang and Null Effects

This brings us back to a more precise version of the original question: what are the unintended constructs that caused the boomerang effect? One explanation is that something about the messages used in this study caused the unintended effects. Some

research suggests that self-affirmation heightens central route processing and therefore sensitivity to argument strength (Correll, Spencer, & Zanna, 2004). The message utilized in the current study emphasized the public health risks of climate change but lacked information intended to increase efficacy beliefs associated with addressing climate change—an ingredient that is believed to be a necessary component of effective risk communication in general (Witte, 1992), and increasingly for climate change in particular (Doherty & Webler, 2016; Feldman & Hart, 2016; Hart & Feldman, 2016). It may be that this lack of efficacy information prompted self-affirmed individuals to conclude that the message was weak, and engage in fear control by resisting the contents of the message.

Another explanation is that there may be something systematically different about the way self-affirmation works in the context of climate change communication versus health communication, where most of the persuasive effects of self-affirmation have been documented (Epton et al., 2015; Sweeney & Moyer, 2015). For many individuals, climate change is a diffuse and psychologically distant threat (Rickard, Yang, & Schuldt, 2016; Spence, Poortinga, & Pidgeon, 2012) and most individuals believe that people like them have relatively little influence over elected officials' decisions about climate policy compared to other societal actors (Leiserowitz, Maibach, Roser-Renouf, Feinberg, & Howe, 2013). Taken together, these factors may translate into lower feelings of personal responsibility for addressing the risks of climate change compared to addressing the risks to one's own personal health caused by poor diet and lifestyle decisions. Perhaps self-affirmation is less effective in changing attitudes and behavior in contexts where an individual feels relatively little responsibility for addressing a problem.

We can further investigate the possibility that something is simply different about the issue of climate change by systematically comparing the results and design features of the present study to other published studies that have examined the effects of self-affirmation in the context of climate change. To guide this analysis, I rely upon Cronbach's UTOS framework for identifying threats to external validity across studies (Shadish, Cook, & Campbell, 2002). Specifically, UTOS proposes that effects may differ across studies as a result of differences in the **U**nits (study participants), **T**reatments (experimental stimuli), **O**perations (measures used), and **S**ettings (context in which data was collected). Table 7 summarizes the differences in results and design features across the present study and other climate-related self-affirmation studies.

Table 7. Comparison of results and design features of climate change-related self-affirmation studies

	Sample	*Control task*	*Treatments*			*Dependent Variables*	*Moderator variables*	*Setting*	*Results*
			Essay-based	*Questionnaire-based*	*Message-based*				
Kotcher (2016)	Demographically diverse quota-sample of U.S. Citizens (n=1337)	List everything ate or drank in past 48 hours	Values Essay SA - Based on Cohen et al. (2000); 11 different values	N/A	Two message conditions focused on health consequences of climate change (i.e. with/without protection value SA component) fully crossed with essay-based treatments	Belief certainty, human causation, collective efficacy, worry, issue importance, perceived harm, injunctive beliefs, policy support, political participation intentions	Political ideology - Single-item	Online survey experiment	Null/boomerang effects; not conditional on political ideology
Sparks et al. (2010), Study 1	Convenience sample of U.K. university students (n=125)	Answer series of irrelevant questions (e.g., "I think that chocolate is the best flavour for ice cream [Yes/No]")	N/A	Kindness questionnaire SA - Shortened five-item version based on Reed & Aspinwall (1998)	Uniform message across conditions; Six "short pieces" about climate change from newspapers and books; message wording not provided	Denial of outcome severity, Denial of self-involvement, General denial measure (composite of subscales)	N/A	Information not provided	Main effect decreased general denial, null effect on denial of outcome severity, main effect decreased denial of self-involvement
van Prooijen et al. (2013a)	Convenience sample of U.K. university students (n=88)	List everything ate or drank in past 48 hours	Values Essay SA - Based on Sherman et al. (2000); 9 different values	N/A	Uniform message across conditions; text from United Nations website; message wording not provided	Acceptance of climate change risks, Individual Efficacy	Ecological Worldviews - Three-item "fragility of nature's balance" subscale of New Ecological Paradigm (NEP) scale	Online survey experiment	Conditional effect of SA increased perceived risk and individual efficacy among those high in skeptical ecological worldviews, no effect on those with low in skeptical ecological worldviews

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| *van Prooijen et al. (2013b)* | Convenience sample of U.K. university students (n=90) | List everything ate or drank in past 48 hours | Values Essay SA - Based on Sherman et al. (2000); 9 different values | N/A | No messages | Moral judgement of pro-environmental behavior, Perceived effort to reduce carbon footprint, Self-efficacy for pro-environmental behavior, Pro-environmental behavioral intentions | Ecological Worldviews - Full 15-item New Ecological Paradigm (NEP) scale | Online survey experiment | Conditional effect; SA increased attitudinal polarization among those high and low in ecological worldviews on all DVs |

First, it is worth pointing out that the only other study to have undesirable effects on climate attitudes was van Prooijen et al. (2013b), in which they found that self-affirmation polarized attitudes when a message about climate change was absent because self-affirmation tends to strengthen pre-existing attitudes when a threat to self-integrity is not presented. The other two studies found a main effect of self-affirmation that produced more desirable climate attitudes (Sparks et al., 2010), and that self-affirmation reduced attitudinal polarization among those with high and low skeptical ecological worldviews as intended (van Prooijen et al., 2013a).

A potentially key driver of the differences in results in my study may be the samples used in our respective studies. All three of the other climate-related self-affirmation studies used convenience samples of university students from the United Kingdom, whereas I used a demographically diverse quota-sample of U.S. residents. This suggests there may be differences in how individuals respond to self-affirmation on the basis of age, educational status, or country of origin. It is also possible that university

students pay more attention than study participants recruited online through an external vendor (such as they were in my study).

The differential effects may also have been caused by differences in the methods of self-affirmation used. While the two studies by van Prooijen et al. (2013a, 2013b) used a value essay form of self-affirmation, I used a different value essay protocol that contained both a different set of values and a greater number of them (11 values versus 9). It is possible that the availability of different values in our two studies led to different outcomes. Additionally, the study by Sparks et al. (2010) used a Kindness Questionnaire method of self-affirmation which also may have different effects than a value essay form of self-affirmation.

Additionally, my study used different messages from Sparks et al. (2010) and van Prooijen (2013a). While a detailed comparison is not possible due to the unavailability of exact message wording from Sparks et al. (2010) and van Prooijen et al. (2013a), it is possible that something about the content of the messages used in my study activated more negative message responses than those used in other climate-related self-affirmation studies.

The measures in my study also differed in several ways from those used in prior climate-related self-affirmation studies. First, although there was some conceptual overlap in the outcome measures we examined in our studies (e.g., efficacy, risk perceptions), we operationalized these measures in different ways which may have led to different results. Furthermore, I used political ideology as a moderator variable to examine the conditional effects of self-affirmation whereas van Prooijen et al. (2013a,

2013b) used ecological worldviews in their studies. It is possible that self-affirmation is more effective at debiasing the influence of domain-specific background variables like ecological worldviews rather than a more domain-general background variable like political ideology.

Directions for Future Research to Identify Causes of Boomerang and Null Effects

Stemming from the analysis presented above, several promising avenues for future research could help to identify the causes of the null and boomerang effects in the current study. First, one could investigate whether the effects of the different types of self-affirmation in this study were conditional on the basis of age, level of education, or perhaps other demographic variables given the differences in sample populations in other climate-related self-affirmation studies. Alternatively, one could replicate the current study with a sample of university students.

Another option is to examine the responses to the traditional self-affirmation task in more detail. This might entail an analysis that tests whether responses differ depending on the most important value selected by participants to see if certain values systematically lead to more or less desirable message responses. I could also conduct a content analysis of the essays to examine whether the length, quality, or some other attribute accounts for the negative message responses. An additional study could also test the efficacy of the value essay task used in the van Prooijen et al. (2013a) study to examine whether it is the availability of a different set of values that accounts for the unexpected pattern of results in the current study.

In order to find out whether something about the messages (including the protection value self-affirmation manipulation) caused the undesirable outcomes, several things could be tested. First, a follow-up study could ask participants to engage in a thought-listing task following exposure to the messages. Responses to the thought-listing task could then be used to identify which message elements elicited negative reactions and for whom. Another method could ask respondents to highlight the parts of each message that they found helpful or convincing and the parts that they found unhelpful or unconvincing. Lastly, additional survey measures of negative affective responses could help to explain whether the messages evoked fear, anger, guilt, or disgust that led to the negative attitudinal outcomes.

Lack of Differential Effects by Political Ideology

Why did political ideology fail to moderate the impacts of self-affirmation? In principle, the effect of self-affirmation should be comparatively greater among individuals that experience greater threat to their self-integrity. Because conservatives tend to be more skeptical of climate change and less supportive of action address it, I predicted that the effects of self-affirmation on reducing resistance to a message about the risk of climate change would be greater among political conservatives. However, the current study used a message about the public health consequences of climate change across all conditions, which prior research suggests actually resonates with political conservatives (Myers et al., 2012; Petrovic et al., 2014). Other research suggests that self-affirmation weakens the persuasiveness of pro-attitudinal messages, presumably because self-affirmation increases objective processing rather than general agreeableness,

resulting in greater message scrutiny regardless of congruence (Correll et al., 2004). If both liberals and conservatives were predisposed to accept the public health frame used in the message (i.e., if it was pro-attitudinal for both groups), and if self-affirmation attenuated this predisposition to uncritically accept the public health message by increasing objective processing, then this may explain why the self-affirmation conditions caused a series of negative main effects relative to the control group, independent of political ideology. Future research could test this hypothesis by pairing self-affirmation with different messages about climate change previously shown to be counter-attitudinal among conservatives, such as an environmental frame or a national security frame (Myers et al., 2012).

In their studies, van Prooijen et al. (2013a, 2013b) used measures from the New Ecological Paradigm (Dunlap, Van Liere, Mertig, & Jones, 2000) as moderators of the impact of self-affirmation. As mentioned above, it may be the case that a domain-general moderator variable such as political ideology does not produce the same interaction with self-affirmation as a domain-specific (i.e. values specific to environmental issues) moderator variable like the NEP ecological worldview measures. Therefore, future research could also test this possibility by using the NEP scale as a moderator instead of political ideology to see if the forms of self-affirmation tested in the current study reduce polarization among those with positive and negative ecological worldviews.

Insights on the Mechanism Behind the Effects of Self-affirmation

The mediation results of this study shed light on the psychological mechanisms underlying self-affirmation's persuasive effects. Consistent with past research (Crocker et

al., 2008), feelings of connectedness mediated the desirable impact of both traditional and protection value forms of self-affirmation (and the combination of the two), across most of the outcome variables. This lends credence to the idea that self-affirmation works at least in part by altering the salience of emotions tied to interpersonal relationships. Counter to this general explanation however, was the fact that feelings of social belongingness were unaffected by self-affirmation. This could be because the measure of social belongingness used in the present study tapped into a stable psychological trait sense of belongingness, whereas the measure of connectedness captured a more pliable psychological state form of belonging. Although this explanation has face validity based on examination of the question wording of these two measures, additional research should seek to more systematically answer whether this is indeed the case. An alternative explanation is that the measure of connectedness—which has not been systematically validated—was tapping into a more abstract feeling of intimacy or closeness with others, while the measure of social belonging—which has been systematically validated—is specifically tapping into one's feelings of acceptance versus rejection by others (Malone et al., 2012).

It is also notable that feelings of love mediated the impact of all three self-affirmation conditions on political participation intentions. Past research on the role of discrete emotions in stimulating political participation has tended to focus on anger (van Zomeren, Postmes, & Spears, 2008), and less on positive emotions like love. A handful of studies have examined discrete emotions such as hope, fear, anger and others as predictors of climate change attitudes and behaviors (Chadwick, 2015; Feldman & Hart,

2016; Smith & Leiserowitz, 2014), but no previous studies, to my knowledge, have focused on love as a predictor. These past studies have also overwhelmingly focused on negative emotions (with the exception of hope). In the future, climate change communication research should explore the persuasive potential of other positive discrete emotions such as happiness, joy, relief, pride, and compassion (Nabi, 2002).

The finding that changes in relative identity importance mediated some of the indirect effects of traditional self-affirmation, and to a lesser extent the indirect effects of the protection value self-affirmation, provides some additional support for the idea that self-affirmation works in part by altering the working self-concept (Critcher & Dunning, 2015). Consistent with the framework outlined by Critcher & Dunning (2015), it may be that the threat posed to one's political identity by the message was attenuated due to the fact that participants had affirmed another domain of their identity tied to close interpersonal relationships, which wasn't threatened.

Taken together, the mediation results suggest that self-affirmation likely works through multiple psychological processes rather than one single explanatory mechanism. Furthermore, as discussed above, the fact that the direct and indirect effects worked in opposite directions (i.e., intended and unintended) suggests that self-affirmation not only can activate multiple psychological processes, but that it may activate both productive and counter-productive processes simultaneously. These findings in particular may have the most importance for our understanding of self-affirmation theory. It suggests that self-affirmation is at the same time both more complex than previously understood (e.g., no single mechanism is fully responsible for its effects) and less precise as a potential

intervention than one might hope (i.e. it can lead to both desirable and undesirable outcomes).

While the current research adds empirical support to some of the previously identified mediators of self-affirmation (Critcher & Dunning, 2015; Crocker et al., 2008), more attention is needed to figure out what mediating variables may be responsible for the undesirable impacts of self-affirmation on message responses found in the current study. Such a program of research might be able to develop communication strategies (and methods of self-affirmation) that are more precise in targeting the constructs that lead to desirable message responses, without activating the constructs underlying the unintended effects observed in the current study.

Comparing Traditional Versus Applied Protection Value Forms of Self-Affirmation

What can be said about the similarities and differences between the essay-based traditional form of self-affirmation versus the message-based protection value self-affirmation? Overall, both the desirable and undesirable effects produced by the protection value self-affirmation tend to be smaller in magnitude than the effects produced by the traditional self-affirmation. This may be due to the fact that the traditional self-affirmation method was idiographic in nature, allowing participants to select values that were more important—and consequently more influential—to them than the protection value activated in the message-based self-affirmation. It may be the case that the more personally important the value affirmed, then the greater the buffer to self-integrity. Another explanation is that the composition of a self-affirming essay is likely to be a slower more reflective process—and therefore have stronger effects—than

the mere reception of a self-affirming message. Nevertheless, there were some

commonalities among the two types of self-affirmation in terms of the mechanisms

behind their impacts. Both forms of self-affirmation exerted some degree of indirect

effects via changes to relative identity importance and feelings of love and connectedness

(depending on the specific outcome variable under consideration), and social

belongingness failed to mediate any of the effects produced by these two methods. This

provides evidence that it is possible to use message-based forms of self-affirmation to

activate some of the same psychological processes behind traditional self-affirmation

methods. However, this study tested only four different possible mediating variables

responsible for the effects of the two different forms of self-affirmation. It is quite

plausible that these two methods activated additional, and possibly even different, sets of

unobserved mediating mechanisms. Future research can test whether other forms of

message-based self-affirmation are capable of reproducing a similar magnitude of effects

via the same set of psychological processes associated with traditional forms of self-

affirmation.

Practical Implications

Unfortunately, this study provides few concrete implications to improve the

practice of climate change communication. Perhaps above all, the findings of this study

echo the warnings of others "that theoretical claims about psychological states and

processes—even when empirically robust and well supported—do not easily or

automatically yield corresponding dependable generalizations about message design or

communication effects" (O'Keefe, 2012, p. 1). Not only should practitioners exercise

caution in trying to apply the insights of self-affirmation theory to climate change

communication specifically, but given the paucity of research on message-based methods

of activating self-affirmation, practitioners would be wise to wait for further research on

the efficacy of applied methods of self-affirmation before investing substantial resources

into this strategy on any issue.

Limitations

Several limitations of the present study are worth highlighting. First, filtering out

some participants based on a requirement that they meet a minimum standard of attention

probably artificially increased the average level of attention participants paid to the

experimental stimuli. This likely increased internal validity at the expense of external

validity given that in a naturalistic setting one cannot guarantee a specific minimum

standard of attention among audiences for a communication campaign. Second, the

present study only permits inferences about the immediate effects of a single exposure to

the stimuli under examination and does not provide any insight into how these effects

might differ with multiple exposures or how the effects may change over time. Third, as

mentioned above, the current study only tested two different forms of self-affirmation. It

is possible that other methods of self-affirmation might lead to a different pattern of

results. Similarly, the current study only examined the effects of different forms of self-

affirmation on responses to a public health frame about climate change. Future research

should test other message frames such as an environmental, economic, or a national

security frame. Additionally, the current study did not measure perceived message

strength to determine what specifically about the content of the messages may have been

unconvincing. Lastly, several of the mediators and dependent variables relied upon single-item indicators which likely contributed to additional measurement error that could be addressed by using multiple-item indicators in future research.

Conclusion

This dissertation contributes to our understanding of the mechanisms underlying some of the desirable effects of self-affirmation on responses to strategic messages about the public health threats of climate change. Consistent with prior research, the results suggest that some of the debiasing effects of self-affirmation may be attributable to the activation of certain cognitions and emotions tied to interpersonal relationships.

This dissertation also demonstrates that some of the same psychological processes activated by traditional, essay-based forms of self-affirmation can also be triggered by specific components strategically embedded in a message, albeit generally to a lesser extent and with a smaller effect on attitudinal outcomes compared to essay-based forms of self-affirmation. Further research should try to develop stronger forms of message-based self-affirmation and explore other applied methods of inducing self-affirmation.

Perhaps most importantly, the null and boomerang effects observed in this dissertation highlight a set of potential boundary conditions for the utility of self-affirmation to reduce ideologically-motivated resistance on climate change. Future research can help ascertain whether the undesirable message responses produced by self-affirmation in this study are attributable to characteristics of the sample used, the particular time period during which the data were collected, the methods of self-affirmation tested, the message treatments utilized, the survey measures employed, or

some combination of the methodological features used in the study design. This additional work would have practical importance if it elucidates conditions under which self-affirmation can help facilitate more desirable responses to climate change communication. However, if the findings of the current study cannot be explained by certain aspects of the study design, then it suggests a reconsideration and possible refinement of self-affirmation theory may be warranted. Specifically, it may be the case that self-affirmation is a highly complex psychological process that activates constructs that are both productive and counterproductive to reducing resistance to counter-attitudinal information, making it a rather blunt instrument for improving strategic communication efforts. Consistent with the appeals of others (McQueen & Klein, 2006), greater examination of additional moderators could help to further clarify the limits of self-affirmation on reducing defensive processing of information.

Messages

Protection value message condition (1,861 characters with spaces)

Take a moment to think about a person very close to you, who clearly likes you, and simply accepts you for who you are. It may be a loved one, or close friend. I want you to visualize that person and see a picture of their face. Think about how this person is important to you and makes you feel good about yourself. Now, if that person was at risk of getting sick or injured, wouldn't you do everything you could to protect them? This isn't simply a hypothetical question.

Climate change, once considered an issue for a distant future, has moved firmly into the present. For example, we know that increasingly frequent and intense heat events lead to more heat-related illnesses and deaths and, over time, worsen drought and wildfire risks, and intensify air pollution. Increasingly frequent extreme precipitation and associated flooding can lead to injuries and increases in waterborne disease. Rising sea surface temperatures have been linked with increasing levels and ranges of diseases. Rising sea levels intensify coastal flooding and storm surge, and thus exacerbate threats to public safety during storms. We also know that certain groups of people are especially vulnerable to the range of climate change related health impacts, including the elderly,

children, the poor, and the sick. Others are more vulnerable because of where they live, including those in floodplains, coastal zones, and some urban areas.

To respond to these threats, we must take actions that ensure our loved ones' safety and well being to the best of our ability, and safeguard them from the health threats that come with climate change. Concern for the welfare of people we care about is the hallmark of a protective approach. Simply put, we have a duty to protect our loved ones and their health from the effects of climate change. Protection is the right thing for us to do.

Non-protection value message condition (1,871 characters with spaces)

Americans are noticing changes all around them. Summers are longer and hotter, and extended periods of unusual heat last longer than any living American has ever experienced. Winters are generally shorter and warmer. Rain comes in heavier downpours. People are seeing changes in the length and severity of seasonal allergies, the plant varieties that thrive in their gardens, and the kinds of birds they see in any particular month in their neighborhoods.

Climate change, once considered an issue for a distant future, has moved firmly into the present. For example, we know that increasingly frequent and intense heat events lead to more heat-related illnesses and deaths and, over time, worsen drought and wildfire risks, and intensify air pollution. Increasingly frequent extreme precipitation and associated flooding can lead to injuries and increases in waterborne disease. Rising sea surface temperatures have been linked with increasing levels and ranges of diseases. Rising sea levels intensify coastal flooding and storm surge, and thus exacerbate threats

to public safety during storms. We also know that certain groups of people are especially

vulnerable to the range of climate change related health impacts, including the elderly,

children, the poor, and the sick. Others are more vulnerable because of where they live,

including those in floodplains, coastal zones, and some urban areas.

To respond to these threats, we must take actions that reduce greenhouse gas

emissions and deal with the health threats that come with climate change. Taking steps to

limit the magnitude of future climate change and adapt to the changes already taking

place is the hallmark of an effective approach. Simply put, we have a duty to minimize

damage and prepare for the future to address the health effects of climate change. Careful

planning is the right thing for us to do.

Additional Results for Main Effect of Attention.

Table 8 presents the main effects of attention from the MANCOVA/ANCOVA

analysis.

Table 8. ANCOVA Summary Table for Main Effects of Attention

Dependent Variable	F-Value	Partial η^2	Scale Range	Mean estimates by level of attention		
				Passed 1	Passed 2	Passed 3
Relative identity importance	15.329***	0.023	-6 to +6	1.132[a]	1.519[a]	2.096[b]
Loving	20.482***	0.031	1 to 5	3.63[a]	3.572[a]	3.083[b]
Connected	15.715***	0.024	1 to 5	3.422[a]	3.476[a]	3.046[b]
Belongingness	19.44***	0.029	1 to 7	4.492[a]	5.074[b]	5.237[b]
Belief certainty	1.612	0.002	1 to 9	6.706[a]	6.99[a]	7.035[a]
Human causation	0.767	0.001	1 to 6	4.303[a]	4.229[a]	4.183[a]
Efficacy	5.157**	0.008	1 to 5	3.642[a]	3.498[ab]	3.379[b]
Worry	5.86**	0.009	1 to 5	3.101[a]	2.989[a]	2.796[b]
Issue importance	5.005**	0.008	1 to 5	3.222[a]	3.114[ab]	2.935[b]
Perceived harm	1.661	0.003	1 to 7	5.144[a]	4.888[a]	4.881[a]
Injunctive beliefs	0.89	0.001	1 to 7	5.345[a]	5.342[a]	5.219[a]
Policy Support	6.78**	0.01	1 to 7	4.497[a]	4.822[b]	4.858[b]
Participation	17.383***	0.026	1 to 7	4.352[a]	3.851[b]	3.479[c]

Note: Means with dissimilar superscripts (a, b, c) are significantly different.
*** $p<.001$, ** $p<.01$, * $p<.05$, † $p<.10$

Overall, there were main effects of attention on relative identity importance, love, connectedness, belonging, collective efficacy, worry, issue importance, policy support, and political participation intentions. Specifically, those who passed all three attention checks had higher levels of relative identity importance, and lower levels of love, and connectedness compared to those who passed only one attention check. Those who passed two, and those who passed all three attention checks had higher levels of belonging compared to those who only passed one attention check.

In terms of the climate related beliefs and attitudes, those who passed all three attention checks had lower levels of collective efficacy, worry, and issue importance compared to those who passed only one attention check. Those who passed two and those who passed all three attention checks had higher levels of policy support compared to those who passed only one attention check. Those who passed two attention checks had lower levels of political participation intentions compared to those who passed only one attention check. Those who passed all three attention checks had even lower levels of political participation intentions than those who passed only two attention checks.

Results from the PROCESS analysis generally show a similar pattern. Attention was positively associated with relative identity importance ($b= 0.5638$, $p<.001$) and belonging ($b= 0.3083$, $p<.001$), and negative associated with love ($b= -0.3342$, $p<.001$) and connectedness ($b= -0.2670$, $p<.001$).

In terms of climate-related outcomes, attention was positively associated with belief certainty ($b= 0.1999$, $p<.01$) and policy support ($b= 0.1837$, $p<.001$). Attention was negatively associated with collective efficacy ($b= -0.1279$, $p<.001$), worry ($b= -0.1445$, $p<.01$), issue importance ($b= -0.1305$, $p<.01$), and political participation intentions ($b= -0.3698$, $p<.001$).

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